

**AN EVOLUTIONARY (MEMETIC)  
PERSPECTIVE ON 'HOW AND WHY DOES  
ORGANIZATIONAL KNOWLEDGE EMERGE?'**

**Jill Shepherd  
Graduate School of Business  
University of Strathclyde  
PhD  
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# ABSTRACT

This thesis explores *how* and *why* organizational knowledge emerges. An under-developed branch of evolutionary theory called memetics, which applies to social evolution, is used as a theoretical back-drop. Evolutionary theory is an explanation of knowledge that assumes knowledge emerges in a system without foresight, making the system infinitely self-sustaining. The thesis explores the dynamics of knowledge emergence during social interactions. This is done on the basis that knowledge is created through social exchange and social exchange has to happen before knowledge can become embedded in minds and embodied in artefacts and anyway the knowledge stock of any social system can never be known as it is forever changing. The research is exploratory in that the theory, the research strategy and the empirical element of the thesis are all very novel. Two empirical settings are explored: 'un-managed' Internet chat rooms and a 'managed' organizational setting, with the aim of being able to compare these settings to determine how management can affect the emergence of knowledge.

In order to be able to compare the emergence of knowledge within these settings knowledge emergence is described and explained. Knowledge emergence is *described* in terms of both content, specifically variety of content; and process, specifically the nature of the steps involved in adding that variety. Knowledge emergence is *explained* by characterising the system in which knowledge emerges. The system attributes of community interactivity, differential retention dynamics, rules of knowledge emergence and reflexivity are shown to be responsible for knowledge emergence.

In comparing the three cases within each setting and the two settings, it is shown that each case of knowledge emergence has its own unique 'fingerprint', which is more or less similar to others. Using these comparisons in association with the theory, the thesis elucidates the system attributes and concludes that the system is beyond perfect control, but the system attributes are more or less controllable and hence more or less manageable. Community interactivity and retention dynamics are difficult to manage whereas rules of emergence and reflexivity are more manageable.

**This thesis is dedicated to my friend Andrea who kept me company throughout the many moments of doubt, Gerry who had the temerity to supervise an unconventional PhD, my parents Pam and Cliff and family, especially for their support in the early days and my husband Pete who despite meeting me in the difficult latter stages of the thesis supported its completion in every way he could.**

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# CHAPTER ONE

## Overview of the thesis

### 1.0 Chapter overview

The thesis asks the question, 'how and why does organizational knowledge emerge?' The question is asked on the assumption that being able to understand knowledge emergence will explain the differential accumulation of sustainable, organizational advantage in the rapidly changing, knowledge-based economy. Advantage is defined as the creation of appropriate knowledge. 'Appropriate' is considered to have two dimensions. Firstly, the speed of knowledge emergence must be similar to or greater than the competition, where the competition is defined as organizations that are developing similar knowledge. Secondly, the knowledge must incrementally emerge to become sufficiently prevalent in the minds of a range of stakeholders for it to survive. This use of 'appropriate' is based on the evolutionary concept that if an entity exists in an unchanging inert system it can continue to function within that system without changing. If, however, the system around it is changing, the entity will not survive unless changes occur such that the knowledge the entity harbours re-relates to the new version of the system. The concept of sustainable is based on the evolutionary notion that the system over time might be characterised by more or less change, or might remain relatively stable for long periods of time. Thus to remain fit different speeds of change are necessary.

The thesis begins to create an approach to describing and explaining knowledge emergence. The approach has the potential to compare knowledge emergence in different social settings, including organizations, by determining what 'appropriate' knowledge is, what knowledge is emerging compared to what knowledge is appropriate, and can provide indications on what can be done to close any gaps and to avoid gaps opening in the future.

In theory terms, the research explores the extent to which modern evolutionary theory can contribute to the trend towards building an organic, strategic and knowledge-based view of the firm. There is a need for 'organic' models (not in any biological sense but in terms of agency and complexity) to be theoretically robust and able to challenge the mechanistic view of strategy without rejecting outright that management, at least in some form, is possible (see Farjoun, 2002 for an integration of organic and mechanistic views of

strategy). The organic perspective on strategy has developed as mechanistic models that define strategy as a single planned posture have become increasingly less pertinent. Organic approaches place an emphasis on incessant time, interactive flow and integration of concepts rather than discrete time, directional flow and distinct concepts as in mechanistic models. Equally, there is a need for a dynamic, knowledge-based theory of the firm which is both a synthesis of socio-technical systems theory and self-regulating biological systems (Spender, 1996). Porter also stresses the need for a dynamic theory of the firm (1991). Evolutionary theory can lay claim to being both knowledge-based and dynamic.

The thesis is driven, both theoretically and methodologically, by the concept of evolution, most often applied to biology and defined very specifically here in broader terms as the differential prevalence of knowledge over time (Hughes, 1999). This definition makes evolutionary theory (Darwin, 1859 and 1998 facsimile) a theory of the transformation of knowledge, where knowledge is defined as that which creates a functional relationship with the world (Plotkin, 1993). It is a position created by the stance that if evolution explains organic life then it is logical to think that what came before and after organic life might be subject to the same basic logic and principles; namely that the engine underlying geological, organic and social life is the relentless blind production of variant knowledge which keeps the system dynamically stable. Evolutionary theory is dynamic in that it explains the differential prevalence of knowledge over time. It questions the concepts of agency, foresight and control, making it 'organic' in the sense of how the term is used in organizational theory. In Porter's terms (1991) it is also dynamic in that it accommodates creative strategies, is able to look at advantage in terms of innovation, complexity and sophistication, is highly context specific and sees knowledge as the endogenous variable and selection forces that act on the differential survival of that knowledge as exogenous.

The tone of the thesis is one which moves away from the use of evolution as a metaphor towards the direct use of evolutionary theory. A decision is made to move away from loose terms such as 'organic', which suggest that organizational life is identical to biological life, towards making clear that evolutionary theory, if it can be applied directly to social life, must share concepts with biology but must also be distinct from it. Lastly, the thesis moves away from the casual use of evolution, in which the term is associated very generally with change, to a definition of evolution that is precise and which explains different rates of change.

Specifically, a new branch of evolutionary theory, memetics, (Dawkins, 1976, Blackmore, 1999, Dennett, 2000) is used to create insights. The theory is chosen because it is considered, at least by some, (Dennett, 2000) to be knowledge-based, it is the most robust theory within social evolution as regards everyday evolution, its potential has yet to be explored in organizational theory, it is systems based in both socio-technical and self-regulating terms as required by Spender (1996) and is 'organic' in that it questions managerial agency (Blackmore, 1999).

The thesis shows how the theory enables the development of a perspective on organizational life that is built upon a knowledge-based unit of analysis that operates within social systems. This unit can be traced longitudinally in terms of content and process, thereby describing knowledge emergence. The perspective is used to compare and contrast knowledge emergence in two empirical settings and cases within these settings. Differences and similarities are highlighted and connections are made between intended and realised knowledge. Empirical populations of this unit show organizational life to be part of a knowledge system that is larger than itself and which possesses a number of attributes that direct its emergence. These attributes are shown to be more or less controllable and hence more or less manageable. Last but not least, the implications of the findings are discussed. In particular, the claims, made within evolutionary theory, that man is unable to perfectly control or predict the evolutionary process of knowledge is used to question how organizational advantage can be accrued.

Working within this paradigm, emphasis is placed on understanding the dynamics of the creation of knowledge within social systems of which organizations are part, rather than being able to account for the knowledge stock of an organization and/or the environment it operates in. This is because the evolutionary perspective on knowledge states that the knowledge stock of any social system is too complex to understand and is in any case always changing, making the dynamics of its production more interesting than a detailed account of its content at any one moment in time. Specifically, working with a dynamic knowledge-based unit of analysis, the thesis uses this unit to focus on the variety of knowledge content produced in conversations, the process by which that knowledge is produced and, most usefully, uses this as a basis to work out the forces within the system that operate to produce that knowledge. The emphasis is on knowledge being retained

within the conversation for what can be both economic and non-economic reasons. The stance is taken that before knowledge can become embedded in artefacts or minds it must be exchanged during social interactions as this is what creates new knowledge that can then become embedded. So whereas the 'normal' stance on knowledge might be that which is embedded in artefacts and embodied in minds, in this thesis knowledge is what is transferred during social interaction that might or might not become embodied. Indeed, looking at what is not embodied is as important as looking at what is embodied as evolution seeks to explain differences in the distribution (of knowledge) over time.

The thesis is exploratory and as such only starts to generate an answer to the research question. The research rests on an un-tested view of organizational performance, namely that sustainable advantage is accrued through appropriate knowledge emergence. This view rests on two assumptions. Firstly, it assumes that organizations can, and perhaps even should, be viewed as operating within a knowledge-based social system. Secondly, it assumes that within that system organizational advantage is accrued through the creation of knowledge which binds the organization together, at least to some extent as a community; becomes sufficiently prevalent in the minds of other communities (internal and external stakeholders) to possess commercial worth and/or is knowledge which helps the organization create that commercially valuable knowledge. The system is seen as evolutionary, by which it is meant that the knowledge stock, in terms of what it is and who harbours it, changes over time. Furthermore, the thesis is exploratory because it describes and explains knowledge emergence in only a limited number of cases, within one organization and using only one under-developed theory of knowledge emergence that has yet to be compared with others. It does, however, show that a way of describing and explaining the emergence of knowledge can be developed.

Section 1.1 provides an overview of the whole thesis. Sections 1.2, 1.3, 1.4, 1.5 and 1.6 provide summaries of their numerically corresponding chapters. Hence section 1.2 provides a summary of Chapter Two in which the research question is developed in the context of the literature, section 1.3 summaries Chapter Three on research design, sections 1.4 and 1.5 summarise Chapters Four and Five which contain the analysis of the data from the two empirical settings that are studied. Lastly, section 1.6 summarises Chapter Six on the contribution and its' theoretical, managerial and research implications.

Section 1.7, entitled 'back to basics', justifies a number of aspects of the thesis which might surprise the reader. These include, firstly, the proposal that a theory dominated by the principle of social systems lacking foresight and intentionality might have some relevance within management. The thesis upholds that the currently dominant paradigm of planning and designing an organizational future, or indeed several futures using the technique of scenario planning, is inadequate for the current economy where the probability of many futures unfolding, including radically new ones, is far more evenly spread than in the past. Using a theory that forces the exploration of ways of defining management which are not based on command and control is justifiable in that it forces the investigation of alternative ways of managing. Secondly, evolutionary theory is applied as a theory of transformation of knowledge. Evolution has been used so extensively in organizational research that it exists as a field of work, but it has never been used as a theory of knowledge emergence. Lastly, a social setting is used as a comparison to an organizational setting. Organizational research is dominated by research which tends not to place organizations in the broader social context because organizations tend to be considered as a special social setting. This thesis questions that assumption by suggesting organizations have something to learn from types of organization that feature in the broader context of social life and by suggesting that organization theory can benefit from drawing on more broadly based social theories.

## **1.1 Overview of the thesis**

Two aspects of general strategy literature are of particular relevance to the thesis. Firstly, those eminent within the field promote systemic, dynamic theories of strategy (Porter, 1991) and dynamic, knowledge-based ones (Spender, 1996) as a way forward. Secondly, the concept of evolution, so often involved in organizational theory development, is frequently used in a way that is convenient rather than rigorous, using parts of the theory that suit the data, rather than staying true to all the fundamental principles which underpin evolutionary theory. Indeed, (Nelson and Winter, 1982) freely admit that they exploit any concept within evolutionary theory which helps in the understanding of economic phenomena but are prepared to modify the theory if it leads to better economic theory. This led the researcher to update herself on evolutionary theory, a task enabled by her having been a geneticist before turning to managing knowledge-based innovation and later working as a strategic consultant prior to becoming an academic, in order to determine whether this needed to be the case.

Much of evolutionary theory is hotly debated. The term 'evolution' is often used so casually that it is never defined, let alone positioned, within these debates. The literature review therefore places the stance being taken within this thesis in the context of contested areas. These include: How many areas of the system we live in, including the sub-systems of cosmology, geology, organic life, social life, artificial life, does evolutionary theory explain and what does this imply about the theory? How do these sub-systems operate and what is identical and different about them? How do alternative evolutionary theories of culture (such as socio-biology and evolutionary psychology) compare to memetics? What are the pros and cons of alternative approaches to empirical work? What are the debated areas within memetics and why? In addition, it compares this stance with the approach taken in organisational evolutionary research.

The literature review achieves several things. Firstly, it creates and defends a logic that shows how, if evolutionary theory does explain more than organic/biological phenomena, it must be knowledge-based, be lacking in foresight and shows how agency must lie within the system as a whole rather than any particular part of it. Secondly it provides a defence of memetics as a robust enough theory of social evolution to warrant investigation within the context of organizational life, especially as it provides a way to approach non-economic behaviour within organizations. Lastly, it challenges organizational evolutionary theorists to consider more and to embrace developments in the broader field of evolutionary theory in order to advance the field beyond metaphorical thinking.

Specifically the review found a new branch of evolution called memetics (Dawkins 1976; Dennett, 1995; Blackmore, 1999) which applies directly to social life. It is thus, a branch of the theory, rather than an 'organic' perspective of social life. Memetics is considered to be a theory of the transformation of social knowledge (Plotkin, 1993 and Dennett, 2000). Memetics relies on the concept that social evolution, like genetic evolution, is based on discrete knowledge that can be transferred between people and which differentially survives as time passes. Knowledge is considered to emerge in a complex system that has no foresight and is beyond the control of man. Pulling these strands of literature together, it is proposed that applying memetics to organizational life might be a way of elucidating the nature of the emergence of knowledge and hence provide insights into the reality of managers not always behaving as a *homo economicus* especially in the fast moving

economy of today. The use of memetics is defended from several angles. Firstly, it is knowledge-based and organizational theory needs a knowledge-based unit of analysis. Secondly, memetics is the most robust evolutionary explanation of social life that has yet to be explored within organizational theory and an explanation which questions functionalism and hence the assumption that managers can, and do, work towards a logical strategic intent and profit maximising commercial goals.

The under-developed nature of memetics means that propositions, based on memetics, are unrealistic. Indeed, this option was adopted at first and found to be unworkable. Instead, memetics is used as a backdrop or foundation on which to answer a far more generic and open question of 'how and why does knowledge emerge?' Most definitively the thesis is founded on the meme, the notion that the meme changes in knowledge content over time creating variety and a lineage, which possesses dynamics that perhaps can be elucidated. The engine of memetics according to Blackmore (1999) is one of memetic determinism, which is present in the thesis as a challenge to management thinking, dominated as it is by foresight, planning and control. Memetics introduces the notion that knowledge might be retained for reasons associated more with power, emotions and attractiveness to an individual as much, if not more, than for reasons associated with strategic intent.

The 'how' part of the question is directed towards investigating whether a memetic perspective of organizational life can be created that describes how knowledge emerges. Specifically it aims to obtain a 'handle' on the amount of variety and the process by which variety is produced. The 'why' part of the question is directed at whether the research can go further to provide an explanation of why that knowledge, rather than any other, emerges. Hence, it investigates the engine behind the theory. This analysis takes into consideration, that on the one hand, the theory states evolution has no foresight and is too complex to manage, and on the other, that man as part of the system must influence it and has the ability to understand knowledge emergence and also therefore has the ability to control it to some extent.

Given that the focus of the research is on the nature of management, it is decided to compare a 'managed', intentional organizational setting with an 'unmanaged', highly creative setting. An organization that follows normative best practice is used as a setting for data collection. The alternative setting is Internet chat rooms, known for their very free



discussions of anything anyone wishes to discuss and the way in which they are self-organized and emergent.

A methodology is developed that considers the ontology of memes to be as it is within genetics, namely that the ontology of memes lies, not in words or word counts within discourse, the equivalent of words (called codons) within DNA, but lies in the functionality or meaning of these words. A mixture of content analysis (to identify and characterise memes), the technique of clustering (to make the data more manageable) and a grounded approach (for theory development in unknown areas) allow knowledge emergence to be described in terms both of content and process. A grounded approach, in association with the very high-level, undetailed aspects of memetics, creates a view of why knowledge emerges the way it does and looks at what this means for the management of knowledge emergence. The meme and the creation of variety of content over time is the key concept taken from memetics to direct the 'how' part of the analysis. The 'why' part of the analysis looks both for memetic determinism in the form of uncontrollable system elements that direct knowledge emergence as well as controllable elements which reveal what man's agency within the system looks like.

The thesis cannot prove memes exist and does not attempt therefore to test memetics. It uses the concept of a meme and develops a memetics perspective of organizational life, specifically conversations, and develops that perspective into insights which begin to answer the research question. In doing so it explores variation-selection and retention mechanisms and dynamics within a social evolutionary framework. It assumes organizations exist as bunches of memes that co-evolve and compete but which on the whole, at least for a certain period of time, survive because their existence within the structure of organizations makes for a dynamic environment able to match the level and nature of dynamism in the bigger system of which it is part. It assumes memes are knowledge-based. This is because if one assumes that evolution accounts for much more than organic evolution and that it operates on a substrate, knowledge is the only common denominator. Furthermore, knowledge is what flows through human minds as humans interact socially. According to the evolutionary way of thinking (Goonatilake, 2002), social life does not occur when knowledge is created solipsistically but when it is articulated socially as humans interact.

When applied to the three successively more complex Internet chat rooms, the methodology produces descriptions of the knowledge that emerges in each case in terms of content (how much variety, of what type, exists within memes clustered into content similar memplexes) and process (has this variety been created in many big jumps or many little jumps or something in between). So, as regards the content part of the 'how' of knowledge emergence, the data is reduced and managed to create a qualitative and quantitative picture (dendrogram) and simpler, purely quantitative histogram of content depth and breadth. As regards the process part of the 'how' of knowledge emergence categories of emergence are created that reflect for each social interaction how much knowledge is added to the previously generated pool of knowledge. For each case the amount of each category is illustrated in histograms called replicationgrams which show upon replication of each piece of knowledge how much content is lost or gained. This analysis step is descriptive of the amount of variety and the nature of its production rather than explanatory.

Having described the evolution occurring within each case, the three cases within each system and between the two settings are compared and contrasted. The exercise is used to identify four system attributes which on the one hand explain knowledge emergence in all cases and on the other hand also explain the differences in knowledge emergence between the cases. These attributes are more or less controllable by man or put another way are more or less emergent in nature. Firstly, the term **community interactivity** is coined to encapsulate the duality of individuals interacting with others, resulting in the differential subjective interpretation of knowledge which creates variety and the differential sharing of that knowledge which creates knowledge-based communities that are bound by the knowledge that they share. The individual element of this duality involves tracing every social interaction and explaining it fully. It is only currently possible to describe social interaction in terms of who meets whom and what emerges. Knowing exactly why that person meets that person, exchanges that information and produces that outcome is not possible to explain in detail. What can be looked at is the extent to which a system is closed or open to new social interactions and new knowledge. This involves looking at the collective element for evidence of community dynamics within a system. Specifically, identifying whether one or more communities are involved, whether these overlap, whether new communities are born and, how all of these change over time as knowledge emerges, allows the dynamics of community interactivity to be understood. The more dynamic the community interactivity, the more varied the knowledge emergence in that knowledge

combines and is added to. In terms of management whereas it is not possible to control every social interaction and outcome it might be possible to influence the nature of community dynamics.

Secondly, the term differential retention dynamics is coined to convey the fact that in each case of knowledge emergence certain knowledge is preferentially retained, whereas other knowledge appears never to be retained within future discourse, as well as all combinations in between. This concept is akin to that within memetic theory of 'meme strategies', that is to say aspects of memes are considered to make memes more or less likely to be copied in different contexts. However, as meme strategies cannot easily be identified, in this exploratory study the concept that different types of knowledge might be differentially retained is explored. Differential retention dynamics are seen as highly related to community interactivity as communities appear to remain closed and less likely to form new communities when retention dynamics are biased towards retaining the same, or very similar content, over and over again. In contrast, in situations where retention dynamics are biased more towards the retention of a variety of content, community interactivity seems to be higher. Retention dynamics can be and are described in terms of preferentially retained and non-retained knowledge. To explain much more than these extremes is impossible due to the complexity of the data. Equally, just as these retention dynamics cannot be described fully it is difficult to imagine how they could easily be directed in any detailed way.

Thirdly, the term rules of knowledge emergence is coined to describe the fact that rules operate within these cases which have an effect on knowledge emergence. Such rules influence the amount of variation which is produced. Organizational strategic intent is, for example, a rule which tends to ensure organizational knowledge is produced within certain domains. In Internet chat rooms there are rules which prevent 'spam' (the repeated posting and therefore promotion of the same knowledge). On the whole the communities subscribe to these rules, but in one case this does not happen and knowledge emerges which is about the nature of these rules and whether they were and should be adhered to. This suggests that rules of knowledge emergence evolve. This concept is seen as manageable in that it can be imagined that rules can be intentionally created to increase or decrease the chances that knowledge of a certain kind is produced. These rules are forward looking in that they alter the forthcoming dynamics of knowledge emergence. Such rules are not mentioned in

memetics and would suggest a degree and or type of human rather than memetic agency. On the other hand such rules can themselves be considered as memes!

Lastly, the term reflexivity is used to cover the data which involves knowledge about the emergence of knowledge. This includes when people are seen in the data to reflect upon the past dynamics of knowledge emergence in some way and in some cases take action to alter the dynamics of knowledge emergence. This appears to be a matter of choice, an action a person chooses to take and can take because he/she has the intelligence to understand the dynamics of knowledge emergence at least to some extent and at least some of the time. Very little data is found but that it is found suggests that the system can be overtly managed and therefore this data is highly significant. The possibility of managing reflexivity seems more than viable. Whilst people cannot be reflexive all of the time, taking 'time-out' to reflect on understanding what might be deeply embedded knowledge dynamics and relating these to organizational performance in terms of 'appropriate' knowledge is itself a competence that over time could be encouraged by managers and performed by managers.

Specifically, as regards the Internet chat room data, the memetic perspective of knowledge emergence within each Internet chat room is compared and contrasted. All chat rooms contain very large amounts of variety in content that correspond to a bias in terms of the categories of emergence that add variety. Subtle differences between the cases exist. The cases are found to differ in terms of community interactivity involving different community dynamics and levels of openness (even if they are all very open) different retention dynamics per case and different types and amount of reflexivity. They all operate under the same rules of knowledge emergence, although in one case these rules are violated. In representing a memetic pool of dynamic knowledge, each case produces a unique fingerprint of knowledge emergence, just as each longitudinal analysis of a population of evolving genes creates a unique fingerprint.

The same methodology when applied to the three organizational cases also produces unique fingerprints of each case. The categories of emergence and the system attributes developed in the Internet setting are found to be valid in the organizational setting. The organizational setting and hence the cases taken as a whole, is different from that of the Internet setting as a whole. Less variety of knowledge content is produced and there are less categories of emergence which add variety, indeed the majority of categories add little variety. As

regards the 'why' of knowledge emergence, community interactivity within the organizational cases is less than the Internet as the systems are closed and include only one community. The differential retention dynamics are identical across all cases which more or less involve the same set of people all of whom have been employed by the organization for a long time and who therefore can be expected to share many memes. In contrast, in the Internet setting each case involves a new set of people that have only just met and who therefore would be expected to share fewer memes, explaining perhaps why each case possesses a unique set of retention dynamics. The rules of knowledge emergence inhibit variety production whereas in the Internet setting they increase variety production in relative terms. Reflexivity is more prevalent in the Internet setting than in the organizational setting but in neither case is it present in all its theoretical forms.

The thesis makes a contribution by developing an approach to describing and explaining knowledge emergence based on social evolution. The approach has potential theoretical implications in suggesting that an understanding of organizational knowledge emergence dynamics might help organizations to, firstly, compare these dynamics with what is intended in the form of strategic intent and secondly, to compare their own knowledge dynamics with that of the competition. It begins to develop a dynamic knowledge-based unit of analysis that can serve as a way of analysing differential strategic performance given knowledge is what adds value to organizations and is what arranges organizations into communities of practice that go beyond the organization's boundaries to include a range of stakeholders. In showing knowledge to emerge in a system, which cannot be easily or perfectly directed or controlled, the thesis makes a contribution regarding the management of knowledge and goes beyond Rational Choice Theory (Boudon, 1998) which is so complete an explanation of action that no further questions need be asked of it. Lastly, the thesis potentially makes a contribution to organizational evolutionary research as it applies the theory directly, which has not been done before, and in the form of a theory of knowledge transformation, staying true to the theory in its broadest sense, rather than altering the theory 'when it suits'.

The future research agenda implications include consolidating the findings of this thesis, investigating the assumptions which underlie the thesis and extending the thinking into new domains. Above all there is the need to make the work far more robust by exposing it to more empirical settings of different types and by exploring further the link between types of

knowledge emergence and organizational performance. The work can also be extended to include knowledge emergence within clusters of firms, an area that has increasing policy making implications in the knowledge economy. The overall need is to know more about what makes certain memes survive and others not.

## **1.2 Literature review and generation of the research question**

Chapter Two starts with a review of the literature that justifies the knowledge element of the research question explored in the thesis. The review starts with seminal works. Firstly the paper by Porter in which he outlines the requisites for a dynamic theory of strategy is considered. Secondly, the need for and basis of a dynamic knowledge-based theory of the firm is reported as seen through the eyes of Spender (1996) and Tsoukas (1996). Lastly, it is stated that despite these powerful cries for knowledge-based dynamism to be introduced into strategy and despite such an approach being logically appropriate to the knowledge era, knowledge in the strategy literature has only been empirically researched in ways that are reductionist and functionalist (Kakihara and Sorensen, 2001). This is in contrast to basing theory development on the notion that knowledge is intrinsically emergent, systemic, socially constructed and interpretivist.

The second part of the literature review covers evolutionary theory. Although not conceived of in organizational evolutionary research as a theory of the emergence of knowledge, by situating evolutionary theory in its broadest domain and by reviewing recent advances in the theory, evolutionary theory is shown to be an explanation of the emergence of knowledge. Specifically there is the relatively new notion that evolution is knowledge-based in that this is the common denominator to all branches of evolution (Plotkin, 1993, Dennett, 2000) where the branches of evolution go beyond the organic world. Secondly, there is the notion that one of the most recent forms of evolution to develop is social evolution and that this branch of the theory is called memetics and that memes are knowledge-based (Dawkins, 1976, Blackmore, 1999 as regards the meme and Dennett, 2000 as regards the knowledge-based meme). The notions that evolution is knowledge-based, that knowledge-based evolution extends to social evolution and that all of evolution operates without a grand designer are considered to create a comprehensive version of the theory which although not all evolutionists would agree with, is defensible within the state of the current field.

Bringing these two literatures together, the conclusion is reached that it might be helpful to develop this knowledge-based unit of analysis within organizational theory in order to be able to move towards a theory of knowledge transformation that sees knowledge as emergent, socially constructed and complex. Given memetics is in its infancy, a decision is made not to develop propositions from memetics and to 'test' these, but instead to use the theory as a back drop to the question how and why does organizational knowledge emerge? The question is directed towards investigating whether adopting a memetics perspective allows the dynamics of organizational knowledge emergence to be described in terms of the variety within the evolving knowledge pool ('how does knowledge emerge?') and whether the perspective can go further to explain knowledge emergence ('why does knowledge emerge?') in terms of what forces are acting on the system to create that variety.

As mentioned above the stance taken with respect to social evolution is not one without controversy. Arguably no stance within evolution, especially social evolution is not debateable. The application of evolutionary theory to the organic variety that appears over time in life, with the exception of creationism, is very widely accepted and empirically justified although often misunderstood (Mayr, 2001). What is not so certain is the extent to which the principles of evolution apply to the world we live in more generally and what this implies as to what evolution is most fundamentally based upon and whether it can be designed in any way through some type of intentionality. There is also a nature-nurture debate, in that sociobiologists claim our social existence is explainable in terms of genes. There is also a base discipline (biology versus psychology debate) in that whereas evolutionary psychologists claim we are born with a large number of psychological schema that we pull upon when the situation and need arises, biologists say the brain is not big enough for the number of schema that are required. Memetics takes the stance that more than genes are needed to explain culture. There are also debates as to what a meme is, with some claiming it to be electrical and within the brain (Aunger, 2002), others a matter of functional knowledge (Dennett, 2000) and others again more akin to the evolutionary psychologists schema. Within evolution as a whole there is a debate as to how micro empirical research should be conducted, with Dawkins claiming the gene and its equivalents are the unit which is most fundamentally selected whereas Gould sees this approach as reductionist (Sterlenny, 2001).

Equally the use of evolutionary theory within organizational theory has its own history and insights that often do not mirror that within mainstream evolutionary theory. Different researchers emphasise different units but never one as broad as that of the meme. These debates are discussed to place the stance taken within this thesis within the field of organizational evolutionary research.

The literature review serves to make several claims. Firstly, that if evolution does apply to more than organic biological evolution it must be knowledge-based. Secondly, that within social evolutionary theory memetics is the most robust theory available, especially when explanations of everyday evolution are being sought. Lastly, if the field of organizational evolutionary research is to be advanced then the issue of the somewhat arbitrary use of evolution-based concepts within organizational evolutionary research needs to be addressed by introducing alternative approaches.

The empirical research the thesis contains is therefore presented as a way to contributing to these debates, specifically in terms of the impact of building bridges between evolutionary organisational research and evolutionary theory, how to define the meme and lastly to illustrate perhaps that both Dawkins and Gould are right in that wherever you start; at the replicator level of the meme and work upwards or at the level of the system and work downwards, evolution is very difficult to explain fully. Above all the thesis seeks to develop a way of describing knowledge emergence and explaining why knowledge emerges in the direction it does by elucidating attributes of the system and looking at the role of man in directing these attributes.

### **1.3 Research strategy**

In Chapter Three the research design is generated. The design is dependent on three aspects of the theory. Firstly, there is the issue that the thesis is exploratory in that the theory is under-developed requiring grounded approaches in some areas. Secondly, there is the issue of memetics being a branch of a wider theory that includes the methodologically well-developed branch of genetics from which basic principles can be drawn. Lastly there is the issue of memetics as a theory of social life making sociological methods relevant.

Data is collected in two different settings and within three different situations per setting. Settings are chosen that are as different as is possible on the basis that insights will be



easier to create if cases of knowledge emergence that are highly 'managed' and 'unmanaged' are compared. The chosen settings are, hence, an organization that follows Cooper's stage gate process (Cooper, Edgett and Kleinschmidt, 1998) in which strategy making takes place in a relatively highly controlled and directed fashion and Internet chat rooms where knowledge emergence is typically seen as being very free and unmanaged.

The exploratory nature of the work means very few assumptions can be made about the data. Above all, very few assumptions can be made about what a meme is. Given Dennett's (2000) stance and the stance taken in genetics that the ontology of memes and genes lies not in words of whatever alphabet, but in groups of 'words' that have a self-contained meaning, it is necessary to adopt a qualitative approach to identify memes. The form of content analysis (Krippendorff 1980; Neuendorf, 2002) that considers meaning to be the unit of analysis, rather than word counts, is chosen from amongst social science methods as the primary method. Cluster analysis (Krippendorff, 1980) is used to group memes together in a way that reduces the data but which minimises loss of information and which allows prevalence to be determined by counting the numbers of similar memes in a similar way to that done in modern genetics. The approach therefore covers both the need to identify memes and to determine their prevalence in the population in a way that is philosophically in agreement with the fundamentals of evolutionary theory and which makes the data manageable. This part of the 'how' analysis results in qualitative and quantitative dendrograms and purely quantitative histograms that illustrate the breadth and depth of knowledge content in each case and forms a basis upon which the 'why' explanation can be sought.

Content analysis is also used to characterise the process of memetic evolution, given that this involves, the theory states, changes in knowledge content within the knowledge pool over time. The content of successive memes within each social interaction is compared and the amount of change in content noted. It is seen that the creation of each successive meme involves a different change in content but that some of these can be grouped together under a more abstract concept. With no other guidance from the theory, other than the concept of 'imperfect copying', this analysis step uses a grounded approach to create categories of emergence that reflect the amount of variety added and hence the degree of imperfect copying. This part of the 'how' analysis produces histograms, referred to as replicationgrams which illustrate the amount of each category of emergence present in each

case and therefore whether the variety in that case is added in small jumps in changes of knowledge content or large jumps or some combination in between.

These two steps of describing knowledge content and the process by which that content is produced answer the 'how' element of the research question 'how and why does knowledge emerge? Answering the 'why' part of the question, requires a grounded approach as the theory is far from specific about how such knowledge systems operate. It uses the how analysis results to form a basis why which different knowledge systems can be compared so that their dynamics can be elucidated.

Once the system dynamics have been elucidated the thesis moves on analyse the role of man in these dynamics. Memetics concentrates on memetic determinism in the form of memes possessing strategies that make them more or less likely to be harboured by different minds yet provides few examples. Yet genetics and management research suggest that man can influence the process of knowledge emergence through understanding what the process is driven by and what types of knowledge are produced under what conditions. What needs to be discovered is what are the boundaries of control are and what they are contingent upon. In this sense the theory is used as a backdrop against which concepts are found within the data that explain knowledge emergence in that they act as forces within the system that directs knowledge emergence. The analysis is therefore guided by the notion that, even at a common-sensical level, man is not in perfect control but equally is not totally out of control of knowledge emergence. The concepts of human and memetics determinism are held in the mind simultaneously as the 'why' analysis unfolds

The output of the research design is, firstly, descriptions of knowledge emergence for each case, which detail both qualitatively and quantitatively the knowledge content (breadth and depth of variety of each meme) within the case and reveal the nature of the process which produces that variety (rates of change per exchange of meme). Secondly, the nature of the system in which this, rather than any other, knowledge is emerging is characterised by determining what system attributes appear to drive the system and how. Thirdly the analysis discusses what these system attributes implies in terms of controllability and hence manageability.

The method is neither easy to develop nor easy to apply. The major issue is the reliability of the coding of the data into memes and the category of emergence that accompanies each evolution of each meme. The second coding of a sample of data from both settings reveals what must be emphasised when training a second coder. It also reveals that however well trained a second coder might be, it is very difficult for the second coder to understand the organizational data such that all differences between first and second coder can be eliminated. Important factors include the second coder not knowing the company as well as the first coder and not having been present at the meeting for all differences to be eliminated. Also, and arguably most importantly, the level of detail at which memes are identified and clustered and categorised is very difficult to standardise across coders. The second coding is, for example, far more detailed than the researcher's coding, possibly because the second coder worked on some 5% of the data. That said the coding became far more consistent when cases coded by the same coder were compared and decisions made as to whether the original coding should be changed. A 5% error rate is found to be present in the original coding.

Lastly, it is worth emphasising that this method is specifically designed at looking at an elongated moment in time, 'a strategic conversation', and determining the nature of that conversation in terms of micro level knowledge emergence dynamics. The method cannot and is not aimed at knowing the stock of knowledge brought into the room, taken out of the room, or which is collectively in the room. Equally the impact of subtle body language, someone being so manipulative as to say something they do not believe in and what is not said is not, and cannot, be determined.

#### **1.4 Data analysis and insight generation: Internet setting**

As planned in the research design, the analysis of the Internet setting creates descriptions and system-based explanations of the knowledge emergence that occur in the three cases. The three Internet cases reflect increasingly complex situations of knowledge emergence. In each case memes are identified, clustered into what are referred to as memeplexes and the prevalence of these memeplexes determined. Each new meme is compared with the former and the amount of variety that has been introduced is coded in the form of placing each instance of knowledge creation within a category. In this process, the grounded approach creates categories of emergence which describe the ways variety is added and taken away from the knowledge pool as a whole.

As regards the 'how' of the three Internet cases, all are shown to differ in their distribution of content but all contain a broad amount of variety, as evidenced by the number of memplexes and the qualitative nature of these memplexes that sometimes involve content which is far from closely related to the initial memes that appear in the discourse. Categories of emergence vary across the cases but all have a significant amount of categories that add lots of variety. Differences between the cases exist and these are explained and discussed.

As regards the 'why' part of the analysis the grounded approach leads to the elucidation of four system attributes which explain why the knowledge emerges as it does. The overriding impression from the analysis is that variety production is emergent and moderated by system level attributes that cannot easily be controlled as time passes but which can be reflected upon after the fact. Specifically, the system attributes include community interactivity, differential retention dynamics, rules of knowledge emergence and reflexivity.

Community interactivity uses the theoretical notion that knowledge emerges when people interact, that people can share the same knowledge thereby creating communities of practice/ interest and that the communities change as the knowledge content within the system changes as people interact. This individual component of community interactivity is shown in the 'how' part of the analysis. The data also shows how open or closed these communities are and how this affects knowledge emergence. Open communities interacting at the fringes of the knowledge which they share can produce a new community as happens in one case (the 'religious' case). In another case (the 'Mars' case) the nature of the community means that it becomes increasingly less open to new social interactions over time reducing the knowledge variety. The last case (the 'Gun policy' case) is seen as being most interactive, as it initially contains two communities that through the emergence of new knowledge result in the creation of a further two communities.

Analysing retention dynamics reveals what type of knowledge tends to be retained and what knowledge tends not to be retained. This is more than a description in the sense that it explains why more variety exists or not in a setting or context or community. Different people seem attracted to different types of memes. Unsurprisingly retention dynamics are found to be different in all cases that involve different sets of people who have only just

met. Why the retention dynamics are as they are is difficult to explain, as they are a function of complex social interaction. They do suggest that knowledge is retained in organizations for reasons that are not related to maximising commercial success. Evidence is found for rules of knowledge emergence in the form of 'Netiquette' and ISP (Internet Service Provider) rules that state emergent knowledge should add variety and prohibit the promotion of any piece of knowledge. Evidence for reflexivity, defined as knowledge about the emergence of knowledge, is found above all in one case where it consists of reflection about adherence to the rules of knowledge emergence and does affect knowledge emergence to the point of creating two new communities. In other cases it is far less prevalent and so affects knowledge emergence to a far lesser extent. Importantly, rules of knowledge emergence and reflexivity suggest that the dynamics of memetic evolution can be managed.

In summary, the Internet setting shows that the 'how' and 'why' of knowledge emergence can be elucidated, that the memetic perspective creates fingerprints of knowledge emergence that are unique but which can, when compared, reveal differences and similarities in knowledge emergence in terms of the introduction of variety and rate of change.

### **1.5 Data analysis and insight generation: Organizational setting**

The three organizational cases are taken from the same meeting of senior directors of an innovative science-based Intellectual Property firm that follows the stage-gate approach to New Product / Value Development (Cooper et al, 1998). The first case involves a discussion of a new project ('project case') for which finance is being sought and which is therefore at gate zero. The second case involves a discussion of internal processes ('internal case') and how to alter them or not. The last case is a piece of discourse that occurs when the Managing Director leaves the room (off agenda case). These are chosen as they represent, firstly an example of what directly adds value to the organization, secondly a discussion about changes in the conditions in which organizational knowledge emerges and lastly, a piece of unmanaged and unintentional discourse that is closer in principle to the Internet cases.

As regards the 'how' element of the analysis, the way of describing content developed in the Internet setting proves to be valid for the organizational setting, albeit that the memes

are easier to code and the variety of content is far less. This means that the content can only be clustered once into first-order memeplexes, whereas in the Internet setting it is clustered twice to form first-order and then re-clustered to form second-order memeplexes. The categories of knowledge emergence generated in the Internet setting prove to be valid for the organizational setting with two exceptions. Firstly, the mis-interpretation category where variety is added, as the category name suggests, through a person misinterpreting another person, does not occur in the organizational setting, perhaps because this is a face to face meeting amongst people who are well known to each other. Secondly, there is the need for the generation of a new category specific to the organizational setting. The four system attributes are all valid in the organizational setting and there is no need for additional attributes.

The knowledge content of the cases shows different distributions. The off agenda case is hijacked by two first-order memeplexes, the project case is skewed towards a few very prevalent memeplexes whereas the internal case is more evenly distributed but still contains more and less prevalent memeplexes. The process of knowledge emergence is incremental in the project case, is more a matter of leaps in knowledge in the internal case and is a mixture of both in the off agenda case. By far the most frequent category of emergence in this setting is one that adds variety in small incremental steps.

Community interactivity is much less dynamic in all organizational cases relative to the Internet setting. The meeting is closed to anyone who has not been invited and the cases rarely involve discussing other people's views. Other communities (stakeholders) are discussed but not in the form of knowledge emergence.

Retention dynamics, as in the Internet setting, are identified for practical reasons only in the form of preferentially retained and non-retained memes. Unlike the Internet setting where they are different in all cases, in the organizational setting they are standard across all three cases. Importantly for organizational performance, strategic memes are not retained. These include discussions about the low levels of middle managerial strategic competence, the latter stages of the business plan cycle, developing markets, models of markets and reflexivity about these.

Evidence is found for rules of knowledge emergence in the form of the processes and rules that need to be adhered to, including the stage-gate process, milestone planning and a written strategic intent that directs knowledge creation. These rules are discussed, indeed are the subject of one of the cases, but always in terms of competencies rather than knowledge. They have the effect of reducing the variety of knowledge emergence. They appear to be intentionally created and there is a level of awareness of their effect on the variety of knowledge which emerges. Reflexivity is not as prevalent as in the Internet case and, as mentioned above, when reflexive memes occur they are not retained.

Working with the theory and the empirical data, a way of describing and explaining knowledge emergence in different social settings is developed. What drives knowledge emergence, referred to as 'system attributes' are shown to be more or less controllable, and hence more or less manageable. Community interactivity, especially at an individual level is seen as very uncontrollable. How could you know or predict every social interaction and what knowledge will emerge as a result as is done retrospectively in the 'how' part of the analysis? Differential retention dynamics can be elucidated through careful analysis in the form of the extremes of preferentially retained and non-retained memes, but explaining why these exist or attempting to create a certain set of dynamics seems a difficult task as they are a function of community interactivity. Rules of knowledge emergence which seem to be intentionally created are found in both settings and effect future knowledge emergence. In the Internet setting they are not adhered to and action is taken to address this situation but the action does not result in the system returning to its former intended state. Reflexivity about past knowledge emergence exists and it appears that people can choose to be reflective. Reflexivity does not, however, exist in all its possible theoretical forms, is rarely retained to the point at which it affects subsequent knowledge emergence and cannot feasibly, in practical terms, occur at every social interaction and hence at every moment of knowledge emergence.

#### **1.6 The contribution and its' theoretical, managerial and research implications**

The thesis makes a contribution by beginning to develop a way of describing and explaining knowledge emergence. The research develops a knowledge-based unit of analysis that can be traced longitudinally in terms of changing content and the process which creates that variety. It creates a way of determining the systemic dynamics of knowledge emergence within different contexts and relating these to the amount of variety created and retained.

Furthermore, the thesis shows that what directs this process and consequential changes in content are the attributes of the system within which knowledge emerges. Lastly, it is suggested that these attributes are more or less controllable and this has an impact on how knowledge can and should be managed. It does not relate these dynamics to performance. It assumes, as evolutionary theory does, that variety production must mirror the speed of change in knowledge content within the broader environment or system the organization operates in.

If it is assumed that organizational advantage involves the creation of appropriate knowledge (see section 1.2 for a definition of appropriate) then this elucidation of knowledge dynamics can be related to organizational performance. Equally, in a similar way, if it is considered that knowledge is the ultimate source of advantage and a dynamic knowledge-based unit of analysis a route towards this (Spender, 1996), then the memetic perspective on organizational life might form the beginnings of such a theory. Also, in being able to hold within one theory, aspects of organizational life often considered as too paradoxical (Porter, 1991), (for example intended and creative strategies, exogenous and endogenous factors), the thesis makes a contribution to introducing a holistic dynamic perspective into strategy. Lastly, the thesis begins to go beyond best practice and normative laws that assume *homo economicus* rules organizations. It does so by placing the manager within a social system, which he is part of but not in control of, in which differential retention dynamics such as emotions, experience and power as well as economic rationality operate. These contributions must, however, be put in the context of the thesis being highly exploratory making the research weak in a number of ways. Firstly, it has been conducted in only two settings, one of which was not organizational. Secondly, it needs to develop a stronger methodology in terms of coding reliability. Thirdly, the assumptions made linking knowledge emergence to organizational performance need to be tested.

The managerial implications of the work are that the thesis creates a way of viewing the manager and organization as *part of* a knowledge system. This is in stark contrast to organizations investing, often very heavily, in ICT based Knowledge Management Systems that reduce knowledge to something far more static and factual. It is also in stark contrast to normative literature that assumes man is in control of the system (e.g. best practice literature, for example Cooper (1999) as regards innovation, and Fahey and Prusak (1998) as regards knowledge management and literature which conceives of the environment being



deterministic, 'out there' and therefore unmanageable in any form, as well as very other degree in between (Mintzberg, Ahlstrand and Lampel, 1998). Memetics might be able to greatly increase our understanding of social evolution in the way genetics has increased our understanding of physical evolution. Managers might be able to compare the emergence of knowledge from the perspective of the organization or a part of it, and compare what is emerging (realised) with what is appropriate (intended) and explore whether what is intended is appropriate as the system around the organization evolves. Management might then be able to attempt to improve the management of knowledge by reducing the difference between the knowledge that is intended and what is appropriate by determining in which ways the system is best influenced given this goal. Equally, through an analysis of reflexivity the manager can decide in what ways the organization might and should become more reflexive such that the difference between intended knowledge emergence and appropriate is reduced on an ongoing basis. Importantly the theory does not stipulate the best ways of creating whatever knowledge is appropriate. In fact it promotes the notion that emphasis should be placed on enhancing natural pre-existing dynamics where these are positively related to organizational performance given they are so difficult to change. Only if this is not possible should attempts be made to reframe and reposition natural dynamics, rarely if ever should attempts be made to transform the current dynamics. This contrasts the concept of 'best practice' that encourages organizations to be similar to each other and 'corporate transformation' whereby performance is increased by radically altering how organizations operate.

The research implications involve the field moving towards tighter definitions of evolution and entering into both the debates and new theories and concepts which exist within the broader field of evolution. The main area of future research needs to be a greater elucidation of meme strategies and dynamics in different firms. Another area is the investigation of the relationship between variation and organizational performance. Here there is work to do on associating computer modelling of such systems with the qualitative insights generated here in order to develop both. Lastly the agenda might expand to look at specific areas such as variety production within clusters of firms.

## **1.7 A back to basic thesis: Why and how**

This thesis studies 'management' a phenomenon of interest that underpins all organizational literature and which has therefore by definition been extensively researched.

The research claims new definitions of management are needed for the faster, more knowledge-based economy of the new millennium. It applies evolutionary theory, used so extensively in organisational research that a field called 'organizational evolutionary research' exists and contains many eminent organizational scholars. The thesis claims however that the theory's potential to explain organizational life is far from reached as organizational evolutionary theorists have yet to make use of developments and thinking within the broader field of evolutionary theory. Lastly, the thesis explores not only an organization as an empirical setting but also the Internet, in the form of Internet chat rooms, despite the research question being 'how and why does organizational knowledge emerge'.

These surprising elements of the thesis all stem from a 'back to basics' philosophy. This philosophy is upheld by the notion that theory development of a phenomenon should start with the most simple of assumptions. It is argued that this has not happened within the strategy literature in terms of whether management by command and control needs to be relaxed in today's economy and specifically if so how, in terms of understanding what managing can realistically involve. It is argued that the mechanistic tradition has taken organizational theory, especially within the strategy field, into a space that is too distant from the general social sciences and from general social life, both of which it could learn from. This back to basics philosophy upholds the view that organizational theory suffers from not being more careful about positioning itself within the broader social sciences and drawing on base disciplines (Tranfield and Starkey, 1998). In essence, the researcher considers organizational theory to consider itself too much of a special case. Each of these three 'surprises' are taken in turn and explained more fully in the following paragraphs.

Rather than starting at a point that assumes the manager can direct the future, the alternative starting point from which to build theory about advantage is to assume the manager cannot create a future. The starting point of this thesis involves assuming that management is a phenomenon which is not purely economic or organizational or social but involves a mixture of selection forces, each of which fit into one of these categories. Whilst such a view of management is not new, the work does look very overtly at how these forces might differentially interact within firms to produce a unique dynamic per firm.

The thesis takes a knowledge-based view in which some knowledge is shared within communities that are generated and defined by that communal sharing of knowledge. Both

what is shared and by whom creates a dynamic view of organizational knowledge. Thus the concept of an organization is conceptualised in terms of those members of the organization that share the same meaning of the organizational strategic intent or some other organizational way of relating to life. The memetic perspective is economic in that it looks at the creation of communities that are commercially viable in that they harbour organizationally generated knowledge. It is social in that it accepts that organizational knowledge may be created, harboured and shared by whomever for a host of reasons, not always economically rational ones. Just as, therefore, customers might impulse buy, within organizations people may preferentially generate, share and retain different types of knowledge.

In this thesis knowledge is defined as that which allows us to relate and re-relate to social life as its nature changes. This definition is defended in terms of knowledge being defined as the output of ideas which are both original and adaptive (Simonton, 1999). This definition makes the future about newness, where newness is generated from combinations of knowledge which already exist and about that newness satisfying some intellectual, aesthetic or other criteria such that the ideas obtain eminence. This in turn means the future is about variety in knowledge and that variety becoming popular, but not necessarily for purely economic reasons. The emphasis is therefore on organizations being part of interpretivist social systems that move forward according to competing rationalities. Above all what is important about this logic is it suggests not only are knowledge emergence and advantage general social phenomena, but that treating them as such might well move the understanding of organizational performance away from normative and functionalist paradigms in which strategy and knowledge literature are currently stuck, towards an interpretivist paradigm. The logic suggests that the starting point for a theory of organizational advantage might lie beyond organizational theory within a theory of social knowledge emergence. It is though this 'back to basics' approach should create a better understanding of the management of advantage by finding how and why its accrual lies between the extremes of total control (normative economic paradigm) and total lack of control (environmental determinism) by considering knowledge to be differentially subjectively interpreted during social interaction.

The second 'surprise' is the view expressed within the thesis that evolutionary theory has been adjusted to fit so many settings by many researchers of diverse origin that

'evolutionary theory' and the term 'evolution' have become less than theoretical, even colloquial. Researchers have lost sight of the fundamentals upon which the theory has been built. Rarely, if ever in more recent work, do organizational evolutionary theorists cite evolutionary theory (e.g. Lovas and Ghoshal 2000). In separating evolutionary organizational theory from evolutionary theory, organizational evolutionary theorists have lost contact with developments in evolutionary theory and hence do not take them into consideration in their research. For example, the recent developments that evolution is a theory of the emergence of knowledge, that in social evolution the knowledge-based unit of analysis is the meme and that the meme, like genes, is the level at which the system differentially selects what survives into the future (Blackmore, 1999; Dennett 2000), have not been incorporated into organizational evolutionary research. This thesis therefore goes 'back to basics' in terms of reviewing evolutionary theory literature and incorporating its logic, recent developments and current areas of debate into the research.

The third 'surprise' is that the researcher chooses not to compare knowledge emergence in two different organizational settings but compares organizational knowledge emergence with the emergence of knowledge within Internet chat rooms. This choice is in part practical in that it should provide the greatest possible contrast between managed and unmanaged settings thereby aiding theory development, and partly to illustrate that knowledge can be 'managed' outside of organizations in ways that organizations and organizational theory development might learn from. It is hence part of the overall 'back to basics' theme in that, although we think of management occurring only in organizations, forms of 'management' occur elsewhere in the social arena often in the form of more self-organized and emergence forms of organization. The Internet is a self-organized space, to the extent ICT people, before its creation, considered it impossible, as no one is in control. Yet in time its power as an alternative form of organization has been harboured in the form of different business models including involving customers via Internet in the process of innovation (Thomke & von Hippel, 2002). Consequentially organizations have moved from Knowledge Management Systems to Customer Relationship Management to Customer Knowledge Management.

The 'back to basics' philosophy is therefore present throughout the thesis in the way the phenomenon of interest (management) is treated, in the way theory (evolutionary theory) is applied and in the selection of one of the two empirical settings (Internet chat rooms). This

stance is defended in terms of the perceived need for the term 'management' to be redefined, organizational evolutionary research to be updated and integrated with mainstream evolutionary theory and organizational theory to operate within a broader domain than is currently the case.

## CHAPTER TWO

### Literature review and generation of the research question

#### 2.0 Chapter overview

This chapter presents the theoretical bedrock of the thesis. It defends the nature of the contribution the thesis seeks to make. The research question is formulated and justified in terms of the theory it is based upon, the context in which it proposes the theory be applied and the insight being sought through that same process of application. The theory explored is a new branch of evolutionary theory called memetics that explains social evolution. The insight sought is an understanding of how and why knowledge emerges within organizations.

The justification for the use of memetics is several fold. Firstly and above all, the case is made for memetics in terms of organizational theory requiring a dynamic, knowledge-based theory of the firm and memetics incorporating a knowledge-based unit of analysis which is studied longitudinally. Memetics might therefore be able to form the basis for such a theory. Secondly, the case for memetics is made by illustrating that memetics is arguably the most robust explanation of everyday social evolution and organizational life is a case of social evolution. As yet, however, organizational evolutionary research does not include memetics and hence works with metaphorical versions of the concept. Lastly, the theory is non-normative, does not assume functionalism and hence might provide very valuable insights into intentionality and agency, both of which are concepts that have proved to be difficult to unpack within organizational theory.

Firstly, the claim that evolution is knowledge-based is not without controversy, nor is the evolutionary definition of knowledge a definition that 'works' easily outside of the field. As regards the former issue, for some (Campbell, 1987 in Radnitzky and Bartley) evolution is substrate neutral, all that is needed is blind variation-selection-retention. For others (e.g. Gould, 2002 as well as geneticists) evolution does not extend beyond organic life and so the question of a more general substrate does not feature in their views. For those working within 'cultural' or 'social' evolution, the fact that knowledge is the basis of the phenomenon in their opinion needs describing and explaining but seemingly does not need

to be justified, presumably because there is no alternative (Goonatilake, 2002 in Wheeler et al eds).

This chapter explains the basis on which the claim that evolution is knowledge-based by revealing that if evolution extends beyond genetics it must work on a common substrate and that common substrate is logically knowledge. The evolutionary definition of knowledge is one that emphasises interaction; between the knowledge captured in genes and the geological environment, between the geology of a planet and the solar system in which it exists and between people as they interact socially. In turn interaction keeps the system forever in balance despite it for every changing because of that same interaction. It does not go out of balance because the interaction ensures the system constantly re-relates to itself. The logic as regards social or cultural evolution (the two expressions are used interchangeably in evolutionary theory) is that culture is essentially the informational contents of human minds and is created as culture flows through minds as people interact. Culture and therefore social evolution is not knowledge which is generated within the mind but is when solipsistic internal material is articulated socially (Goonatilake, 2002 in Wheeler et al eds). Such knowledge can become embedded in minds and artefacts but only once it has been socially exchanged. It is the nature of these social exchanges that this thesis investigates with an emphasis on the dynamism of the process and content elements of the exchange.

Secondly, as well as memes being knowledge based and there being a need for a knowledge-based theory of the firm, the second justification for memetics is that memetics is the most robust evolutionary explanation of social life, especially 'everyday' social life. The chapter includes a comparison of memetics with other evolutionary explanations of social life, socio-biology and evolutionary psychology, and concludes that both lack robustness, the first in terms of being able to explain evolution which is not linked to organic reproduction and the latter is inconsistent with brain size. As memetics is a theory that generally lacks empirically generated insights and has yet to be explored at all in terms of organizational life, it is a good candidate for exploration within a thesis.

Lastly, as Weeks and Galunic (2002) have mentioned, memetics, in contrast to organization theory, does not assume functionalism. Instead memetics assumes, as is increasingly the case in genetics, that we are gene and meme machines (Dawkins, 1976; Blackmore, 1999). This is where the concept that evolution is without design and foresight enters the equation.

Evolution is best seen from the perspective of the survival of knowledge rather than species or people, as what the future consists of is a function of changes in the knowledge base of the present. These changes are in turn a function of what knowledge is produced when people interact and mis-interpret, re-interpret and recontextualise knowledge and what knowledge is retained in their heads and artefacts after social interaction has taken place. The premise of memetics is that social knowledge emergence can be controlled and directed only to a limited extent, if at all. In organizational terms, memetics suggests that firms have us as much as we have them. Organizational memes can be produced in unintended ways and can enter our heads without us reflecting on whether we want them to. The thesis seeks therefore to make insights into management by using a theory that does not assume functionalism and is non-normative. The ability to describe, characterise and understand the nature of the dynamics of knowledge emergence from the perspective of the meme is what is sought.

Despite 'evolution' being widely referred to, in fact perhaps because of 'evolution' being so widely referred to, what it encompasses and what it explains is open to debate and misunderstanding. Within this debate the researcher adopts a very specific and explicit stance to position herself within the debates and to avoid common misunderstandings. Importantly this positioning relates to the claims made about memetics in the above paragraph. In everyday life the word evolution tends to mean gradual change yet, when referred to in the context of the concept as a theory, it takes on the meaning of different speeds of change and the theory explains those different speeds of change. What changes is knowledge. This thesis adopts the theoretically founded definition of evolution and seeks therefore to explain the nature and speed of change of knowledge.

The first part of the literature review (section 2.1) explores the need for a theory of knowledge emergence within organization theory (Tsoukas, 1996 and Spender 1996). Despite the potential power of such a theory to;

*'deal with the epistemological problems raised by Simon's (1947)  
critique of economic theory'*

(Spender, 1996:45)

it is noted that such a theory has yet to be developed.



The second part of the literature review (section 2.2) covers the nature of evolutionary theory as a theory of the transformation of knowledge. The term evolution according to most theorists is not defined in the same way as it is in colloquial talk, as gradual change, but instead is defined as the changing frequency in the distribution of knowledge (Plotkin, 1993; Hughes, 1999).

In order to justify this claim, as well as the claim that evolution is knowledge based, the thesis gives an account of the theory from the perspective of its broadest claims, drilling down subsequently to its more specific claims. The theory is therefore explained in the thesis in terms of the history of evolution rather than the history of evolutionary theory. Evolutionary theory has a long history. When describing evolutionary theory, it is invariably this historical development of the theory which is explained. This results in reviews of the theory that do not take into account how less recent and more recent developments serve to create an integrated theory and how more or less recent developments serve to create common or not debates. Instead, the review presented here examines the implications of all views of evolution irrespective of when they were created. The aim is to produce an account and review of the theory rather than its development and hence avoid the misunderstandings that plague the field whilst not avoiding, indeed entering, into the debate about how broad evolution is and what drives the various forms of evolution. Other elements of the theory common to these areas, such as evolution being without foresight and hence suggestive that human agency does not exist, are explored. Following this positioning, section 2.3 shows how these principles hold 'true' over all areas of life to which the theory might apply. This makes the point that these principles are common to all areas of evolution but that the exact nature of evolution and knowledge is different in all.

In section 2.4, attention is drawn to the branch of evolutionary theory, memetics, applicable to the phenomenon of interest, social evolution, by which is meant the form of evolution that takes place everyday between genetic generations of humans. In conjunction with the above section which shows how memetics complies with all other possible forms of evolution, this section serves to defend memetics as a theory worthy of the attention of those interested in the everyday social life.

Social evolution, like all others, is considered by its advocates to be based on knowledge-based memes, which like genes create a functional relationship with the world and which can be defined and identified by that ability to encode for something meaningful and functional. Memes like genes change over time and become more or less prevalent in the minds of individuals as they are copied or not and stay intact or not. In memetic terms it is said that the survival of memes is dependent on being copied into more and more minds, just as the survival of genes is dependent on being copied into more and more physical bodies. Memetics is compared with other evolutionary accounts of culture in terms of their explanatory weaknesses to justify the claim that memetics is the strongest evolutionary explanation of social life. The reasoning behind the development of memetics is explained in terms of the scientific gap it fills. It explains the evolutionary logic behind the development of the genetically disadvantageous human brain which it causes deaths at birth. Furthermore, memetics provides an explanation of the speeding up of knowledge-based change including the advent of ICT, for which there is no current explanation. Sociobiology is discussed as not being able to explain aspects of modern social evolution and evolutionary psychology is considered as flawed in that physically the brain's capacity is insufficient to store what the theory says it must be capable of storing.

Section 2.5 develops a research question driven by the explanatory power of memetics. The section highlights why the research question is appropriate both in terms of the nature of the insight being sought and the stage of development of the theory. In terms of the latter, it is proposed that, given its under-developed nature, it is inappropriate to approach the research by creating 'testable' theoretically derived research propositions. Instead, it is proposed that the theory be used as a backdrop to the investigation of a less detailed, and hence more exploratory and less restrictive research question, namely, 'how and why does organizational knowledge emerge?' The question aims to use the theory to explore how organizational knowledge might not emerge in ways that are intended, how intentions might be misguided and how to understand more about the dynamics of knowledge emergence so that why this is the case can be understood. Specifically, concepts drawn from the theory such the evolutionary definition of knowledge, social interaction creating more or less variety of a certain type and memetic determinism versus human determinism are used.

In terms of the insights being sought, it is shown how the research question investigates both the 'how' and 'why' of knowledge emergence. Firstly, it promises to *describe* the process and content aspects of knowledge emergence in terms of the amount (breadth and

depth) of variation in knowledge content produced over any one period of time and the exact nature of the imperfect copying process (differential semantic interpretation of social knowledge exchange) that produces that variation. Secondly, it promises to *explain* why the phenomenon of social evolution is different in varying settings in terms of the dynamics of the system using the result of the how analysis as a basis on which to build comparisons. Lastly, it promises to use the nature of these dynamics to discover what man's role can, and perhaps cannot be, in directing this system. As Spender explains the aim is to produce:

*'(The result is) a very different mode of theorizing, less an objective statement about the nature of firms 'out there' than a tool to help managers discover their place in the firm as a dynamic knowledge-based activity system.'*

(Spender, 1996:45)

Equally, in the terms of Weeks and Galunic (2002), a memetic perspective on organizational life would be able to explore why some memes which replicate in and around organizations are to the economic benefit of the firm whereas others are not.

In summary, the usefulness of an organizational memetic perspective lies in its potential to act as a non-normative, dynamic knowledge-based tool that looks at knowledge creation dynamics before and as that knowledge becomes embodied in the minds of people and embedded into artefacts such as organizational products, services, practices and ICT rather than after in the form of organizational knowledge stocks. This stance does not deny that what is created is in part a function of what has already been created, embodied and embedded. Its use is theoretically justified as a sound and theoretically driven argument can be made for evolution, including social evolution, being knowledge-based and memetics being the most robust explanation of social evolution.

## **2.1 Dynamic Strategy and Strategic Knowledge Emergence**

The explanatory power of the field of strategy, a field that aims to explain differential organizational performance, has weakened in the hyper-competitive knowledge era as none of the dominant theories within the strategy field simultaneously address value-added transactions, non-economic behaviour, complexity and dynamism. Taking a historical view of the strategy literature, it can be seen how this situation has arisen. With strong roots in

- the openness to accommodate not only well-defined options but also creative strategies; and
- consideration of how firms upgrade their competitive advantage over time through increased complexity, sophistication and innovation.

The most recent and substantive reply to Porter's challenge of the need for a dynamic theory of the firm, which integrates change and economic value very concretely, is Spender (1996) and Tsoukas' (1996) postulation that knowledge is the ideal basis for a dynamic theory of the firm. Proposed as being a way of closing the gap between neo-classical economics and behaviourism by considering knowledge to be socially constructed and what adds direct value to a firm, the concept has potential. Knowledge is thought of as existing in communities of practice (Tsoukas, 1996) which go beyond the organization such that it deals with, or rather becomes part of, its environment. As an entity which changes over time, knowledge deals with the problem of strategic change not being coherent as to what is changing.

Spender asks that such a dynamic knowledge-based theory of the firm will, indeed must,

*'with its discussion of reproduction, variation and selection mechanisms, (will) offer an evolutionary perspective.'*

*(Spender, 1996:45)*

which explains the origin of the firm, the underlying nature of the evolving entity and which is specific about the evolutionary categories in which the perspective is situated (Spender, 1996:46) and must, as he argues the resource-based view begins to, go beyond or rather into the 'black box.' Importantly for this thesis Spender quotes Plotkin (1993) as a theorist who proposes an epistemology of knowledge which might be useful in this regard. Plotkin is an evolutionist. Spender states that the solution is:

*'a synthesis of sociotechnical systems theory and self-regulating biological systems.'*

*(Spender, 1996:59)*

As yet, however, the field of knowledge has been dominated by 'knowledge management' that in practice rarely goes beyond the selection and implementation of ICT tools and which

in academia has yet to generate a theory driven, knowledge-based unit of analysis. As such few advances have been made in the direction of knowledge within strategy and most treatments of knowledge have been predicated on reductionistic and functionalist assumptions that conceive of knowledge as static, objective and independent of context whereas knowledge is subjective, contextual, complex and time-dependent (Kakihara and Sorensen, 2001). Some theoreticians point out that knowledge is not only a vital source of creativity and strategic flexibility but that knowledge viewed in this way is best associated with emergent and self-organizing complex aspects of organization (Weick, 1993; von Krogh et al, 1994; Ciborra, 1999; Brown and Duguid, 2000; Nonaka and Nishiguchi, 2001). Work within this field has yet to build a knowledge-based theory of the firm, it is however moving towards more productive ways of looking at knowledge creation (Rodan and Galunic, 2002) which investigate the relationship between knowledge variety production and network structures and characteristics.

To create the dynamic knowledge-based theory of the firm, ideally a theory of the emergence of knowledge needs to be applied directly to organizations. The theory needs to consider the creation of knowledge to be emergent, self-organizing and occurring within a complex system; new knowledge as creating new relationships between elements of a changing world which maintain fit within that world; and which recognises the subjective, human interpretation and complex social interaction aspects of rent-generating (and non-rent generating) organizational knowledge creation. Such a theory exists. It is, however, a under-developed and has not been applied to the context of organizational life. The theory is memetics, a branch of evolutionary theory.

What follows is an explanation of evolutionary theory, memetics and the applicability of memetics to organizations. Within evolutionary theory, knowledge is defined as that which creates relationships between different elements of the world which is forever changing, making fitness the result of matching internal speeds of knowledge production within one element with speeds of knowledge production within other elements. Knowledge that is unfit is knowledge that no longer creates a relationship between elements, (Plotkin, 1993). Thus a gene or genes that encode for the water bearing structure of cacti is knowledge as the environment the cactus lives in is characterised by periods of lack of water interspersed with short periods of substantial rainfall. Should, however, global warming occur, resulting in more water being available within that environment, that knowledge would no longer be fit.

Memetics is chosen as it is knowledge-based and a theory that has yet to be applied to organizational theory. This is unfortunate in that the theory is particularly appropriate because unlike the other main evolutionary theory of social life, socio-biology, it can potentially explain everyday evolution. Furthermore, memetics questions human agency and therefore whether the assumption of functionalism which underlies organizational theory is valid. It is proposed that differences in knowledge dynamics might explain differences in organizational performance, firstly, in terms of what appropriate knowledge dynamics might be for an organization operating in a certain context and secondly, why that organization might or might not be able to operate according to those appropriate dynamics.

Before we move on, given knowledge is invariably treated as a static construct in the management literature, it is important to mention that the emphasis within this thesis is on the dynamism of knowledge. Dynamism is what evolutionary theory proposes results in fitness. Indeed, the theory meets Spender's heuristics (Spender, 1996:59) in that it incorporates 'interpretive flexibility' (variation is produced in this theory through interpretive flexibility); 'identification of institutional influences' (the theory suggests that knowledge is differentially retained in different minds which have been subjected to different pasts); 'boundary management' (the theory proposes that communities of practice are defined by the knowledge that people share), 'systemic and component parts' (the theory is specific in the components the system is composed of, indeed it is only composed of one component, functional knowledge which operates within a complex system). It considers knowledge to be 'quasi objects' as Spender upholds, rather than a positivist construct that is stored for ever and does not vary in content or does not move relative to other knowledge within the 'quasi-object'. The focus is on social evolution and hence on the dynamic differences in knowledge over time.

## **2.2 Evolutionary theory**

This section introduces evolutionary theory before entering in to the specifics of each branch of the theory (section 2.3) and even more specifically the branch memetics (section 2.4) used as a back-drop to the research. Evolutionary theory is not a theory without misunderstandings or debate. Before it can be used within empirical work it is necessary to reveal these misunderstandings and enter into the debates. The outcome is a stance which

states clearly what evolution is and to what it applies. The main constructs upholding the theory in the form of 'fundamental principles' are revealed and defended.

Evolution is the dominant paradigm of biology. It is upheld by the concept of fitness, defined as that which is generated through variation production rather than design, some of which is fit for purpose by chance. This is a fundamental 'truth' to which all biologist subscribe. Beyond biology, as much as this concept is becoming more widespread in areas that encompass cosmology, geology and social life, rarely do evolutionary theorists stipulate what they consider as the fundamental principles of evolution within and between the areas of life it is said or thought to apply to. If they do their reference point is invariably exclusively Darwinian rather than the theory as a whole, although this requires a definition of what evolution as a whole means (for an example see Gould 2002). Alternatively they propose fundamental principles as if they are shared across the field when there are respected evolutionists that would disagree (for an example see Mayr, 2001) and without commenting on this situation.

In extreme cases, and organizational evolutionary theory is arguably such a case (of which more later), there is a combination of a lack of 'back to basics'. Shared fundamental principles and debated areas are not articulated, rarely if ever any reference to Darwin, or indeed any other evolutionary theorists, is made and there is a general lack of debate about the application of the theory to the specific context. In this section more is said about the need to go 'back to basics' to define and defend a stance within evolutionary theory. Evolution is too often used as a 'paradigm' which appears to substitute for a loose way of thinking rather than as a theory with concrete assumptions (for an example see Lovas and Ghoshal, 2000 and Modelski and Poznanski, 1996).

In order to avoid this confusion, this section asks the question 'how broad is broad' to determine the boundaries of the field and ensure that the fundamental principles which are developed are, and can be, defended in terms of these boundaries. These are not identical to Darwin's three principles (see Gould, 2002) which were developed when much less was known about evolution. The question 'how broad is broad' is vital as it underpins the claim that evolution is an explanation, if not the explanation of most, if not all, aspects of the system we exist within. This in turn legitimises knowledge as the ontological essence of evolution, in that knowledge can be said to be common to all branches of the theory and

hence justifies the use of a knowledge-based meme to explore agency, an area key to evolutionary theory.

What follows is a more detailed account of the need to go back to basics in order to position the stance any evolutionist is taking within the field as a whole. What the field as a whole means is discussed in terms of the alternative approaches to explaining evolutionary theory namely historical (in the order in which it has been developed) versus chronological (the order in which different forms of evolution evolved). Working within this framework of the need to be more precise about the concept, a discussion of the question 'how broad is broad' follows in terms of the chronology of evolution. Having established how broad it might be, three fundamental principles are developed that conform to this definition.

### Back to basics, misunderstandings and the development of a 'stance'

As Mayr (2002) has pointed out, misunderstandings are rife within evolution despite the general principles of evolution being very clear and beyond doubt. This is arguably very 'true' in organizational evolutionary research, where the initial metaphorical use of the concept of evolution has led over time to the development of a field that, it is argued within this thesis, bears a great resemblance to the theory in some cases, especially where empirical data are involved (Burgelman, 1983) and less where the dangers of metaphors are forgotten (see Young's critique (1988) of Hannan and Freeman, 1987). The field over time has become increasingly isolated from evolution as a broad theory and from the numerous debates and developments that have characterised the field since the theory was first taken into the organizational arena by Nelson and Winter, (1982).

Another area of misunderstanding is what the term evolution means, in that for some, somewhat colloquially, it means gradual change, yet evolution can be sudden. Antweiler (1991) has conducted an exhaustive review of the different meanings of evolution but unfortunately concludes that the 'paradigm' should be confined to the study of long-term change and macro trends. Yet if evolution is an explanation of the speed of change it also should account for everyday and micro change. Another frequent misunderstanding that extends from this definition of evolution as gradual change, is that because genetic change is slow and infrequent, faster, more dramatic forms of evolution cannot exist.

As a consequence of these mis-understandings in general, and in particular with respect to organizational research, a choice is made to use this section to first explain evolutionary



theory in its broadest sense, followed by an explanation of the sub-systems that evolution applies to which in turn is followed by a section on memetics. What emerges is a mixture of a position which is free from mis-understandings and a 'Plotkin-Dawkins-Dennett-Blackmore' stance which is defended both in terms of its robustness within evolutionary theory and in terms of its validity as regards organizational life. Plotkin (1993) provides the evolution is knowledge-based premise, Dawkins (1976) and Blackmore (1999) develop the meme, as does Dennett (2000) who specifically points out that the meme must be knowledge-based. A stance is required as evolutionary theory is not a field without debate, especially regarding what counts as valid empirical research and the extent to which, and how, evolutionary theory applies to non-genetic areas of life.

To illustrate the problem of not being able to assume that any stance in evolutionary theory can be taken for granted as acceptable, I quote Mayr, one of the main architects of the modern synthesis of genetics with evolutionary theory, regarding the need for a better account of evolution and drawn from his book entitled simply 'What evolution is':

*What I have aimed for is an elementary volume that stresses principles and does not get lost in detail. I try to remove misunderstandings, but do not devote excessive space to ephemeral controversies, such as the role of punctuated equilibria or neutral evolution. Also there is no longer any need to present an exhaustive list of proofs for evolution.*

(Mayr, 2002:preface xv)

That said creationists would perhaps like proof, what Mayr considers as 'ephemeral' other evolutionists may not, indeed do not, (neutral evolution for example is a problem when accounting for empirical data) and his principles such as needing to view evolution not from a micro level but from a macro individual or species level (preface xiv) is not something this researcher and certain others would agree with! A robust piece of evolutionary research must therefore enter into the debate and misunderstandings rather than assume that none exist or have been resolved and so do not need to be defended.

The next subsection involves explaining why the review is structured in an unconventional way, (namely chronological in terms of the evolution of evolution rather the development of the theory) that avoids, it can be argued, the misunderstandings referred to by Mayr (2002:preface XV). It concludes that before any 'basics' can be developed and justified a

definition of how broad evolution is needs to be developed and equally defended. This happens in the following sub-section, after that the basics are developed. Once these have been established and defended, the next section (section 2.3) discusses the different branches they appear to apply to and how, whereas in section 2.4, memetics is discussed which it is argued operates within these boundaries and adheres to these principles. A stance is therefore clearly generated and made explicit to position the research within the field of evolution that is characterised by debate and confusion but also serves to justify the application of memetics to organizational life. The justification is primarily based on memetics being knowledge-based, the appropriate form of the theory to apply to everyday evolution and one which has the potential to explain differential performance as it can explain why strategic intentions might not be appropriate in knowledge terms and why, even if they are, they might not emerge as intended.

### Evolution as chronological rather than historical

There are two ways of entering evolutionary theory. One is the historical route which starts with Darwin and ends with the views of today and tomorrow's evolutionary theorists. This account relates the theory in the order in which it has been developed. This is a relatively easy route for the writer as the inherent chronology provides an automatic structure to the writing. It is also the account most often found in the literature, (for an example see Hull, 2002) and generally in people's minds perhaps because writers feel obliged to start with Darwin, and having taken that approach, proceed to report on other people's work in the order in which it emerged. For the reader, however, this approach produces an account that does not follow the inherent logic of the theory and evolution, tends to over-emphasise areas of the theory which happen to be more researched than others and tends to under-emphasise areas which have been far better developed since their discovery. Darwin for example did not know of genes nor did he appreciate the implications of genes interacting with the environment to form a complex system. The lack of logic within this most prevalent approach to explaining and thinking about evolutionary theory is, in the opinion of the researcher, the root cause of many misunderstandings of the same.

By way of example of this situation, many critics of the branch of evolutionary theory used in this thesis, called memetic theory, draw on genetic theory as a way of creating and justifying their objections (this occurs mostly during public debates, for example Dennett at the LSE in 2001 and in 2002 at the Fourth International Workshop on Institutional Economics entitled 'How do institutions evolve?'). Here the chronological ordering of

theory development (genetic theory came before memetic theory) appears to be framing people's thought processes.

Instead, once it is appreciated that memetic theory is a branch of 'Universal Darwinism', a term coined recently to encompass the root principles of evolutionary theory, it can be realised that memetic theory needs to be consistent with these principles rather than with genetic theory. Following this logic, the criticisms can then be considered as unfounded, as their issues lie with memetics not being like genetics rather than memetics not complying with the common principles of all branches and hence with evolutionary theory. Furthermore, the term evolution has become a substitute for both the academic theory and the general meaning of gradual change. Yet, as Mayr points out (2002), evolution can be slow and also fast ('punctuated equilibrium'). This characteristic of evolution is not very relevant to understanding the theory but is a great source of mis-understanding and indeed differential speeds of change in terms of the nature of that change are what the theory explains.

Although evolution's prevalence is to be applauded, in the sense it illustrates how well accepted the theory is, the colloquial forms of the term 'evolution' have over time become indistinguishable from the theory to the extent the two can sometimes be used interchangeably (for an example see Lovas and Ghoshal, 2000). This has the effect of diluting the explanatory worth, reputation and general understanding of the theory. Thus in this review of evolutionary theory, the option of the chronological, historical account of evolutionary theory is rejected for a theoretical account of the theory which is also a historical account of evolution.

### How broad is broad?

This question is asked to ensure it is clear what any basic principles of the theory are being said to cover as the answer to the question differs according to the researcher. Put another way this section asks how universal is Darwinism? The chronological approach helps in this regards as it makes one question when evolution first started and when it might end. If it can be said that evolution might apply to many (sub)systems, the logic of evolution being knowledge-based becomes more robust as knowledge is a common denominator to all the sub-systems and hence branches of the theory, including memetics. Some evolutionists such as Gould (2002), who confines(ed) himself to one form of evolution, organic evolution, do not enter this debate, others transcend all areas of evolution (Plotkin, 1993) and discuss

evolution in broad terms in the form of evolutionary epistemology without defining what areas it does or does not apply to, whereas Dennett (2000) transcends genetics and memetics in order as he sees it to clarify the ontology that they both logically share.

At its most fundamental and broadest, evolutionary theory can be considered as a theory of self-perpetuating, dynamic, complex systems which remain in equilibrium. 'Self-perpetuating' refers to the notion that the system is self-referential in the way it controls its own ability to continue to survive by correcting imbalances such that dynamic equilibrium is maintained. 'Complex' refers to the notion that the system is made of an infinite number of component parts which interact and are difficult to explain, let alone trace, but which produce a noticeable macro effect. The system becomes 'dynamic' because the multitude of unique interactions creates sources of imbalance that threaten the system's continued viability but which the system counters and that variety production overtime can create an evermore complex system.

This definition, whilst not found cited by *an* evolutionary theorist, is arguably justifiable. For whereas evolutionary theory has tended until recently to be synonymous with Darwin's theory of natural selection, over time the most fundamental principles underlying genetics have come to be found in all other areas of life (see next section). Indeed Darwin was inspired and reassured by Lyell's 'Principles of Geology' that was eventually published in 1853:

*Volume 1 of Lyell's Principles of Geology was presented to Darwin by Captain Fitzroy in 1831 before they set sail. The next two volumes were sent to arrive at various ports of call. Darwin was deeply influenced by Lyell's theories. Charles Lyell's principles introduced Darwin to the notion that the Earth's surface was constantly changing. He (Darwin) decided that if the environment was continually changing then plants and animals would probably have to change too, in order to survive.*

(Exhibition material at Down House,  
Kent home of Darwin and where  
he wrote Origin of the Species)

Equally Darwin is thought to have drawn inspiration for his biological version of evolution from sociological leading thinkers of his time (Ingold, 1991). In terms of the possibility of

evolution having evolved to create more recent branches of evolution, Frank (1996) asks how many phenomena the theory of adaptive systems might explain. He extends the theory out beyond genetics to immunology and artificial intelligence. This means it can be argued that evolutionary theory might well have a number of branches, each of which explain an element of the system we live in, and all of which subscribe to the same fundamental principles. This thesis includes all of the above and adds cosmology, about which more later. The relevance of this answer is tied to the claim made later that evolution is knowledge-based.

Secondly, defined as such, evolutionary theory challenges the demarcation of the social sciences from all others (Bryne, 2002). Critics point out that such disciplines lie on assumptions that cannot easily be combined (Midgeley, 2000). Both critics and advocates point out that it is easy to be careless and apply more than the principles shared by these theories and hence either find proof, or not, of the fundamental assumptions lying in all disciplines on an incorrect basis. A common error according to Bryne is to adopt inappropriate physical science quantitative techniques to the social sciences. Bryne states that two methodological assumptions must feature in any work, namely that a whole system is being looked at from a perspective which prioritises whole system emergent properties and that the system is viewed over time. Both of these conditions are adhered to in this thesis – see Chapter Three. Another ‘mistake’ is to consider all branches of evolution, especially explanations of social evolution, as extensions of biology rather than branches of evolutionary theory.

The stance taken here therefore with respect to the question ‘how broad is broad’ is that evolutionary theory, in all likelihood, is a theory of ‘everything.’ Hodgson (2002) agrees in that he states evolution is an explanation of how all complex systems work. ‘How broad is broad’ is a relevant issue here because, however many branches of evolution there might or might not be, if memetics is considered one of them, then it must comply with evolutionary theory as a whole and hence comply with the fundamental principles considered to be the essence of evolution. Equally researchers must be careful not to extend principles (such as methods) across areas of theory when they are not valid. Researchers need to be careful on another front too. The theory might be a theory of everything but that does not mean it explains everything. As Hodgson points out, evolution explains both brightly coloured birds (mating reasons) and dull birds (camouflage) but a full explanation requires the added details. The following section therefore details the fundamental principles which the researcher considers apply to evolution whilst also pointing out that these are also not without

controversy and then moves on to the details of memetics. The fundamental principles serve to show that evolution is arguably knowledge-based and that memetics easily complies with these fundamental principles making it a robust theory albeit one which has yet to be explored empirically.

### The fundamental principles

The first fundamental premise of evolution, according to this thesis, is that it is knowledge-based (Plotkin, 1993). Within this evolutionary epistemological stance, knowledge takes on different forms (for example genes in the case of physical evolution, protein in the case of newly discovered prions, transferable subjective meaning in the case of memes), each of which are associated with different parts of the system and hence different ways of relating to it. These different forms all contribute to self-perpetuation by producing knowledge-based variation that either does or does not rebalance the system and hence survives or not. These sub-systems are affected by different types of forces and thus although the variation-selection-retention framework of evolution applies to all, the nature of the mechanisms are different. They are all created themselves out of evolution and thus likely to vary in the form that the knowledge takes, over and above these principles; indeed it would be suspicious if they did not (hence the claims about evolution having many branches, each new branch being a product of evolution and knowledge taking on different forms in each of the branches). It is important to realise that each of these different forms of knowledge responsible for different forms of life might themselves not survive in time; in fact they will not. Equally, just as some of these forms are younger than others, it is highly likely, indeed inevitable that over a long enough time period alternatives will be created. ICT and prions are thought of as possible new forms of evolution (Aunger 2002). Memes which are thought to explain social life may no longer exist if, through global warming, their existence creates a physical planet that cannot sustain our physical nature and hence our genes and also therefore our memes. So the forms of knowledge are themselves subject to the process of variation-selection-retention, including the forms of existence with which they are associated.

For some evolution is substrate neutral (Campbell, 1987 in Radnitzky and Bartley). All that is needed is blind variation-selection-retention (v-s-r) of whatever and evolution can be said to take place given that as time goes on blind v-s-r will cause a changing distribution. That said what appears to be happening is the v-s-r of knowledge of knowledge, if knowledge is defined as that which allows the sub-systems of the world to relate and relate to each other. This is a different definition of knowledge from that which might consider knowledge as

artefacts or that which is in people's minds. As regards artefacts, knowledge is embedded into artefacts in the sense of their being a bunch of ideas which have a history. In a toaster, for example, there are the ideas or memes (in order perhaps of their chronological development) of cooking food, growing wheat to make bread, cooking bread, cooking bread in an oven, cooking bread in a specialist machine, that machine being a fashion item in its own right. However before the artefact can exist, the ideas must be generated and these ideas may be embedded in more than one artefact. Hence it is the memes that evolve as they are what is replicated imperfectly to produce variation and are selectively retained. The toaster does not replicate in the evolutionary sense of the word (as discussed at the Fourth International Workshop on Institutional Economics). The same applies to knowledge embodied in people's minds, knowledge must be exchanged before it can become embodied. This does not mean however that what is exchanged is not a function of what has been previously embodied or embedded but means that new knowledge is created as knowledge is expressed and exchanged and people relate to that exchange in novel ways.

As regards what is in people's minds as Goonatilake (2002 in Wheeler et al eds) points out:

*The evolution of cultural information implies certain concepts. First is that of culture as essentially contents of human minds. Second is that of information, albeit the information that flows through human minds as humans interact with each other socially. Culture is not information generated within human minds solipsistically; it is only when this solipsistic material is articulated socially and made to interact with other humans that it becomes culture. A third notion is that of evolution, as the human carriers of this social information interact with their environment and change the information characteristics of culture.*

(Goonatilake, 2002 in Wheeler et al eds:201)

Teubner (2002 in Wheeler et al eds) talks of the 'evolution of life and the evolution of meaning' as well as 'social meaning' (page 164) being based upon 'communicative operations' (page 165). Working within the context of legal institutions, he also conceives of meaning as evolving subject to a variety of selection forces that include economic but also institutional forces. He talks of the 'willingness of an open system to respond to the demands made upon it of the environment' (page 165). Indeed this volume on the Evolution of Cultural Entities reflects the growing trend to seeing cultural evolution as knowledge-based (see also Nelson with in this volume).

In summary, what is in people's minds is knowledge but that knowledge only came about through interaction and therefore to understand knowledge one must understand social interaction. Equally the thesis takes the stance that what becomes embedded in people's minds and embodied in artefacts is a function of what emerges in social interaction, which in turn is a function of what is already embedded and embodied.

As regards debate and controversy this 'fundamental' premise is a matter of debate about ontology (which is discussed in broader terms on page 63). For example within the realms of genetics where some think of the ontology of genes to be DNA, others consider it to be the knowledge about the world for which the genes encode. In memetics the debate is between Dennett (2000) who considers the ontology of memes to be like genes and therefore knowledge, whereas Aunger (2002) searches for a tangible ontology of electric neuron potential. Adams (1991) views energy as the driving force behind evolution. Sixel (1991) counters this view on the basis it falls into the mind-matter dichotomy which the notion of knowledge can arguably be said to avoid. In other branches of evolutionary theory knowledge is not explicitly referred to but it is a common denominator of them, whereas DNA and electrical potentials are not, making knowledge a relatively robust common denominator. Arguably therefore Plotkin's stance of knowledge as the common denominator is valid across all branches, especially given his voice is one of an evolutionary epistemologist, but it should be mentioned that Plotkin does not enter into the debate as to how broad evolution is. Durham (1991) is another evolutionist who considers human beings to have two information systems, one cultural and one genetic. The logic of the stance that evolution is knowledge-based is far more robust the broader the areas the theory is said to apply to as only knowledge can serve as a common denominator to all of these subsystems.

The second fundamental premise of evolutionary theory is the one that is most referred to and the least debated (outside of the circle of creationists), that of evolution being without design and this lack of design creating fitness. There are two alternative ways of creating sustainability. The first is to manage it through planning and foresight, taking actions targeted at maintaining balance within the system. This is the assumption that drives most, if not all, of the social science literature. The second is to create infinite variety in an unplanned and unintentional fashion assuming that within this pool of possibilities some will bring the system back into a sustainable form. The first approach fails if the planning is not accurate; the second fails if insufficient variety is not produced. These two approaches to sustainability



are offered below and the assumption that is inherent within evolutionary theory about the management of complexity is revealed.

The most obvious, almost intuitive, approach to managing sustainability is to know the system at a very detailed level in order to work out what is wrong and correct it. This assumes the system can be understood at such a detailed level, what is wrong with it can be identified and a correction put in place. Evolutionary theory claims that in the case of systems within the universe(s) (and therefore all systems) such an approach is not possible; no agent has the intelligence to have such an overview of the system to be able to calculate what needs to happen to maintain the system in balance. However, the man as the all powerful agent is, on the whole, the approach taken by managers within organizations

The counter intuitive, deceptively simple, alternative explanation is that the system looks after itself. It is not designed or planned, indeed if it were then the amount of variety would be far less than in evolution and sooner or later would be insufficient. This second fundamental premise or concept is central to the phenomenon of evolution. Evolutionary theory states that the way in which such systems manage themselves is by lacking a designer. In knowledge terms such systems are said to have no true knowledge within them, just knowledge that is true enough to maintain balance within the system as the system stands at that moment in time. Knowledge may appear true because, over the time period being considered, it is evolving so slowly that it appears a fact. Knowledge is defined as the way in which the sub-parts of the system inter-relate. The system operates without knowing, or attempting to guess, the future. Hence the frequently heard phrase evolution has no foresight or design. Instead, variation in knowledge is produced without foresight and whatever fits is selected by the system and retained in the sense that by bringing the system back into balance it remains within the system whilst it does so. Once again the evolutionary definition of knowledge needs to be clarified. Not only does evolution consider knowledge to never be true but also the theory defines knowledge as that which allows the system to relate to itself. So new ways in which the system is related to itself are created, but only some of them are retained, creating differential survival of knowledge within the system. To quote Dennett again:

*Ever since Darwin, scepticism has been aimed at his implicit claim that the various processes of natural selection, in spite of their mindlessness, are powerful enough to have done all the design work that is manifest in the world.*

As much as this concept of lack of foresight producing 'design' is accepted in biological circles the thought that such ecology applies to human social life is however disturbing. Only time will tell whether it does apply to social life and if it does whether this notion is more readily accepted than Darwin's first announcement that there appears to be no designer of organic life. Objectors to this line of thinking include creationists as already mentioned and also evolutionary epistemologists (eds Radnitzky and Bartley, 1987) and many others outside of the field of evolution who claim that whereas physical evolution may be without design, social life is characterised by free will, choice, consciousness and morality (Malik, 2001). What is without doubt is that as intentional as we might be outcomes are frequently not as intended.

There is also some dispute as to the extent that micro (variety) operates within a constrained (macro) environment as regards what is possible within natural selection and hence fitness, making fitness less of a free spirit than perhaps has been implied in the past. Gould (2002:163) promotes greater primacy of the environment than Darwin in terms of what is possible. Another source of debate is the issue of agency, referred to below as the last premise. A lack of a designer or a lack of design suggests that agency lies within the system.

The third fundamental premise of evolution involves the question of agency and with whom or what it lies is a consequence of the two principles detailed above. It has three aspects. Firstly, why the system has the form of agency it has, secondly, what exactly is agency within evolution, and thirdly, from what perspective this type of agency should be viewed.

Agency lies in 'designing' the system to have no foresight and instead incorporating the capability of producing infinite knowledge, which is retained or not. That said, taking the lack of design and hence the second principle to its extreme, it can be thought that many systems might have existed with and without foresight, with the system(s) without foresight surviving as they are sustainable over a longer period of time. Agency lies therefore in the system or rather any system that survives being one that maintains itself without foresight. Instead it produces an infinite amount of new knowledge (variety) some of which brings the system back into balance and hence is retained in the system .

Debates arise when the issue of what is selected for or against is considered. The system's direction and dynamics are considered by Williams (1966), Dawkins (1976) and empirical geneticists (Hughes, 1999) to be best seen from the perspective of the most micro-replicating unit of knowledge within the sub-system as it is this that survives or not into the next generation and is thus what is selected, or not. Smaller units of analysis, e.g. fragments of DNA that make up a gene have no meaning and larger units, e.g. species that survive as a function of the dynamics of the single genes that they are made up of, make these higher forms of unit of analysis a composite of selection forces, in turn making them a less accurate way of tracing evolution. This notion was first postulated within the field of genetics, the most developed area of the theory and was termed, somewhat colloquially, 'the selfish gene' by Dawkins (1976). That said experimental work in genetics has gone on to 'prove' this to be the case (Hughes, 1999).

The most ardent critic of the concept of working at the gene-meme level is Gould. Gould (2002) wrote in his last very comprehensive book on 'The Structure of Evolutionary Theory that the Selfish Gene notion is a 'fallacy' that should be labelled hyperdarwinism. He uses Hull's (1980:13) distinction between replicators and interactors where the former are what is copied and passes on its structure and interactors are entities that directly interact as a cohesive whole with their environment in such a way that replication is differential. He quotes Hull (1994: 627-628) as stating:

*'Evolution of sorts could result from replication alone, but evolution through natural selection requires an interplay between replication and interaction'*

(Hull, 1994: 627-628)

It has also been discovered that the differences between humans and primates can not only be explained by differences in genes but also in expression patterns of the same genes and how active those genes are (Enard et al, 2002). This applies particularly to genes that encode for the most evolved area of humans, namely the brain. This debate has implications on agency but also on the unit of analysis of empirical work and as such is mentioned later when this issue is addressed. In either case of interactor or replicator as the unit of selection, the nature of agency being something beyond man's control is a crucial question in the quest to decipher the role of evolution in social life.

It therefore remains to be seen whether this is the case for memetics and if it were not to be the case whether this would mean that evolution does not apply to social life or whether, which would appear less likely given the evidence in genetics, that this lack of agency is not a fundamental principle of evolutionary theory.

The implication of assuming, or rather exploring the possibility as this thesis does, that the meme, like the gene, as the unit of selection is that agency does not lie with a rational man. Man is just a meme machine in the same way that man is a gene machine (Blackmore, 1999). Human behaviour can, memetics claims, be explained using the same terms used for animals, and plants and bacteria. In this sense man is an ever-changing group of memes that enter his or her head. This population of memes is the result of a complex interacting system that results, or not, in a series of social interactions that make, or not, a person come into contact with new memes, which may, or may not, infect that mind. What is attractive to a mind will depend, Blackmore argues, on past selection that has produced the current knowledge pool within that person's mind, whether that meme is attractive to that person and what sort of functionality the person thinks is implied by the meme. What exactly this means in reality is questionable. Man has learnt through an understanding of evolution to genetically engineer and hence control evolution at least in part. Whether this is the case in memetic evolution is unknown. The evolutionary and memetic perspective does however without doubt, question how much we are in control of knowledge emergence in the sense of man being part of the system but no single person or group of people having the ability to control that same system.

So the third fundamental premise of evolutionary theory is where most debate lies, especially with regards to social life and it is what this thesis above all investigates. It asks, using a knowledge-based unit of analysis, what control man appears to have over the emergence of (social) knowledge. In Spender's terms (1996) it combines a sociotechnical systems (social interaction between people causing variation in knowledge) with the variation-selection-retention algorithm of self reproducing systems. This position is developed further in the section of the research question. Before delving into this area, having explained that evolution creates fitness by operating without design, is knowledge-based and agency lies within the system, we now move on to explore the branches of evolutionary theory. These branches all comply with the above fundamental principles but also vary in ways that include when they themselves evolved and what form of knowledge they involve. The following table serves to summarise the stance taken by this thesis with regard to these principles as opposed to others.

**TABLE 2.0 – Differing principles between major evolutionary theorists**

<b>Principle/ Theorist</b>	<b>Darwin (1865)</b>	<b>Coold (2002)</b>	<b>Evolutionary Epistemologists (Radnitzky, 1987)</b>	<b>This thesis</b>
<b>Fitness and design</b>	Natural selection - emphasis on variety production rather than dealing with complexity of environment	Natural selection moderated by structural and morphological constraints	Variation production	Natural selection as per Darwin with implications of duality between environment and variety
<b>Knowledge- based system</b>	Did not know of genes - so not able to make a comment	Not considered	Knowledge-based	Knowledge-based as per Plotkin and Durham and Wheeler et al
<b>Agency</b>	No divine creator or planner	Disagrees with selfish gene concept - sees a much more complex system operating at many levels	Humans as intentional	Humans at least less than intentional if not un- intentional (Blackmore, 1999). Memes, like genes as selfish and that which is selected

It is worth noting at this point, given the dominance of Darwin in the above table, that an alternative theory to evolution exists, Lamarckism (Lamarck, 1809). Lamarck thought that as organisms inter-related to the environment their nature fundamentally changed. Darwin refuted this direct effect of the environment on organisms. Instead he claimed that the probability (but not certainty) of the reproductive success of an animal depended on inheritance. Indeed, as regards organic evolution, genes have since been discovered that explain the mechanism of that inheritance. This thesis takes the view that evolution is Darwinian.

The next section on branches of evolutionary theory serves to reinforce the possibility that evolution operates in all sectors of our existence and hence the need for an evolutionary explanation of social life that complies with these principles. That is of course, unless these principles are wrong (but if they are wrong some other fundamental principles must exist to have a theory) or evolution does not apply to all branches of our existence. This section and the next therefore combine to make the case that evolution might well extend beyond organic evolution and if it does the sub-systems in which it does take place must all operate according to some common principles but there must also be differences between the sub-systems.

## **2.3 Branches of the theory**

The branches of evolutionary theory, as upheld by this thesis and defended above, are described in the table below. Given that each form of knowledge evolves from a previous form of knowledge, the different forms of knowledge are logically describable in terms of their chronological appearance within the system. This order is different from the historical order in which they entered the literature. This table is based on the broadest definition of evolution. It therefore goes beyond the form of knowledge encapsulated within genes responsible for physical evolution to include memes, the form of knowledge responsible for social evolution which is explored in detail in this thesis. It includes another parts of our world that more recently have moved away from normal, linear science to a more systemic, complex and dynamic science, namely cosmology and as Darwin thought includes geology. Above all, it is illustrative of the transdisciplinary nature of the principles of evolution and that evolutionary theory is still under development in terms of its boundaries, rather than being a definitive scientific statement or something that applies only to genetic evolution. By making this point the section serves to place memetics within the broader field of evolution suggesting that it might be as robust a theory as genetics albeit one that has yet to be developed as much as genetics.

**TABLE 2.1** Branches of evolutionary theory

<b>Theoretical Branch</b>	<b>Cosmology</b>	<b>(Physical) Evolution of the planet</b>	<b>(Physical) Evolution of Life</b>	<b>Immunology</b>	<b>Social Evolution of Life</b>
<b>Phenomenon of Interest</b>	Physical structure of the universe(s)	Geological and climate change of the planet making it a 'living planet'	Life forms	Defence system of more complex life forms against simpler life forms	Organic life
<b>Form of knowledge</b>	Laws of nature	Climatic and geological relationships	Genes	Knowledge within antibodies of previous encounters with disease	Memes
<b>Interrelatedness with other parts of system</b>	Multiple universes! Survival of sub parts of universe e.g. planets, stars, comets given climatic changes	Survival of the genes (changes in fossil records linked to climate and geological changes) Influenced by changes in temperature within the universe	Frequent gene-meme & gene-planet	Genes (creates immune system) and memes (antibiotics)	Frequent meme-gene co-evolution and meme-planet evolution (e.g. pollution)
<b>Length of time over which knowledge evolves (length of a generation)</b>	Very long Multiple big bangs – collisions between universes	Long but becoming shorter with man's interference	According to species	According to situation	Moments - that are becoming shorter with ICT, which is generating a whole new form of evolution independent of man!

What these fields have in common is that they rely on forms of complex interdependence which produce systemic, self-perpetuating, dynamic equilibrium. They all operate in contrast with the notion that perpetual balance is created from a perfect design in the beginning such that the system can remain static and eternal. The evolutionary theory of life on Earth is reliant on the simple algorithm of variation-selection-retention producing complex, dynamic, interdependent life at a very micro level.

As mentioned before, Darwin was inspired by Lyell's notion that the planet was forever changing. A modern version of Lyell upon which this and the following paragraph is based, is that of Lamb and Sington (1998). They discuss how life on Earth is inextricably and interdependently linked to the frenetic and ceaselessly changing geology of the planet Earth within a dynamic universe in which even the laws of nature are not as constant or lawful as we tend to think. As genes and memes co-evolve with the atmosphere and the oceans of the planet, the changing geology of a planet means that life is unlikely to survive on any planet for eternity. It is likely that the creation of life in the Universe is a relatively common but transient occurrence. It just so happens that within the infinite variety of environmental conditions within this Universe, Earth is particularly good at sustaining life, but is unlikely to be able to do so for longer than another billion years (Lamb and Sington, 1998).

The impact of these inter-linkages and interdependencies, or inter-relatedness, is profound; only because the Universe is so active could a planet as geologically active as Earth have been produced; only because the planet Earth is so geologically active could it sustain life and only because life on Earth is so biologically active has it remained so geologically active. Lastly, only because the Universe is so active will life continue to exist. For as life on Earth eventually dies, as its star, the Sun, burns out, somewhere else in the Universe, life will evolve. This will occur as somewhere in the life cycle of another star conditions are created that can support a form of Life. Equally, at a micro level on Earth, memes co-evolve and compete between themselves and with genes. This competition has the effect of altering the chances of both memes and genes surviving as their competition alters the genetic makeup on which memes currently survive, planetary geology alters as a result of the competition within and between replicators, threatening to create a mass extinction. On earth there have been five such extinctions, and a sixth is considered by some to be imminent thereby affecting the chances of life being sustained on Earth and in what form, altering in turn the dynamics of the universe (Lamb and Sington, 1998). Also just as our universe was created from two others colliding another universe might be heading our way, creating another collision. Taken as a whole, as planets and life on those planets which can support life evolve, the universe too evolves moving towards a big bang. Thus infinite and interdependent dynamism is vital to the system; it is the essence of the system that we live in. It is the system.

Lovelock (1988) was the first to propose that the earth operated as a single system, yet mainstream evolutionists do not cite his work. Somewhat ironically it is left to a fierce critic of evolution (especially with regard to how it is sometimes presented), namely the



philosopher Midgeley, to point out that evolutionary theory would be improved by its inclusion (Midgeley, 2000). Equally the work by physicists in the area of cosmology and parallel universes has yet to be brought under the banner of evolutionary theory. The work remains in physics and cosmology journals and is only explained in more general terms on the Internet. Lastly, although the term Universal Darwinism (Dennett, 1995) was coined to refer to the over-arching nature of evolutionary theory, it refers only to genetics and memetics. If however the principles of evolution do apply to all systems, these are the systems they apply to given that each presents itself with a different form of knowledge and each can be thought of as giving rise to the next form or branch and each comply with the fundamental premises as developed and defended here.

Importantly, each form of evolution is faster on average than the one before. For example one of the fastest forms of evolution currently is the battle between memes about antibiotic production and resistance and bacteria that replicate quickly building resistance as they change their knowledge base upon reproduction. The notion that newly evolved forms of evolution are faster than their predecessors is logical in that any new form must replicate faster to have a chance of competing with other forms.

#### **2.4 Social evolution and memetics**

In this section the memetic explanation of social life is described and reviewed in the context of why memetics is needed and in terms of the alternative evolutionary and anthropological explanations of culture that exist. The section serves to justify memetics not only as a theory that fits in well with all other areas of evolution and hence the fundamental principles of evolution but also as a theory which adds to current views on social evolution. The outcome is a defence of memetics as the most robust evolutionary explanation of social life.

Memetics is discussed in detail in terms of its relationship with biology and evolutionary theory, its evolutionary explanatory potential and what can and cannot be said about memes. Debates in memetics are commented upon including the ontology of memes (a physical entity, functional knowledge or imitation), the question of what is agency and intentionality within social life, the problems of building empirical evolutionary explanations, emergence and memetics and the implications of this overlap, what is considered as careless language (selfish rather than selectable gene or meme and competition rather than competition and co-operation) and even more generic areas of debate.

As regards why memetics is needed, if one accepts the notion that each form of evolution can create other forms of evolution and one wishes to explain why physically non-adaptive aspects of humans such as our large brains exist, then one moves into the realms of using evolution to explain what happens in social life. (Note that the assumption here is that as brains are produced as part of genetic evolution then underlying their non-physical adaptiveness must lie another form of evolution that does confer fitness.) Undoubtedly culture evolves in the sense that as time has passed there has been:

*'a general increase in both the complexity and diversity of cultural forms'*

(Aunger 2002:24)

Indeed as mentioned above Darwin found inspiration for his theory in the notion as suggested by leading figures of his time including Spencer, Morgan and Tylor (Ingold, 1991) that societies and cultures evolved, albeit their notion contained an aspect of progress which evolutionary theory does not.

There are however alternative explanations as to what exactly this involves. Sociobiologists (especially Wilson, 1975), who invented the term sociobiology, postulated the first evolutionary theory of culture in which genes are seen to interact very specifically and uniquely with the environment. He sees culture and social life as another branch of biology. The possession of a gene might not be of any significant consequence in one environment but can become deadly in another. Thus the phenotypic response is not encoded in the gene but the genetic make up of the person affects its response to an environment. Thus genes for cancer may only become deadly when the owner inhabits an environment associated with a diet that increases the chance of that cancer becoming phenotypic. The genes therefore code for different reactions to different contexts. The unit of analysis is the gene in the face of a certain environment. Social information transmission is not considered as needed to explain culture, instead the brain is considered to adapt quickly to new local conditions by processing information and coming up with the 'best' (whatever that might mean) genetically encoded rule. Sociobiology has proved to be able to explain certain empirical findings in terms of whether a behaviour complies with producing more offspring. Where the studies are successful tends to be areas where fitness is closely associated with biological fitness. Explanations, as Aunger (2002) discusses, of, for example, use of the contraceptive pill, is

something sociobiologists cannot tackle as such behaviours go against biological fitness. In this thesis such explanations are not rejected, but socio-biology as a theory able to explain everyday knowledge emergence is rejected.

Evolutionary psychology, which as the term suggests, adds the dimension of psychology to the evolutionary story (for the latest review see Cosmides and Tooby, forthcoming) is another alternative theory to memetics. Once again referring to Aunger's (2002) critique of the field, he refers to evolutionary psychology as conceiving of the brain as having a series:

*'of evolved psychological mechanisms designed by natural selection to solve adaptive problems that our ancestors faced recurrently'*

(Aunger 2002:37)

The mind becomes a matter of many mental models or cognitive programs, to use the Cosmides and Tooby expression, designed to cope with everyday adaptive problems with matching neurophysiological circuits. So just as natural selection has created physical adaptations, so has cultural evolution developed psychological adaptations. Neural circuits were designed by natural selection to solve problems that our ancestor's faced during past evolution. So here, not only as in socio-biology has the structure adapted over time due to natural selection, but so has the knowledge content. What we need to know we are born with. The expression of this knowledge takes time and an appropriate moment. The problem with this stance is that the human brain does not, Aunger argues (p:44), have the capacity to hold such a stock of information. Equally there is as much within group variation as there is between group variation in studies conducted by evolutionary psychologists. So although murder rates can be related to genetics in that people are less likely to kill someone who harbours their genes, there are also huge variations within these groups according to the presence or absence of a 'gun culture' (Daly and Wilson, 1988).

In conclusion, cultural variation is both significantly independent of genes and of the environment turning on or off some universal set of rules. There is far too much cultural variation for these to be sufficient and accurate explanations as much as sociobiologists and evolutionary psychologists like to think of the social transmission of culture being insignificant. The inability of these theories to explain anything other than broad cultural differences is why they are rejected in favour of memetics.

On the other extreme there are anthropologists who see culture as extremely significant and in some way a transmission process. They claim that memetics adds nothing new in that epidemiological studies of cultural transmission are common (Aunger, 2002). Here one enters into the realms of cultural selectionism, which attempts to explain why culture is different, in that culture is distributed over space and transmission is imperfect over time. As considered by Mayr (2001), in its broadest sense culture needs to account for differences in the knowledge pool. There are, as Aunger (2002) points out, differences in views as to what the underlying process of transmission is. Above all Aunger poses the question does culture involve replication? If so a replicator needs to be found and if not then there needs to be a way of constantly recreating beliefs in each mind (Aunger p:333) whereby each person lives within their own psychological box. If one accepts that culture does involve replication then memes, so far a theoretical construct, should explain culture and adhere to evolutionary theory. This thesis therefore accepts that culture might not involve replication but chooses to investigate this possibility by seeing whether culture can be explained if it is assumed it does involve replication.

Memetics takes an alternative view on culture. One that is not an extension of the branch of physical evolution and hence biology in the form of sociobiology, nor is an integration of another base discipline, psychology, into biology in the form of evolutionary psychology. Memetics starts with the general observation (Aunger, 2002) that over the ages life has become more and more complex as time has allowed greater and greater types and levels of variation to be created and retained, or not. This complexity, memetics states, allowed forms of life to live longer and to begin to adapt to the environment as it changed within the same generation of life. *In extremis* this trend produced humans, (Blackmore, 1998). Complexity is thought to have provided the opportunity for another replicator to emerge. The emergence of this new replicator follows the logic that it is difficult to imagine that at some point in history evolution stopped being responsible for what was happening within the universe and another mechanism took over. It is not based however on the premise that social life can and should be explained in the same way, or should follow the same mechanisms, as organic evolution. Instead it is based on the need for there to be some (evolutionary) explanation of the size of the human brain, especially given that this physical feature of humanity is a cause of death in childbirth, and thus must have some evolutionary advantage that outweighs its disadvantages. It is also based on the notion that there is reason to assume that the production of variety that is so fundamental to Darwinism is highly likely to have produced other ways and forms of

creating variety that have been selectively retained and which explain today's more rapidly transforming and more theoretical knowledge-based world.

Dawkins (1976) coined the term 'the meme' to represent the nature of knowledge that is responsible for socially initiated forms of inter-relatedness. He thought of them as being ideas, inventions, stories and songs which are imitated during social interaction. Blackmore (1999) postulates why and how such a source of knowledge might have evolved. She critically reviews the explanatory power of alternative theories of the same phenomena. Interestingly, many of these theories are 'socio-biological', meaning they are evolutionary sub-theories which explain such social phenomena exclusively in terms of genetics. These theories include those which attempt to explain what makes humans different from other species, both in general and specifically in terms of man's disproportionate size of the human brain, why language has evolved and what is an adequate explanation for altruism. In critiquing these theories she reveals, as does Auger (see above) gross inadequacies in their explanatory power, meaning such phenomena cannot be explained, at least fully, in terms of socio-biology and evolutionary psychology

Blackmore's starting point in her investigation of the explanatory power of memetic theory is that humans are different from all other life, not because of their ability to think or be conscious, defined as what it is like to be me, but because of their ability to imitate. This ability to imitate is inextricably connected to the meme. The New Oxford English Dictionary defines memes as:

*'An element of a culture that may be considered to be passed on by non-genetic means, esp. imitation.'*

Although the specific origins of imitation may have been lost in history, it is easy to imagine that the ability to imitate was a useful asset. It is also easy to imagine why it evolved in man, rather than any other species, given man's combination of overall intelligence would provide the brain power to select what was worth imitating, and good motor control enabling him to do so. The social skills of man would have also been important in developing the ability to see the world from different perspectives i.e. to be able to imitate one has to step into another's shoes in order to infer intentionality in other people's version of events. Once imitation commenced, it would have become important to

imitate the most successful people. Given natural genetic variation, it is logical to presume that there would be some genetic variation in people's ability to imitate and thus in time genes for imitation would become widespread within the gene pool, giving rise to selection for imitation. The second step would be the action of imitating the best imitators. The third step would be to mate with good imitators. Blackmore suggests that this evolution of imitation drove the increase in brain size within humans to a size proportionally greater by far than any other species. Furthermore, cognitive studies have shown that imitation does in fact require a lot of brainpower whilst alternative theories of 'the big brain' are comparatively inadequate in this regard (Blackmore, 1998).

This discussion of imitation leads logically to the question of what purpose does imitation serve. The answer Blackmore provides is to spread memes, just as reproduction spreads genes, without having to re-invent the wheel. The origins of language can, for example, be explained in terms of its function being the spread of memes. It is thought that when language evolved it provided a selective advantage to memes and thus language can be thought of in terms of memes hijacking the genes to build better and better meme spreading equipment, such as the brain. The Internet, CDs, radios and TVs can all be thought of as meme spreading apparatus, causing us to spread memes more and more quickly (Blackmore, 1999). Interestingly, BT no longer understands its own telephone network and the Internet also has the feel of a system with a life of its own. Irrespective of memetic theory, it is undeniable that knowledge is being created and disseminated ever more quickly as time progresses. Thus memetics can be said to explain why societal change is becoming both faster and more obviously knowledge-based. Memes increasingly have the equipment to replicate faster, producing more knowledge and this same equipment means the knowledge produced can be disseminated faster. This phenomenon promotes faster adaptation in an ever more complex system. This equipment has been selected for as it promotes faster adaptation. The ultimate evolutionary competition can be thought of as the memetic development of new antibiotics and anti-virals that have to keep pace with the equally, if not more rapid, evolution of viruses and resistance bacteria, courtesy of their short replication times that can produce new knowledge under pressure very quickly. In essence memes therefore compensate for man's long genetic replication times.

The Blackmore view explains why memes might have evolved and why their replication times are becoming faster. What follows is an exploration of the characteristics of memes.

These include the ontology of memes, the process by which they are copied (irrespective of whether this is dependent on imitation) and the nature of memetic agency.

The ontology of memes can be addressed by asking the question 'what would a meme look like if you saw it walking down the road towards you'? This is the view of people who incorrectly assume the ontology of genes lies in the physicality of DNA molecules or in the sequencing of the four chemical bases or codons that make up DNA (or indeed RNA). The ontology of genes does not lie in the DNA or the bases that make up the gene according to the latest thinking (Dennett, 2000). It lies in something more abstract. The ontology of a gene lies in the knowledge it possesses. The gene codes for a physical entity which creates a functional relationship with the world. It is a piece of knowledge about the world which has been incorporated into the gene through the evolutionary process. This distinction is the equivalent to celebrating the sequencing of the human genome, only to realise the more substantial leap in knowledge will come in the more distant future, when molecular biologists discover what each gene codes for and hence the relationship with the world each gene creates.

The stance that memes are 'relational knowledge' is ontologically stating that memes are knowledge about the world (Plotkin, 1993). Memes allow life to socially relate to and interact with its environment such that it becomes part of the system. In contrast, genes allow life to relate to the world through physically mediated interaction, including in certain animals a physical brain which has the ability to imitate. So in terms of deciphering the knowledge content of evolutionary data, it is necessary to think in terms of the knowledge content of the data. Specifically when data contains sufficient meaning to be transferred to another person in the form of a gene through physical interaction or a meme in terms of social interaction. For it to be sufficiently meaningful to be transferred to another it must be sufficiently meaningful to the researcher too (unless the researcher is trying to attempt to understand data that she is unfamiliar with). The operationalisation of this construct thus involves dividing data into sets of words that have stand-alone and hence transferable meaning taking into consideration the context in which the meaning is being transferred.

More specifically, Dennett coins the terms of IT hackers, 'thinkos', to distinguish between typos in DNA, (which is the level at which geneticists start, albeit they then proceed to work out what changes in functionality are causing changes in the alphabet of DNA and what happens in memetics. His argument starts by stating that our species name, *Homo sapiens*, is well chosen in that we are a knowing species and it is our culture and social

nature which makes us so. As regards *Homo economicus*, defined as an intentional being that acts in his or her self interest, Dennett explains that, in his evolutionary view, man uses its 'intentionality' associated with our higher, semantic capacity than non-memetically driven species possess, such that the recipe for functionality (DNA style) is not copied but the intention within the meaning being expressed is copied. This point is at the crux between memetics most eminent supporter, Dennett, and memetics most fervent critic, Sperber.

*He (Sperber) supposes that this invocation of intelligent, semantically sensitive, intention attributing agents in the purported replication process flies in the face of a fundamental requirement of Darwinian processes; mindless, purposeless mechanisticity..... Genetics edits with an eye toward what the message says not what it means. Clever human beings, in contrast, edit with an eye toward meaning.'*

(Dennett, 2000)

So although Sperber considers man's ability to be semantically sensitive as evidence that evolution which has no design cannot apply to social life, Dennett turns the argument on its head and declares that this semantic sensitivity and ability to interpret other's intentionality in their own way, is what produces variation. This thinking suggests memetic evolution occurs through differences in semantic interpretation of memes by semantically sophisticated, subjective beings. Only man has the ability to interpret meaning in others in a sophisticated way. The importance of semantic interpretation is also voiced by Teubner (2002 in Wheeler eds). This stance suggests that finding words in data which express a meaning will identify memes. Others would suggest this interpretation of the meaning as intentionality suggesting more work needs to be done to unpack this aspect of memetics. Can we be intentional but be part of a system that does not always emerge as we intended? Or are we intentional only when we stop to reflect? Or are we never truly intentional as we are the memes that have entered our heads in the past and some at least of these will have entered our heads without reflection? Any future intentionality will be a function of these memes and therefore can we never be truly intentional?

An alternative ontology of memes is suggested by Aunger (2002). Memes ontologically in terms of evolutionary epistemology are pieces of knowledge. Physically it is not known what they might be, although Aunger has postulated a neurochemical basis for them. In terms of furthering the memetic debate his argument is three-fold. He states that memes are



above all neurochemical states in the brain and it is these that are replicated (as with genes) whereas the social transmission of knowledge between people is a signal. This in my view is problematic, as although we do need to find the physical equivalent of memes, finding genes through the human genome project has not led to an increased understanding of evolutionary dynamics given that this relies on deciphering functionality. In placing an emphasis on the physical status of memes Auger has moved away from the Blackmore and Dennett stance of memes being knowledge. Auger has however, in line with Dennett and Blackmore, specified that memes are not routines, behaviours or artefacts. Thus a toaster is an artefact of memes whose lineage starts with cooking food and ends perhaps with the latest style trends being incorporated into toasters: whereas routines are perhaps a type of meme, behaviours are interactors of culture rather than what is replicated (Auger 2002:167). Similarly Adam talks of evolution in terms of energy and is critiqued by Sixel (1991) because ontology involves a mind-matter dichotomy in the sense are memes something physical and real or something abstract and intangible. Taking knowledge or meaning as the basis of evolution does not create this problem, albeit he accepts that energy differences between neurons might result from knowledge dynamics. The point being made is that the considering the ontology of memes to be knowledge-based is very reasonable but is not what all memeticists consider as the ontology of memes.

As regards the robustness of memetics, Jahoda (2002a, 2002b) challenges Blackmore (2002) as regards the strengths and weaknesses of the imitation aspect of memetics which can at least in some respects be a debate about ontology. Above all they debate the extent to which imitation as part of culture and imitation related to cultural evolution have been raised before. Jahoda quotes Darwin, (1803), Bagehot (1872), Baldwin, (1897), Tarde (1895) as having previously made the connection.

There is also a tone to the debate in which Jahoda accuses Dawkins and Blackmore of somewhat sloppy language which can lead to memetics being taken less than seriously by academics and clouds debates about its content. Midgley (2001) also critiques memeticists for being far too inaccurate with language in attempts to make their work more accessible. In particular, she rightly emphasises that the use of the words 'competition' and 'selfish' are misleading in that the term selectable should be used rather than selfish and that co-operation occurs as much as competition. She rightly also points out the systemic nature of evolution is often under-emphasised and highlights the validity of the Gaia hypothesis in this regard. The Gaia hypothesis does, as I do here, take the view that our planet and even

the systems beyond act as a single system. Where perhaps Midgley and Dennett disagree is the stance Midgley takes with respect to the ontology of memes lying with a physical state, in the same way the ontology of genes is considered to lie mistakenly within DNA, rather than with their functionality as Dennett upholds. This is explained in detail in section 2.4.

More importantly there is the debate of metaphor with Jahoda claiming that as information particles cannot literally compete, then memetics must be a metaphor. In this vein he highlights Blackmore's use of the phrases such as the meme 'needing' or 'wanting' something. Jahoda does not mention whether or not he agrees that genes, which are equally pieces of knowledge, can be said to compete in the same way. Memes (and genes) do compete in the sense that they differentially survive to varying degrees into further generations. Lastly and somewhat inevitably Jahoda and Blackmore debate the nature of agency and the implications of memetics on agency. Here the different style of language clouds the debate. Essentially however Jahoda makes the point that humans can be intentional and make choices. Not-with-standing this problem, it can be seen that there is the same problem in memetics as there is in the Gould-Dawkins selfish gene debate. The whole of the system affects the whole of the system so it is very difficult to unpack and explain the dynamics of evolution. That said this thesis upholds the Blackmore and Dawkins version that agency is best explained from the most micro level, meaning selection happens at the level of genes and memes or at least that this level of analysis is worth investigating in order to question just how intentional humans can be about each meme they encounter. That said, it is appreciated in the spirit of Gould, but which is not emphasised by Dawkins or Blackmore, that such units operate within bigger complexes such as bodies and minds. If these do not survive then every replicator in them does not survive either whether it, in isolation, conferred fitness or not. Equally as Gould points out, what can possibly survive is a function of the environmental niche surrounding the replicator and any gross environmental perturbations which may occur within the environment. So ultimately agency lies in the system. This thesis seeks to explain what this means for man.

What follows is more detail on memetics regarding variation production in the form of copy fidelity, the issue of agency and more generic debates within memetics. After that there is discussion of the problems involved in conducting empirical investigations within all branches of evolution.

Mememes are thought to relate to each other. Dawkins talks of the concept of memplexes in which mememes that are related co-evolve. This also occurs in genetics where groups of genes

cluster together on chromosomes according to expression patterns (Hamilton, 2002). This draws on the concept of the gene pool of a species (all the genes that make up a species), which can be seen as a group of mutually co-operating genes (Blackmore, 1999). Blackmore warns however of drawing too much from the notion that the properties of genes can or need to be transferred to memes. Thus, although it can be said that memes do relate to each other, how has yet to be elucidated. What can be said, as is in genetics, is that in content terms genes and memes can be more or less similar to other genes and memes. In genetics this concept is used to work out retrospectively what the likely evolution of genes within a species must have been (so called phylogeny). The more similar the content between genes, the more likely they are to have existed close together in time. Making this assumption does have the disadvantage that, on occasions, mutations between single generations can cause great changes in content. This is why as a technique it has been shown to be imperfect in reconstructing the path of genetic evolution (see Chapter Three for an empirical example). In memetics there is no need to recreate retrospectively the path of evolution as it happens so quickly, meaning data of live evolution over many generations can be collected. The grouping of memes, which have been generated over a certain time span, should permit the overall knowledge content within that population of memes to be deciphered. Indeed, this is what is done as an analytical step in answering the 'how' element of the research question and is discussed further in the following chapter on methods.

As regards the process of social evolution, Imperfect copy fidelity is responsible for the creation of new knowledge (Dennett, 2000). The source of this imperfect fidelity is differential semantic interpretation, rather than the imperfect physical copying of genes as in genetics. Generational replication times are much shorter in memetics than in human genetic replication and the copy-fidelity is lower. Copy fidelity in genetics has to be high, otherwise the species would die out, but has been manipulated through an understanding of genetics in the search for pharmaceuticals (Radman and Wagner, 1988). Both characteristics of the process of social evolution create challenges for the researcher, as semantic differences (in memes) are more difficult to determine than physical differences (in genes) and faster replication times and greater levels of imperfect replication make for a complicated analysis process. This issue is covered in more detail in the next chapter.

Agency within memetic theory lies, as it does in genetics, with the ability of the meme to be copied. Whether this happens is a function of whether the meme brings the system back into

balance. The system is however so complex that, as in genetics (Hughes, 1999), memes might be copied for a long time, relatively speaking in neutral mode, before they cause imbalance in the system such that they reduce in prevalence. Memes are said to possess strategies which make them more or less likely to be copied in different contexts, creating the differential distribution of knowledge that is evolution. The example most often given to illustrate this point is that of computer viruses, which do not benefit humans, but which do hijack the memetic machinery of humans to ensure they are replicated. The Melissa virus is a case in point; a file entitled 'I love you' was opened by millions via e-mail causing substantial structural damage to PCs and financial damage to the businesses to which the knowledge inside the computers belonged. The content of the virus was a programme which damaged the hard drive of the computers, whereas the so-called meme strategy was the 'I love you' part that served no other purpose than to increase the chances of the meme being copied. This differential copying is said to be the basis of the direction of social evolution. However, exactly what these strategies are has yet to be elucidated in memetics in everyday terms. Equally as Ingold (1991) in a paper which discusses becoming persons within human evolution points out, social relations suggest that the rules are embodied and emerge within institutions and depend upon a distinctively human mode and ability to be self-reflexive. Others argue that intentionality was a part of Darwin's theory (Costall, 1991). Such variety and essentially theoretical views suggest that empirical work is needed to explore and unpack intentionality within an evolutionary framework.

At the level of the relationship between evolutionary theory and philosophy, evolutionary epistemology (eds. Radnitzky and Bartley, 1987) also comments on agency and rationality within social life. Authors of this edited tome of evolutionary epistemology include, amongst others, Donald Campbell and Karl Popper. The views contained within evolutionary epistemology are in some ways in agreement with memetics, in others not. Evolutionary epistemology and memetic evolution agree that evolution created our brains. The focus is on understanding the process by which knowledge grows within our minds. In particular there is agreement with the view that evolution is a knowledge process with stored knowledge resulting in adaptation; for evolution is both a process by which information about the environment is incorporated into the organism and involves explaining changes in the frequency of that knowledge stock over time.

Returning to Lamarck, evolutionary epistemologists see nearly all traditional epistemologies as Lamarckian, as they consider knowledge to arrive through instruction rather than

adaptation and selection by the environment. This view is somewhat difficult to unpack relative to memetics. It can be said that memetics sees the selection process occurring as a result of the human mind not letting a meme be harboured by it for many reasons which could be familiarity with what the meme is expressing, an emotional pull to the meme even though the content is not that attractive etc. Specifically, Popper sees theories in science as being selected in this fashion, with that which survives being the theory that natural selection proves itself fittest to survive. However, by fittest he means whether upon empirical testing the theory through application survives the test. This could indeed be one successful meme strategy (and indeed appears to be so in the scientific case study looked at in this thesis – the ‘mars case’). However, this is a different definition of fitness from that considered here and generally in memetics, which considers theories as memes and hence able to survive for a host of reasons, only one of which would lie within the area of scientific positivism. What is rational in memetics is what makes a meme prevalent. Evolutionary epistemologists do refer to an ecology of rationality where rationality is a process of conjecture (blind unjustified variation) and refutation (selective retention). This logic is akin to the stance within the thesis in stating that the survival of a theory does not guarantee it will survive forever. However, whereas in evolutionary epistemology, especially according to Popper, this is courtesy of the theory being refuted scientifically over time and the truth being discovered, in this thesis the stance is taken from Plotkin (see below) that nothing is truly true, just able to fit within the system for a longer or lesser period of time or in some cases no time at all.

There are even more generic areas of debate within memetic theory which are the result of the theory’s wide appeal that ends up including a number of disciplines in its wake. The theory’s origins are biological, but as it comments on social life just how strictly biological can it be? Should it include psychology or should it treat the brain as a black box for the moment whilst our knowledge of how the brain in the form of neurobiology catches up? Equally for the social sciences, memetic theory promises to open up the black box of bounded rationality, yet real insights into social contexts are as yet lacking. Meanwhile anthropologists argue that memetics holds nothing new for them as they have studied cultural differences for many years. Such critiques are articulated in Auger (ed, 2000) in which a collection of authors debates the validity of the concept of memetic evolution. Criticisms include memes possess too low copy-fidelity to be evolutionary, memes are not as distinct as biological species, their hereditary lineages are too complicated to discern empirically, imitation is too simple a mechanism for culture, the lack of human-based

agency is not credible, there are non-informational components to culture, memes provide no more explanatory power than previous anthropological epidemiological niche construction experiments. These are all difficult to refute without empirical research.

Despite the universality of evolutionary theory, indeed perhaps because of it, the strongest critiques of the theory lie within the general problem mentioned before of building convincing empirical explanations. Firstly there is the issue of 'adaptive story telling' (Gould and Lewontin 1979). The essence of this argument being that evidence of adaptation does not demonstrate the existence of natural selection. The notion of the complex system lacking foresight, in particular the notion of the gene being the unit that is subject to selection pressure (Dawkins, 1976) has come some way to alleviating this problem. If selection works on the level of the smallest replicating unit, this unit needs to be the subject of empirical scrutiny in order to counter accusations of 'just so' stories. This approach involves working at a very micro level made available in genetics only recently. The advent of molecular biology, particularly in the form of rapid DNA sequencing, (Maxam and Gilbert, 1977) revolutionised evolutionary theory. As Hughes states and shows in his review of empirical genetic research Darwinian theory has been difficult to prove but with the advent of DNA sequencing the effects of natural selection can be followed at the level of the individual gene, (Hughes, 1999)

Gould (2002) however disputes the validity of the gene (and therefore by extrapolation) the meme being that which is selected. He considers the situation to be far more complex with multiples of genes interacting with an environment that presents at different times very different evolutionary situations. Some situations may result in mass extinction of a whole species, others may result in the slight alteration of the functionality of a gene. This has implications for building empirical explanations. What is advocated in the paragraph above is the creation of a micro to macro picture. As regards the most appropriate way to build evolutionary explanations, the principal opponent of Dawkins has been Stephen Jay Gould (1996 and 2002).

Gould was an 'evolutionary pluralist' where Dawkins is a 'hyper Darwinian' and a reductionist (Sterelny, 2001). As with Mary Midgely, however, it is debatable as to how contradictory their views are. Dawkins very much sees evolution as being able to be explained at the level of the gene using a modus operandi of explaining natural selection through the most micro unit of analysis. In contrast, Gould liked to work at the level of complex systems. Specifically he emphasised that evolution was and is not always gradual

but could and can be sudden in the case of dramatic environmental influences. He coined the term 'punctuated equilibrium' to encapsulate his view. It can, however, be debated as to whether Dawkins says anything that contradicts this statement. Within Dawkins' thinking, evolution is not a matter of progress but a matter of producing variation. Whether that variation is or is not retained dictates the speed of evolution. Gould also emphasised the possibility of non-adaptive structures that constrain function but this again is not so much something that Dawkins would argue against, it is just not something he emphasises. Only the variation that does further functionality is selected into future generations. Furthermore, neither Gould nor Dawkins have integrated into their work the more recent, but as yet barely comprehensive knowledge of genetics, that has revealed how complex genetic expression is made through regulatory regions, how much non-coding DNA there is and how much unexplained repetition there is. Campbell (1965) recognised the problem, even before it existed, of adopting either a micro-reductionist and macro-contextualist stance. Irrespective of how much these two views of evolution really do disagree rather than represent two like minded people working with the phenomenon from different levels, it is beyond doubt that the debates between the two have been in the spirit of good academic discussion and hence have progressed the field.

An argument has been put forward that evolution explains much, if not all, of history. If this is so, then it is likely that evolution is knowledge-based, lacks foresight and agency lies within the system as a whole rather than within any part of it. An overlapping argument has been presented that memetics, an evolutionary explanation of social life, fits into this argument and is the most robust explanation of everyday social life (where everyday is used to denote elements of social life that are not explainable by our genes). Furthermore as organizational life is part of social life there is reason to think that if this logic is valid memetics ought to apply to organizational life. Lastly there is the notion that evolution is knowledge-based, hence memes are knowledge-based and organizational theory needs a knowledge-based theory.

There is, however, one last area of the field that must be considered before the meme can be explored within organisational life. Organizational evolutionary theory is a field in its own right. As such it is necessary to investigate how this field has dealt with the issue of how broad is evolution, what is the theory of culture and social evolution and what is the natural unit of selection within organizations to place this field within the more general field of evolutionary theory. In particular the section will address the last justification of applying

memetics to organizational life, namely that it might provide insights into agency, intentionality and rationality because it does not assume functionalism. This approach is taken to establish what common ground does and does not exist between the two fields given that in many respects they should not be two fields given they both rely on evolutionary theory.

### Organizational evolutionary research; A comparative review

As in biological evolutionary theory, where research has moved from a macro to a micro level, specifically from species to niche level to single gene level, organizational evolutionary research has moved from an industry-level population-ecology level (Hannan and Freeman, 1984) to the level of routines (Nelson and Winter, 1982) to strategic initiatives (Burgelman, 1980 and 1983) within firms and towards memes (Weeks and Galunic 2002). Evolutionary organizational research can, however, be considered a field in its own in that cross citations between the researchers mentioned in the above section and those working in evolutionary organizational research are few and far between. What follows is a review of evolutionary organizational research which considers the implications of this in terms of the theory, the three premises rooted in the theory and upheld within this thesis as fundamental and knowledge-based memetics. This section therefore serves to place the review of evolutionary theory outside of organizational evolutionary theory in the context of evolutionary theory and vice versa. This is not easy to do but this in itself makes the point that there is a need to integrate evolutionary organizational theory with evolutionary theory.

### The theory as a whole

As regards the theory, evolution is used far more as a 'perspective' or 'approach' (Aldrich, 1999:20; Nelson and Winter, 1982:3) or as a 'metaphor' (Nelson and Winter, 1982) than it is as a theory, as in the case of this thesis. This position leads to the selective use of certain concepts over others, or an emphasis of one evolutionary concept over another. Aldrich (1999) emphasises the notion of selection. Nelson and Winter (1982) use the concept of fitness in terms of economic organizational survival as do Hannan and Freeman (1977 & 1984) at an industry level and Freeman (1983) in terms of population ecology. Burgelman (1983) uses the variation-selection-retention framework to examine competition between two strategic initiatives and Brown and Eisenhardt (1997) use the concept of lack of foresight in investigating the use of low cost probes into the future rather than detailed



planning. Others use the concept of co-evolution to study multi-level competition and technology development (Jenkins and Floyd, 2001). This heterogeneity on the one hand is beneficial as it tests out a variety of assumptions, notions and links between certain evolutionary concepts, on the other hand it makes for a difficult field as the work lacks theoretical coherence as it is only loosely associated with the theory as a whole, including all evolutionary concepts and their inter-relationships.

More specifically, over and above the declaration that the position taken by the researcher or theorist is one of an 'approach', 'perspective' or 'metaphor', little attention is paid to making a clear connection between the stance being taken and the debates and areas of controversy within evolutionary theory. Important issues are rarely considered. These include what extent evolutionary theory is being used as a metaphor or analogy, how is evolution being defined and hence what organic theories and areas of life (such as geology and social life) count as being part of the field, what stance is being taken with respect to advances in the field of evolutionary thinking in the social sciences and what is the natural unit of analysis of selection for organizations. Each of these issues are now taken and investigated further and their impact discussed in terms of the choice made within this thesis to apply memetics.

With respect to metaphors, Nelson and Winter (1982) make it very clear that their use of evolutionary theory is metaphorical and that only the parts of the theory that they claim help in understanding the phenomenon in hand are those that are used. Over time however this disclaimer has been lost and most, if not all, evolutionary organizational research neither makes clear that the theory is used as a metaphor, nor alternatively states what the author(s) consider as the justification for the extension of the theory beyond gene driven evolution into social life. For example, Lovas and Ghoshal (2002) use 'evolution' as a colloquial term for gradual change interchangeably with 'evolutionary theory'. Another example is provided by Burgelman (1983), who uses the variation-selection-retention framework but does not cite any evolutionary references, indeed states that he uses grounded theory to draw his conclusions. Criticisms of this practice include that of Young's (1988) questioning of the validity of population ecology and Tsoukas (1991) who makes clear the dangers in using metaphors, using biological metaphors within organizational theory as an example. In particular, he highlights that metaphor can be used to make a point more understandable but at the risk that in further development of the field the metaphor might no longer be valid. This critical line of thinking has, however, never been extended to

the general use of evolution as a metaphor within organization theory by those working within the field and as such the field has grown without any adjustments to accommodate such criticism. Although, not explicitly stated by the authors, but noted by reviewers (Meeus and Duysters, 2001), more recent work can, however, be considered to have moved away from the metaphorical early work. This trend is especially notable in terms of trying to identify the means by which the processes of variation, selection and retention take place (as seen in Baum and Singh eds, 1999 third section).

This thesis makes clear that memeticists do not consider memes to be metaphors (Blackmore, 2002). This stance relies heavily on memes being knowledge-based in that, as represented by the Jahoda-Blackmore debate (2002) mentioned before, if this is considered the case then memes like genes can be said to really compete. Once memes are not considered to be metaphors but 'truly' part of the theory, memetics must stay true to that theory in all its elements and cannot choose what appears to be appropriate. Thus the use of memetics arguably is a more robust theoretical stance to take when applying evolutionary theory to organizational life.

Advances in evolutionary theory outside of the very specific domain of organizations are rarely mentioned and evolutionary theorists are generally rarely cited. This means that developments in evolutionary epistemology, evolutionary psychology, socio-biology and memetics are not referred to. Also various units of analysis are used from communities to populations to organizations to routines to activities to strategic initiatives (Aldrich, 1999). The question of the impact of working at a micro or macro level of analysis, in the style of Gould and Dawkins, are not entered into nor are the units of analysis which are used compared with those used in evolutionary epistemology (knowledge), sociobiology (genes), evolutionary psychology (cognitive schema) and memetics (memes).

This situation of a lack of attention to the theory as a whole tends to mean that evolutionary concepts are repeatedly taken from evolutionary theory and 'played with' within an organizational context without referring to the original basis upon which these concepts were developed. Baum and Singh in their opening chapter to their edited book (1994:3-20) attempt to create an over-arching framework of organizational evolutionary research. They introduce numerous evolutionary concepts such as 'interaction and replication', 'ecological and genealogical', 'taxonomy', 'Lamarckian versus Mendelian inheritance', processes such as 'replication', 'mutation', 'recombination', 'random drift', 'learning', 'competition', 'birth and death' and 'natural selection' without once questioning their validity when

applied to a social context or alternatively engaging in debate with evolutionary social scientists. Other concepts have weaker ties with evolutionary theory, such as organizational inheritance, entities (routines, competencies, jobs organizations), processes such as reorientation and entrepreneurship. Yet these are listed along with the 'straight out of' evolutionary theory concepts without any qualifying statements or explanation. The two are then sometimes combined to produce concepts so loosely based on evolution that to call them evolutionary in any theoretical sense is false. For example, Baum and Singh (1994:7) talk of organizational inheritance as 'frequency dependent', varying with either commonness or rarity of organizational practices; 'path-dependent', sensitive to positive feedback on small fortuitous events and 'reputation-dependent', successful enough to be imitated without explaining the mechanisms of inheritance, variation production or selection.

Following in the footsteps of Young (1988) it can be said that terms within evolutionary organizational research are badly defined and how they link to evolutionary theory ranges from strongly to non-existent to unspecified but rarely is this link, or lack of a link, discussed explicitly. A good example is that with which the section starts, namely the trend from macro to micro. Some reference is made in Baum and Mckelvey (eds 1999) in that within biology there has been a move towards 'microstates' but the theory, 'selfish gene' that underlies this is never debated nor are the implications of associated methods discussed. Instead this trend is used to justify moving towards internal organizational ecologies without justifying in evolutionary terms the split between organization and population or community that this move entails (but then this would not be possible). All evolutionary concepts used in this thesis are rooted in evolutionary theory. The thesis also attempts to elucidate very clearly the mechanism of variation, does not mix evolutionary and non-evolutionary terms, makes use of a stance deeply rooted and clearly positioned within the field and debates within the field.

Lastly, there is the issue of unit of analysis. Aldrich (1999:39) on the one hand points out there is a need to establish what the natural unit of selection is whilst also pointing out that routines and competencies taken individually or in bundles, as well as organizations and also possibly communities and populations could, and are, used. The consideration of what the natural unit of selection is within the social sciences and in biology, with the exception of Aldrich, is not debated within evolutionary organizational research. This thesis chooses the meme and justifies the choice, not only in terms of evolutionary theory (memetics is a

branch of evolutionary theory) but also in terms of organizational research (the need for a dynamic, evolutionary perspective non-functionalist perspective on knowledge).

Thus organizational evolutionary research placed within the broader field of evolutionary theory needs to justify itself with respect to several issues. Firstly it needs to consider whether metaphors are still needed. In this thesis they are not considered as necessary or the option that they might not be necessary within memetics justifies the exploration of the use of memetics within organizational theory, and clearly positions the use of the theory within organizations in the context of the theory as a whole. Secondly organizational evolutionary research needs to consider whether advances in the broader field of evolution and complex systems are relevant to organizations. Once again this thesis very much considers them to be so and enters into the debate surrounding them. Lastly it defends the use of the meme as a natural unit of analysis with the potential to explore all of the other units of analysis used so far within organizational evolutionary research under one 'hat'. In particular it sees that this stance allows for all organizational knowledge to be considered as changing in nature and prevalence in the minds of people who have contact with the organization. It is also a unit that allows the nature of intentionality and agency to be explored.

### The three fundamental premises

More specifically, to compare the stance within this thesis with that of organizational evolutionary research, this section reviews the three fundamental premises of evolution this thesis upholds in the light of that same research.

The first fundamental premise of evolution as applied in this thesis, namely that evolution is knowledge based, is relatively unheard of in organizational evolutionary research. Knowledge is frequently mentioned in Aldrich (1999), not however as a unit of analysis or that which is selected, but more in terms of something that does indeed change. Change is a central theme in organizational evolutionary research but changes in the prevalence of knowledge are not present as a subject area within the field. Interestingly whereas evolutionary epistemology is frequently referred to in terms of Campbell's views on variation-selection-retention (about which more appears below) it is not in terms of his view that evolution is a knowledge process (Campbell:47 in eds. Radnitzky and Bartley, 1987) and in terms of Plotkin (1993) who also views evolution as knowledge-based. Although as mentioned previously Spender (1996) does refer to Plotkin and evolutionary epistemologists.

In terms of fitness being the result of a lack of design, the second fundamental premise, the variation-selection-retention framework that underlies this thinking is dominant within the field of organizational evolutionary research as a result of Campbell's (1965) paper 'Variation and selective retention in socio-cultural evolution'. He stipulated in a very theoretically coherent way that variation is haphazard in terms of knowing in advance what will be a good outcome. Hannan and Freeman however interpret this, as mentioned above, in terms of environmental determinism. Most organizational theorists (see Baum and McKelvey (eds) in Honor of Donald Campbell, 1999) however view the production of variation as vital to evolutionary explanations, as the fit between that variation and the environment is vital (see in particular Burgelman, 1983). Aldrich (1999:44) uses the selection framework to create an overview of all major alternative approaches to viewing organizations by asking what varies is selected for and retained and to what transformational effect in perspectives that range from ecological to institutional to interpretive to learning to resource dependence to transaction economics. Miner and Raghavan (in eds Baum and Singh, 1999) contemplate the possibility of variation production being the result of imperfect imitation, which is akin to memetics.

Organizational evolutionary research has differing views on agency, the third fundamental premise, that of agency organizational evolutionary research is diffuse in its views. Aldrich (1999) points out that there is a difference between freedom of action and the efficacy of the action. This has relevance in terms of organizations being goal directed but not always able to reach those goals. He differentiates between 'blind variation' in which involves everyday action between people, trial and error, luck, imitation, passion, misunderstandings, trial and error learning etc. and 'intentional variation' involving planned experimentation, the setting up of incentives to vary from standard routines and powerful groups suppressing variation production in organizations. He therefore distinguishes between what a manager can control and direct and what a manager cannot so easily control and direct. Arguably there is a third category of what a manager can influence, but perhaps not control, within the category of blind variation. In contrast Hodgson (2002) states that there might well be an evolutionary explanation of intentionality.

In much work (see especially Baum and Singh (eds) Variations in Organizational Science. In Honor of Donald. T. Campbell, 1999) Campbell's blind-variation-selection-retention ('BVSR') dogma prevails and in evolutionary theory terms, directs thinking. Ingram and Roberts in Baum and Singh (1999) contemplate that many evolutionary processes may be

co-evolving in organisations independently of the organization as a whole. This stance takes emphasis away from the organization as the unit of analysis and suggests that agency might lie in these multiple processes. What is missing however, and inferred above, is a more detailed explanatory link between intentions and failed realisation and why intentions may sometimes be bounded or non-economically rational.

### Memetics

Memetics has yet to be examined in any detail within organizational theory. As mentioned previously it provides a theoretical position that includes some concepts which harbour promise. These are; the knowledge-based unit of analysis that is associated with certain minds that form communities of practice/interest; a concept of fitness that is related to competition to enter as many minds as possible at any one time and to survive in minds over time; a concept of agency which suggests there may be many reasons why a meme may be attractive to a mind and the thought that many of those might not be economically rational.

The theory is discussed by Galunic and Weeks (2001) in a chapter entitled 'Intraorganizational ecology.' The authors start by stating that resistance to the notion that human behaviour might be explained in the same terms as fauna and flora is unfounded, as ecological theories are not mechanistic and are a way of interpreting and reinterpreting existing organizational theories. They review seminal works, as has been done here, and conclude, as has also happened here, that there is far too little dialogue within the 'community'

*'to the point where we hold check-in-tongue when we call it a domain.'*

(Weeks and Galunic, 2001)

Indeed they reference Dawkins (1989), Dennett (1995) and Blackmore (1999) making the point that the tradition of regarding routines as what evolves should perhaps be extended to include memes. They emphasise the meme strategy part of the theory, stating for example, that memes might be retained for reasons other than economic is what should be investigated. As yet however, to the researcher's knowledge, an extensive and empirical investigation of all areas of the theory has not been undertaken.

In summary, as explained in the previous section, memetics is the most robust theory of everyday social evolution, for as much as socio-biology can explain certain elements of our

lives, it cannot explain a lot that is to do with basic aspects of our lives (e.g. sexual reproduction, hunter-gatherer behaviour). It cannot explain everyday social life that is not linked to survival of our genes. As such it is worthy of our attention within organizational theory. In addition, evolutionary organizational research has some weaknesses that are revealed above including not working at a very micro level, not taking a stance with respect to developments within the field of evolutionary theory, not having a 'natural unit of analysis', not working in a evolutionary domain that is not-metaphorical and failing to use the theory to open up the black box of economic rationality.

## 2.6 The research question

As regards the development of a research question, in summary, the stance taken within this thesis is that Darwinism is a theory which does apply to all open, complex systems, as it is difficult to imagine how the system in which we live could develop following fundamentally different principles, especially as these principles must have arisen from those which already existed. One, if not the most important, of these principles considers evolution to involve the incorporation of knowledge into the system and the creation of variation which either does or does not bring the system back into balance. The mechanism might be imitation but has yet to be elucidated. Here the view is taken that the mechanism involves differential subjective interpretation of meaning as expressed by others during social communication. The thesis rejects the Popperian notion that knowledge survives successive generations *purely* because it is proven to be true through empirical testing, and instead considers that memes might remain in the population for more or less time and inhabit more or less minds for many reasons, or 'meme strategies' to use the language of memeticists. It adopts the view that both sociobiology and evolutionary psychology might well be 'true' but are inadequate to explain cultural evolution, principally because the former cannot explain aspects of culture other than grossly biological ones, and there are many, for example grossly sexual ones, that contradict the concept of biological fitness and because evolutionary psychology based explanations require a larger memory power than the brain possesses. It accepts the notion within cultural selectionism that the transmission of information might not involve replication and memes and therefore might involve the re-creation of beliefs and values in each brain (Aunger, 2002:333) but does not probe into this further, choosing instead to investigate the alternative hypothesis. It accepts that memes in physical terms might exist (as Aunger proposes as neurochemical states) but adopts the position advocated by Dennett (2000), and found to be valid in genetics, that ontologically

memes are the knowledge which they contain. By building an argument that starts at the most fundamental level of evolution it rejects the notion that in organizational terms the 'natural unit of analysis' within organizations can be anything other than the natural unit of analysis within social systems. Having argued that this is the meme, or that it might be the meme if culture is replicated between individuals, then the thesis proposes that the meme is the natural unit of analysis in organizations. This attachment to the meme, in the spirit of the Dawkins-Gould-Campbell debate, does not however preclude more macro explanations or assume that meme based explanations can be fully comprehensive.

The next step in memetic theory is to test empirically its explanatory power using a research design that allows for analysis and inferences to be made at the micro level of knowledge-based memes which open up the black box of economic rationality by empirically exploring what evidence there is for human determinism and memetic determinism within systems of knowledge emergence.

It presents several challenges, not least the under-developed state of the theory itself and the lack of a tried and tested memetic methodology as well the difficulty in creating robust evolutionary explanations because of the complexity of evolution. Dennett has stated in association with Sperber (Dennett, 2000) that memetics faces two main challenges. The first challenge is considered to be the characterisation of the copying fidelity process, the empirical elucidation of which is likely they states, to be an immense empirical challenge given the much lower copy-fidelity of memes compared with genes. Secondly, they consider that the proof of memetics must lie within the provision of empirical evidence of differential copying as the over-riding force directing evolution; where evolution, as ever, is defined not in the colloquial sense of gradual change but in the scientific sense of the differential distribution and survival of knowledge (Hughes, 1999).

So despite the many questions that remain unanswered, memetic theory remains an interesting prospect for a number of reasons. Firstly, it is a branch of one of the most robust theories in existence, Darwin's theory of physical evolution. Secondly, the field is a potential source of new insights because it interests people from a wide range of disciplines from anthropology (Aunger, 2002) to economics (Hodgson, 2002) to biologists (Hughes, 1999) and to psychologists. Thirdly, it promotes a unit of analysis, which because it is knowledge-based, is very apposite to our age. Lastly in emphasising the complex systemic nature of the world in which we live, the theory provides a way of understanding this complexity to the point of highlighting that we are a part of this complex system which is



larger than us. Rationality is said to lie within the viability of the system as a whole, rather than with any element of the system, and indeed any elements of the system can be disadvantaged to save the whole. Memetics highlights that economic man is a recent construction and highlights that emotional man can be drawn into relationships with the world that are un-economic. The theory is an attractive contrast to that which dominates the organizational literature in that it states that in any population of memes, or social context, memes of many kinds may be present and economic ones might be less likely to be copied than non-economic memes. It provides for example, an explanation of the Internet whose self-managed philosophy is penetrating managerial thinking. Furthermore it can be applied directly and to social life using the meme as a unit of analysis, unlike other branches of evolutionary theory which have no natural social unit of analysis. To make any great assertions about memetics as a science would however be premature. It stands currently as a back-drop to empirical work instead of a director.

Taking into consideration these challenges and precautionary statements the following explains the generation of the research question and which keeps the above view of memetics in mind. The nature of the question is justified in terms of how it closes the theoretical gap in organizational theory as regards dynamic knowledge emergence, how the theory can be used to answer the question and why the question is appropriate for this stage of development of the theory.

According to Dubin (1978) and discussed in terms of organizational theory by Whetten (1989), theory development involves a 'what', 'how', 'why' and a 'who-where-when'. The 'what' involves detailing which factors should be incorporated into the theory. The 'how' describes the inter-relationships between these factors. Together the 'what' and the 'how' describe the elements that constitute the domain of the theory. A good theory however goes one step further and describes 'why' we should expect these relationships within our data. Upon completion the researcher must assume the work is part of a never-ending research agenda and explain the limitations of the research in the form of a 'who-where-when' statement.

The primary 'what' in this research is knowledge, in that knowledge, as the literature review revealed, can be seen as a way of explaining differential performance by allowing for the comparison of knowledge creation within an organization, between different settings and within different contexts within those settings (and potentially between different organizations, although this is not done within the thesis but the method developed could be

applied to this task) and between organization and the system they operate within. Memetic theory contributes the unit of analysis, the meme, interaction as a vital social factor and the varying interpretation of knowledge by different people as another factor which contributes to knowledge emergence.

The 'how' becomes a matter of the inter-relationships between these factors. Furthermore, in order to begin to determine the origins of differential advantage within the process and content of organizational knowledge it is necessary to describe how knowledge emerges to create a comparative 'base-line'. The research question then becomes:

*How does organizational knowledge emerge?*

The theory helps in the answering of the question by stating that knowledge is best viewed as independent, self-contained knowledge particles. Memetics states these are interpreted differently by different people, hence change in content over time, and are differentially retained in people's minds producing differential distribution of knowledge across a population of minds and communities of practice/interest that share the same meme. As knowledge content emerges it can therefore be divided into memes and differences in the knowledge content of memes determined. The process by which that knowledge content is created can also be characterised by looking in detail at the nature of the imperfect copy-fidelity between each meme and the previously generated population of memes.

Answering this question provides a description of knowledge emergence in different settings and as such the differences between the settings can be described both in terms of the different knowledge (content) produced within different settings and the differences underlying the processes which produce that different knowledge (content). It cannot, however, determine the underlying economic or social dynamics that justify the selection of factors or causal relationships.

To do so requires a 'why'. The 'why' within memetic theory lies within the system's dynamics. Comparing system dynamics in different settings and comparing them with the 'what' (content) and 'how' (process) of knowledge emergence that the system produced should help elucidate why knowledge emerges differently in different settings, going beyond a description to an explanation. The work becomes a matter of relating the dynamics of the knowledge-based system to what knowledge is produced and how. This requires the research question to be extended as follows:

## *How and why does organizational knowledge emerge?*

As regards the 'why' part of the question, the theory is less helpful and far more vague. Firstly, there is the issue that evolution takes place in a system which is more complex than man's ability to understand it, as this requires knowledge of every destabilising interaction within the system and how subsequent interactions remove (or not) that imbalance. This complexity is due to the emergence of social knowledge being a function of all the incidents of social interaction that take place in everyday life and a function of the memes to which each social being has been already exposed that makes up what might be transmitted to others. The theory thus leaves us with an unavoidable problem of having only the potential to explain cases of social evolution in part, just as in genetics the evolution of genes can only partly be explained. Despite this problem, the theory does suggest that evolution is a function of social interaction leading to the mixing of the pools of memes available within those minds. This creates a 'probability space' which defines what knowledge might emerge and must have an impact on what does emerge, even though the complexity of the situation cannot pre-defined exactly what will emerge as the situation is too complex to predict how it will unfold. The breadth of meme pools, and their likelihood of expanding or contracting are therefore likely to have an effect on why knowledge emerges. Furthermore the concept of meme strategies that makes memes differentially attractive to a population of minds and memetics denial of free-will provide further theoretical guidance for what to look for in empirical data.

This research question is appropriate for another reason. Memetic theory is under-developed theory and as such research questions which set out to explore knowledge emergence that pre-define elements of the theory such as what memes are, how the copying process works, what memetic agency is, are likely to be too restrictive (indeed this approach was initially adopted in the form of propositions and rejected as it was found to be too constraining).

### **2.6 Conclusions and next steps**

In this chapter it has been stated that in an era of hyper and knowledge-based competition, managers need to understand the dynamics of knowledge creation through a knowledge-based unit of analysis. There is a particular need to relate everyday activities with performance and to unpack the nature of managerial agency to help managers operate in the complex world of business today.

The thesis uses a branch of evolutionary theory, memetics that defines the emergence of new knowledge as creating a new relationship with the world. Knowledge thus becomes knowledge about the world which is generated by social interaction and then incorporated into the mind. The direction of knowledge emergence is seen as a function of the dynamics of that social interaction. The chapter very much acknowledges that the field of evolutionary theory is not without debate. It enters into that debate and makes clear how this thesis is positioned within that debate and defends the stance taken in terms of how the stance justifies using memetics to explore knowledge emergence and the role of man in that process.

The justification of using this evolutionary stance to explore the emergence of knowledge are many. Firstly, in claiming that the theory is knowledge-based, the theory provides a knowledge-based unit of analysis, which allows the phenomenon of interest to be accessed directly. Secondly, the theory provides an explanation of knowledge emergence, namely that it is caused by differential semantic and subjective interpretation of meaning between people, providing a framework within which to explore emergence. Thirdly, in suggesting that the emergence of knowledge occurs within a complex system of which man is part, but not in control of, the theory provides an approach to building an explanation of knowledge emergence that is dynamic and epistemologically novel.

Given memetics is under-developed theoretically, methodologically and empirically a simple research question of 'how and why does knowledge emerge?' is proposed, as opposed to basing the research upon a series of testable propositions based upon memetic theory. This question is justified as an appropriate approach to theory development given that it contains the intention of not only describing knowledge emergence but also explaining it.

The following chapter, Chapter Three, converts this theoretical foundation into a research design. Emphasis is placed on two areas. The first is the development of a methodology that is theory driven and which respects that memetics is a part of a cross-disciplinary theory of evolution and a theory of social life, as well as an under-developed theory. The need to look at the most methodologically developed and closest branch of evolutionary theory to memetics, namely genetics, is justified and the guidance it creates is described. As memetics is a theory of social life, sociological methods are also investigated; and as memetics is an undeveloped theory and hence for some areas of the design inspiration is not

to be founded in either field, the grounded approach is explored. Secondly, the chapter focuses on the break-down of the research question into empirically achievable analytical steps, proceeding to associate the methodological approach with these steps, providing a detailed account of both the data management and analytical parts of the research to the extent the work could be repeated by another researcher.

# CHAPTER THREE

## Research Strategy

### 3.0 Chapter overview

Chapter Two revealed that as much as a dynamic, knowledge-based theory of strategy making is needed, one has yet to be developed. Evolutionary theory was presented as a theory of the transformation of knowledge and the meme as a, if not the, unit of analysis for the study of social evolution. The simple question of 'how and why does new knowledge emerge' was proposed as the best way to use the meme and its accompanying concepts of variety and memetic determinism to look at the phenomenon of strategy making in terms of knowledge emergence and the role of human agency in directing knowledge emergence.

This chapter explains and defends the chosen way in which, an empirical setting is selected, data sought, managed and analysed with the intention of answering the research question. Research strategy is primarily about conducting research that is integral and robust. In this thesis, the theory itself presents a challenge to this intent. Firstly because memetic theory, as a branch of evolutionary theory, can, like evolutionary theory, be accused of being a theory of everything, making the search for divergent evidence theoretically impossible and the likelihood of the accusation of producing a 'just so' story likely. Secondly, memetic theory is an under-developed theory, especially in empirical terms, making the research highly exploratory. How these weaknesses do not become pitfalls is addressed throughout the chapter. Emphasis is placed on how the concepts essential to memetics are used in the research. In summary, attention is paid to providing the reader with an audit trail from data to insights, presenting the thesis as one of many possible perspectives and striving for robust insights.

The chapter has eight sections over and above this overview. The first section describes the basis on which the theoretical foundation of the thesis is translated into a qualitative, comparative, multi-case based research design across two contrasting settings. The second section details how the cases are chosen and the case data collected. The third section explains the overall methodological approach. This involves considering which general methodological principles and techniques are both appropriate and required to cover all eventualities, as well as the specification of when and how exactly these principles and

techniques are applied. Details of the former are provided in section 3.4 and details of the latter are provided in section 3.5. Section 3.6 explores the concept of reliability from the perspective of data coding and the relationship between the researcher and the data. Section 3.7 reflects on the experience of conducting this part of the thesis in terms of the issues it raised. The last section brings the chapter to a conclusion whilst looking forward to the subsequent data analysis chapters.

The first section details how the research question is transformed into a design that can be empirically researched. The choice of a qualitative case study approach is justified and the details of the approach explained. The details of a multi-case, dual setting design are explained and justified. Emphasis is placed on the addition to knowledge being sociological, contextual and exploratory. Data collection is explained in section 3.2 in terms of the choice of cases and the data collected.

In section 3.3, the methodology is introduced as needing to be viewed from two angles. The first of which involves a carefully selected basket of methodological principles and tools that reflect the eclectic nature of the research, namely its evolutionary base, the social science nature of the branch of evolution, memetics, and the exploratory nature of the empirical work. The second angle involves breaking down the answering of the research question into stages and specifying where and how the basket of principles and tools are used.

These angles are explained in detail in the following two sections. Section 3.4 explains firstly, why the researcher, in the absence of any tried and tested memetics methodology and in the face of an under-developed theory, delves into other branches of evolutionary theory, specifically genetics, to find direction and assistance within established methods. This section explains that it is also theoretically appropriate to look into the social sciences for direction in dealing with memes, which unlike genes are social in origin. Furthermore, it is shown that despite this comprehensive search across disciplines, areas of the analytical process exist for which there is no precedent. This search for a research strategy creates a hybrid methodology which consists of adhering to the high level principles of modern genetics, the use of an established social science technique and a grounded approach where the social science tool used in association with the principles of genetics is insufficient.

influences on this process as possible can be identified. This requires that contexts be studied in which the knowledge that is being created is within a setting where as many influences as is practically possible on that subsystem can be determined. Unfettered access to dynamically emergent knowledge prospects is therefore a requirement. Thirdly, given the empirically unsubstantiated nature of memetic theory, it is deemed unwise to work only within managed organizational contexts but instead to include another dynamic, non-managed sociological context in which knowledge is emerging rapidly to aid the analytical process by providing a comparison. Lastly, a methodology able to identify memes and analyse them needs to be created.

Given the highly exploratory nature of the research, purely quantitative approaches are discounted. Quantitative approaches have been taken within the field of memetics. These have either involved theoretical modelling, or in one case the use of Internet chat room data to identify memes using computational text analysis, a form of content analysis, that looks at the frequency of re-occurring words (Best, 1997) This work, performed within the media lab of M.I.T., is unusual in that it is empirical and makes few assumptions. The work claims to identify memes, defined as pieces of semantic text that compete for resource.

The conclusions reached in Best's work included:

- A phenomenon of competing memes has been described within a corpus of texts in terms of population ecology.
- This description is not metaphorical in that interacting populations of texts exist and their constituent memes do evolve and compete.
- The exact driving forces behind the evolution, the role of self-replication and the micro details of the lineage are not known and need to be investigated in further research.

The significance of this work is the 'discovery', within complex empirical data, of memes in that a form of competition is seen. The researchers themselves, and others, have critiqued this work as requiring more detailed qualitative checks which would, it is argued, have added substantial weight to the insights by being able to check that what the Artificial Intelligence considers as a meme agrees with the theory. So a qualitative approach in this thesis is chosen to ensure the existence of memes can be verified in the most basic of terms.



Given large-scale research designs are inappropriate, it follows that an in-depth exploratory design is required to explore the research question. The requirements of a qualitative approach (Miles and Huberman, 1984) involve, above all, the immersion of the researcher in the setting, the creation a systemic picture through that immersion which incorporates the different realities of the people involved; and a focus on words, the creation of the most compelling account of the data by adopting a theoretical perspective, whilst appreciating other perspectives could have been adopted and might have be more or less consistent with the data. These are met in terms of; immersion of the researcher within the contexts, the creation of a systemic picture, a focus on words in the form of meaning and challenging the extent to which on the one hand, traditional strategy literature that predominantly assumes man to be in perfect rational control and evolutionary theory on the other hand, which states that man has no control despite his ability to understand evolution. Being exploratory research that creates only a memetic perspective from the data and which does not compare that perspective to others, the research cannot be certain of having created the most compelling account of the data. Nor can it be considered to test the theory, let alone prove it. One of the important elements of qualitative work is to see reality from the perspective of individuals. This is very necessary in this research given it is the differential subjective interpretation of knowledge that is being investigated.

The aim of analysis as an activity is to find the most convincing explanation of the data collected in the light of a research question and to convince others that this is the most convincing explanation. As Yin claims:

*'much depends on an investigator's own style of rigorous thinking, which must be presented along with the sufficient presentation of evidence and careful consideration of alternative interpretations'*

(Yin 1994:102-103)

This thesis presents two challenges in this regard. Firstly, having decided qualitative analysis is the most appropriate approach, it has to be accepted that qualitative work has been described as more of an art than science (Wolcott, 1994). It is undoubtedly a creative process and one, which, if repeated by another, would result in a somewhat different

picture. Given the highly exploratory nature of this thesis it is highly likely that this problem will apply. There is however no excuse for allowing qualitative analysis to become any less rigorous than its quantitative counterpart. This is no easy task however and requires, as a minimum, that as explicit an analytical framework as possible must be provided alongside an audit trail that goes from source data to insights, which enables the reader to follow the researcher's interpretative framework. Such an audit trail is provided, in that every step the researcher took from the source data to the final conclusions can be traced by the reader, using a combination of the data chapters (Chapters Four and Five) and Appendix III and IV where all the data and related coding are provided. Equally, Appendix II provides all the data that was second coded, the second coding and the analysis of the differences.

Secondly, in adopting a memetic perspective from the start and not comparing it with, for example, the perspective on knowledge emergence seen from the eye of the individual, means that at least in the traditional sense of the term, the search for divergent evidence is difficult. What can be, and is examined, is the notion that man might not be able to control evolution in the traditional sense of control but must affect it by being part of the system and might have some kind of understanding of this effect to the point of being able to alter its direction to some extent. It is by exploring the uncharted territories of the theory to understand the nature and extent of intentionality, human agency and free-will that divergence is addressed. In this regard, the system attributes of rules of knowledge emergence and reflexivity discovered in both empirical settings suggest that man does attempt, and succeed to some degree, to 'manage' the variety of content produced in future conversations and can reflect and take action upon past knowledge emergence dynamics.

The ultimate test of the thesis is therefore not so much whether divergent data can be sought by comparing a memetic perspective with an alternative perspective to memetic, but can a memetic perspective of the emergence of knowledge be developed. Furthermore, can this perspective produce useful insights about how and why does knowledge emerge, and provide evidence for the explanation of the emergence of knowledge from such a perspective, positioning man as one part of a system rather than the primary driver of that system.

Within the realms of qualitative data, the research strategy of case studies seems an appropriate one. Case studies are particularly appropriate when context is important (Yin, 1994). Knowledge creates context in the sense that this thesis wishes to compare different contexts to see if knowledge is 'managed' in different ways in different contexts, so the research question is best answered by comparing contexts and thus by examining multiple cases. Cases can be formed from the study of an organization, an element of an organization or a situation within an organization. In this thesis the cases need to be based on a population of memes created over time, so need to fulfil the following criteria:

- Given the systemic nature of the phenomenon of interest, the dataset needs to be accessible to the extent that data indirectly involved in the emergence of knowledge, as well as the emergent knowledge itself, needs to be captured.
- Given the work is exploratory and data management cumbersome, the contexts need to be examples of rapidly emerging knowledge, rather than slowly emerging knowledge, such that a small amount of data contains a large amount of knowledge dynamics.
- Again given the work is exploratory, in order to make the process of the generation of insights easier and more robust, cases need to involve the generation of knowledge in different contexts so that the cases can be compared to facilitate the generation of insights
- The cases need to involve real time discourse between people in order to study the evolution of actual rather than recalled versions of memes in a dynamic social setting.

Six cases in two different settings form the basis of the empirical foundation of the research. The first setting is the Internet. This is chosen because, although not an organizational setting, principles of this 'unmanaged', self-organized system are being incorporated into organizations through Intranets. Also being unmanaged and self-organized the Internet should, in principle, provide a stark contrast to the second chosen setting of organizational life that is very managed and organized.

Details of the Internet chats, where knowledge about a subject is exchanged in a dynamic virtual community, can be found in Chapter Four, where the three chats that form the three cases are described in detail and analysed according to the research strategy presented in the following sections. The remaining three cases are organizational discourses or strategic conversations, taken from the same organization, meaning the researcher did not have to

account for, or cope with, different organizational cultures. In both settings of the Internet and the organization the cases differ. In the case of the Internet, they contain successively more complex subjects as described in Chapter Four, whereas the organizational cases each involve quite different circumstances of knowledge emergence (see Chapter Five). This diversity provides a good basis for developing insights.

There is no way of telling how many cases are required. It is thought however that by looking at two different macro-level contexts, and within each of these three different micro-contexts, sufficient differences and similarities would be revealed for interesting and robust insights to be generated. Cases are, in memetic terms, populations of evolving memes.

The emphasis in the thesis, given the subject is evolution, is very much on process, which given the importance of dynamic organizational phenomena in the light of increased change has recently become more common. As Langley (1999) points out in her review of theory building from process data which forms the basis for this section, one group of researchers has chosen to adopt a coarse grained, longitudinal time series and event-history methods. Others have chosen to delve deeper into the processes themselves to collect fine-grained data that is often, presumably for practical reasons, not always collected in real-time. Process data are messy, are associated with ambiguous boundaries, work at multiple levels and are eclectic. The challenge lies in moving from:

*'a shapeless spaghetti toward some kind of theoretical understanding that does not betray the richness, dynamism and complexity of the data but that is understandable and potentially useful to others.'*

(Langley, 1999:694)

This thesis falls into the latter category of fine-grained, real time work, meaning the qualitative approach requires the recording and transcribing of a real time emergence of knowledge. As regards dealing with ambiguous boundaries, cases need to be chosen that have some kind of natural boundary whilst taking into consideration in the analysis that events 'outside' of these boundaries will have an effect on what is inside the boundary and the boundary is somewhat arbitrary. In terms of working with data at multiple levels, the

meme can be associated with other memes that are related in content. In addition the meme is associated with communities which harbour that 'meme', meaning with the one unit of analysis multiple levels can be seen and transcended dynamically. Lastly, as regards eclectic data, Langley advises that it is important to understand:

*.. the effects of events on the state of an entity (a variable) or to identify the effect of a contextual variable on the evolution of the events.'*

(Langley, 1999:693)

Adopting the 'meme' as the unit of analysis allows this, indeed the research is aimed at tracing and explaining changes in the meme in terms of context and events that unfurl in time.

Langley identifies three challenges in theorising from process data. Firstly the challenge of accuracy, simplicity and generality needs to be faced. Computer simulation for example has low accuracy as regards reflecting subtleties but high simplicity and high generality. Given this is exploratory work it inevitably needs to start with an approach that is highly subtle, and hence probably not very simple, and move towards simplicity and generality. The second challenge involves variation, permutation and combinations of sense-making strategies of process data. Langley proposes that strategies either focus on the meaning of the process (which here takes the form of the memes having independent meaning), temporal patterns (which here included the way content of memes changes over time and the accompanying process), process motors (which are seen here as lying within the system of knowledge emergence that the manager may be more or less in control of) and prediction (which here takes the form of deciphering the dynamics of the system such that a greater fit can be created with the type of knowledge that is deemed appropriate). The last challenge is labelled, induction, deduction and inspiration. Here the point is being made that some steps in theory development will be uncodifiable, a mixture of theory and grounded thought that comes from in-depth familiarity with the data and understanding of the theory. This was very much the case in this exploratory thesis. Inspiration is however no excuse for a lack of a systematic approach, or for not making analytical steps explicit. Here therefore every attempt is made to show when the insights are theory driven and if so to what extent a grounded strategy is required and involved.

In summary, the approach is qualitative, because meaning and context are vital to the identification of memes, quantitative, because having identified memes, their prevalence needs to be determined. In addition the approach is case-based, as this provides the opportunity to compare and contrast cases and because cases represent populations of evolving memes. The approach is processual, in that events over time need to be captured. Lastly, as very minute changes need to be captured, a very fine-grained, real time and therefore accurate approach is required. A qualitative approach is used, because no quantitative approach can identify memes, and memes need to be identified on the basis of their meaning. Equally, given what counts in evolutionary theory is prevalence, a quantitative approach is needed to determine differential prevalence. In terms of methods, this means identifying a way of analysing content that took context into account; finding a way of counting content that is practical, and finding a strategy for theorising from process data. What follows is an explanation of the choices made to adopt a qualitative-quantitative approach, to use cases and to analyse fine-grained, process, real-time data. More specific methods are described in section 3.5.

### **3.2 Data collection**

The collection of the Internet chat room data case data took place in November 1999. The process involved conducting a search for chat rooms that produced *deja.com* as the first chat room on the search list. Upon entering that web site, three chat rooms were chosen as being representative of increasingly complex settings and discourses and because they were areas of discussion which the researcher understood. Further details are given in Chapter Four. All cases had to include more than 100 posts. The posts were then printed out one by one along with the chat room structure that detailed which post was in reply to which and thus the natural flow of the discourse.

The collection of the data that made up the organizational cases was completed during a meeting that took place in February 2001. The meeting was of a type arranged every 4-6 weeks depending on the availability of senior managers. Having attended a previous meeting and both audio and video-taped it, as well as taken notes, both researcher and managers were familiar and relaxed with the process of data collection. The project managers who attended the meeting had been briefed about the research and were introduced to the researcher as they entered the room. All were reassured by the Managing

Director that the data was being collected on a non-attributable and confidential basis, in that the agreement between the organization and researcher stated that the Managing Director had the final say on whether the research could be published in association with the company name or anonymously.

The meeting took place in a typical meeting room albeit of an irregular shape. The managers present sat around a diamond shaped table. Project managers entered the room at the times the agenda stated they were scheduled to present. They presented by standing at one end of the room by the PC and overhead projector. As the meeting progressed, the timings of the agenda slipped. On these occasions the presenters still entered the room but sat on chairs near to the door until it was their turn to present. The directors attempted to create a relaxed atmosphere within the room. Unfortunately, this was only partly successful in that the company was undergoing a substantial amount of change in this period, making presenters apprehensive; and the nature of the meeting was to report progress upon which future, director level support, and hence funding, was dependent, making the situation one that was less than relaxed.

The whole of the six-hour meeting was taped. The unusual shape of the room allowed the video camera to be placed in an unobtrusive position that captured both the senior and project managers. The audiotape recorder was placed on a chair by the researcher to allow for rapid and unobtrusive changing of tapes and to avoid the microphone picking up the noise of the tape-recorder. The microphone was a high quality, boundary microphone which was placed on the table and adjusted slightly during the meeting as the discourse moved around the room.

Three parts of the meeting were chosen to form the organizational cases. These choices were made on the basis of two criteria. Firstly, they had to contain at least 100 memes, preferably 200, as did the Internet cases. Secondly, to aid the answering of the question about the nature of the management of knowledge, the cases were chosen to reflect possibly different types of management. For this reason a conversation about a project was chosen as this type of work is the instrumental part of the organization and represents the most conventional organizational source of new knowledge. The chosen project involves the presentation of an idea at the first stages of development. It is selected because it represents the first time knowledge had been exchanged between the two types of managers and

because the presenters were particularly relaxed about the presence of the researcher, but any of the other projects presented on that day could equally reasonably have been chosen. Secondly, the conversation about internal management was chosen as a contrast to the outwardly facing project chat. Lastly, and opportunistically, the period in which the chat went off agenda was chosen as the last case study as this presented a novel case in which knowledge might emerge differently in the absence of the Managing Director and the set agenda. More details of each of these organizational cases are provided in Chapter Five.

Other general background data were collected during the three-year contact with the company. This included company reports, business plans, exploitation plans, investment meeting agendas, material that accompanied investment meeting presentations, investment meeting minutes, business process documents, interviews with senior managers and project managers as well as corridor encounters. Although none of these data were used directly, they did serve to understand the strategy of the company, its people, its knowledge-base, its culture and its customers in some detail.

### **3.3 The overall approach**

Having decided to adopt a qualitative case study approach, the researcher is presented with a number of challenges. Firstly, in what stages can and should the research question be answered? Secondly, what role does theory need to play in addressing, in practical terms, each of the stages needed to answer the research question? Thirdly what methodological approaches are in principle appropriate? Lastly, how can these methodologies be used to tackle each of the stages involved in answering the research question?

It is decided that the research question needs to be tackled in two stages. Firstly, the question 'how does knowledge emerge?' needs to be answered. It involves three substages, firstly identifying the population of memes in each case, secondly identifying the distribution of knowledge content within that population and lastly characterising the process of emergence by which that knowledge content has been produced. It is thought this process would create a memetic fingerprint of each case in the same way genetic fingerprints are created that functionally describe the knowledge content and process of an organism, or part of an organism, and which are now generically referred to as functionally annotated genomes (Ouzounis and Karp, 2002). In this sense memes have not been proven to exist, it is a matter of developing a memetic perspective from the data.



The theory backing this step was that memes, defined as self-contained knowledge particles, can be identified by considering their ontology to lie in their semantic meaning and the emergence of new knowledge to lie in successive 'thinkos' in which knowledge is edited, not as in the case of DNA by making alphabetical 'typos', but by using man's more developed semantic ability which interprets meaning in subtle ways that differ from person to person (Dennett, 2000). This is in agreement with organizational literature that considers knowledge creation to involve subjective interpretation of other people's knowledge (Kakihara and Sorensen, 2001).

The second stage involves answering the question 'why does knowledge emerge?' It is answered, firstly, by determining the systemic forces that acts on the process of knowledge emergence and which had the effect of altering the outcome in terms of distribution of content. The systemic forces are elucidated by deciphering what describes what is resulting the knowledge variety identified in the 'how' analysis across the cases and explains the differences between the cases. Then secondly, the role of man within that system is determined having understood the system as a whole and having analysed his role within that system.

The next two sections take a different perspective on the same overall method. The first looks from the perspective of the methods used. It justifies these methods as needing to be part of the general approach whilst touching upon in what stages they are used. The second section takes each stage and covers all of the different methods used for that stage.

### **3.4 A theory driven methodology: Evolutionary theory, sociology and grounded approach**

In order to generate as much coherence and consistency across the thesis, the methodology is as theory driven as is possible. That said the research presents a methodological challenge for a number of reasons. Firstly, and above all, memetics is an under-developed theory and is associated with no substantial empirical work. This means the theory has yet to be empirically tested, there is no tried and tested memetics methodology and some of the areas of the theory are so highly abstract and conceptual that they provide little guidance as

to what should be sought in empirical data. Secondly, memetics is a branch of evolutionary theory, with each branch complying with the fundamental principles of the theory as a whole, but each with its own characteristics, stage of development and methods. Borrowing in an unadulterated and complete form from another branch of evolutionary theory is therefore not appropriate as only aspects of it would be applicable. Thirdly, in being an alternative theory of social life, memetics is similar, but not identical to, other theories of social sciences, making established sociological methods potentially useful, but unlikely to be sufficient.

The appropriate route is therefore to create a methodology that where appropriate borrows from other branches of evolutionary theory, seeks inspiration from relevant and applicable methods from within the social sciences and, where this combination is insufficient, uses a grounded approach.

In creating the methodology, care has to be taken to appreciate that each source of inspiration had the potential to add value whilst also harbouring the danger of leading to incorrect assumptions and inappropriate choices. Methods drawn from sociology had the advantage over other branches of evolutionary theory of being designed to handle socio-qualitative data, but had the disadvantage of not possessing a method of dealing with memes both as the unit of analysis and the level at which selection occurs. Genetics, the most empirically developed branch of evolutionary theory, had the advantage of containing experience of dealing methodologically with viewing the world from the perspective of a micro, selectable unit of analysis. Its use did, however, harbour the disadvantage that memes are, in many ways, different to genes. Furthermore, given the possibility of finding some inspiration and justification in evolutionary theory and the social science, a grounded approach was going to need to tread carefully between the ability of the theory to guide the approach and the ability of the data to speak for itself. What follows is a review of the three areas of evolutionary theory, qualitative sociological methodology and grounded approach, together with a justification of how picking and choosing from all three created as theoretically robust a methodology as could be expected at this stage in the development of memetics.

## Evolutionary Theory

As stated in Chapter Two, which covered the theoretical foundation of the thesis, evolutionary theory, irrespective of the numerous branches (and corresponding sub-systems) that make up the theory (and system) as a whole, has some fundamental principles to which all branches comply. These include that all the elements of the system are interdependent, so that evolution can only be fully analysed and explained by considering the system as a whole. As however, according to the theory, the system is infinitely large, it cannot be explained in total. Indeed, explaining parts of the system can be very difficult, as even they can be very complex and are in any case a dynamic part of the whole system. Not only does the theory itself state that it is a theory that is impossible to prove (as the whole system it explains is too big for man to explain) but being a theory of everything, it is also accused of producing 'just so stories' where all data are by definition justifications of the theory. A second principle is that the infinite sustainability of the system relies on its dynamic nature, whereby variation production in any sub-system is produced without foresight on the basis that somewhere in the huge pool of variation there will be a source of variation that will cause the system to regain balance. This means that studying the complex production and retention of variation is the key to explaining evolution in the most authoritative way possible.

The branch of evolutionary theory in which, not only was this conclusion reached first, but in which the greatest methodological advances have been made, is genetics. In this field, the best attempts have been made to avoid 'just so' stories by building alternative hypotheses and by developing methods that by working at the level of the unit of selection have provided the most robust evidence for the theory. This work provides audit trails that link micro, selectable unit-level copying changes to macro-level, systemic effects. These methodological advances in genetics have only been made recently as a result of great technological advances. Indeed:

*'No scientific theory has been as influential and as difficult to test as Darwin's hypothesis that adaptive traits of organisms arise through natural selection. Today with the advent of rapid methods of DNA sequencing, it is possible to test this hypothesis by observing the effects of natural selection at the most fundamental level that of DNA itself.'*

(Hughes, 1999: back cover)

Even here however, the tests are being performed in an experimental context and rarely is more than one gene considered or the effect of natural selection pressures under non-experimental conditions explored, or if they are, are they explained fully.

Once again, as in the case of evolutionary theory (see Chapter Two) the temptation is to provide the reader with an historical account of methods in genetics. Instead, the subject in this section is broached from a logical methods perspective to glean the lessons that can be learned from this branch of evolutionary theory. In this way the methodological problems the branch has faced are reviewed to investigate which answers, as well as questions, methodological issues in genetics pose to memetics.

Firstly, there is the ontology of genes. As Dennett states (2000) to stay true to the theory, the ontology of genes must lie in their functionality, as it is this that is selected for or against. This has become evidenced in molecular genetics and specifically DNA sequencing. Sequencing the human genome has resulted in knowing the genetic alphabet of the human, but not what function the alphabet stands for when the genes are expressed. Only through the creation of a functionally annotated genome, in which the relationship with the world the genes create when they are expressed is explained, does the research have any explanatory power. This implies, as Dennett claims, that in memetics it is neither individual letters nor words which constitute a meme or that are copied imperfectly; rather memes are the meaning that words convey and mutations come in the form of differences in interpretation of the same words by different people (Dennett, 2000).

The way in which genes are identified is to alter the DNA alphabet around the region of DNA thought to code for a certain function and hence gene, and determine whether upon expression the functionality is reduced, altered or eliminated (Wright et al, 2001), thus determining what letters of DNA make up a gene. In practice, overlapping bacterial artificial clones are produced of the DNA. Reduction of the overlaps to create a piece of single DNA about which there is functional consensus allows the function of genes to be associated with a position on the genome. The corollary in memetics, in the case of transcripts of discourse, is to include more and more content until there is sufficient for the meme to make a claim about the world and to delete words at the periphery of the meme to see whether the meaning of the text reduces. Notably, the identification of where genes

begin and end is not as clear cut as is often thought, as there is much DNA that does not code for functionality and complex expression mechanisms operate to ensure functionality is only expressed in certain contexts. In fact, despite the sequencing of the whole genome, the number of human genes thought to exist varies between research teams by at least 33% (Wright et al, 2001) (The Economist, 2001). Equally, any identification of memes is unlikely to be clear and without controversy, especially as the process follows the same principles used in genetics.

Secondly there is the issue of providing robust evidence for evolutionary theory. Historically, and for a number of reasons, genetics has always suffered from accusations of 'just so stories' (Gould and Lewontin, 1979). This has been primarily due to the lack of an interrupted trail of evidence from macro-level evidence of adaptation to the micro-level changes at a genetic level. In turn this has been because of an inability to access this micro genetic level as well as the inability to look for divergent data through an alternative hypothesis. As a result there has been a bifurcation of evolutionary biology into micro (origin) molecular biology and macro (outcome) phenotypic population ecology. First generation methodology involved population ecology that regarded the species as the unit of analysis. Second generation methodology involved protein sequence data that removed the species boundary and provided adequate empirical data for theories of gene substitution. Third generation methods involve DNA sequencing with the field of molecular biology creating the opportunity to work at the most micro level of the gene, relating phenotypic changes to both macro population ecology and micro genetic changes. This new methodology resulted in a new synthesis, bringing together evolutionary biologists with laboratory molecular biologists to be able to go from micro to macro (Hughes, 1999).

As Hughes (1999) explains, prior to modern molecular biology, researchers made predictions about how an animal should behave if behaviour evolved as a result of natural selection and given that natural selection would only favour certain types of behaviour. Then the researchers examined the animal's behaviour, observed it behaved in the expected manner and congratulated themselves on having tested and verified evolutionary theory. They did not look for divergent data in the form of non-adaptive traits or consider that the presence of adaptation might not be proof of natural selection operating at a genetic level, but evidence of another mechanism or process operating at a higher, more macro level.

In contrast, within modern genetics the changes at a genetic level (either retrospectively or longitudinally) are mapped. Subsequently, when these changes appear in subsequent generations and result in functional changes in the context of certain selection pressures, they are recorded. These events are then linked to macro level outcomes such as changes within species, divergence of species and convergent or parallel evolution in which two species evolve adaptive traits independently.

Hughes (1999) quotes work done to relate micro changes to macro outcomes, whilst considering alternative more macro explanations, as well as work done to relate micro changes to selection pressures. An example of the former is changes in genes in families of immunoglobulins, which are proteins that make up part of the immune system, that have been shown to be responsible for changes in what these proteins do, rather than these changes being the result of the proteins folding differently in different milieu. An example of the latter is the variety of strains of HIV which have slightly different genes in a patient's blood. The variety in the genes has been shown to be the result of the treatment of that patient with different drugs which act as selection pressures.

Thus, within biology, there have been several generations of methodology that have moved away from 'just so' accusations. In the first generation population ecologists regarded species as the unit of analysis and thus studied population dynamics in terms primarily of extinction and the threat of extinction in the way organizational population ecologists examined industries (Freeman, 1983). Second generation methodologies embraced protein sequencing data that removed species boundaries and provided adequate empirical data for theories of gene substitution, just as in organizational theory evolutionists moved towards smaller units of analysis such as strategic initiatives (Burgelman, 1983). The greatest advance was however made with the advent of DNA sequencing, leading to the advent of the field of molecular biology that created the opportunity to work at the most micro level of the gene, relating phenotypic changes to both macro population ecology and micro genetic changes as mentioned before. This suggests third generation organizational evolutionary theory would benefit from working at a memetic level.

The lesson for memetics from genetics is that in order to avoid similar accusations of 'just so' stories, there is a need to be able to provide a similar trail of evidence of memetic evolution. So having identified the memes (for details on how this is done see the next

section), work must be done to identify changes at the very micro level by determining the mechanisms for these changes as a result of imperfect copying (read subjective interpretation) and working out the consequences of the changes in terms of prevalence and explaining these changes in prevalence in terms of selection pressures. The important point being that if an audit trail is provided for this rearrangement of data, the researcher cannot be accused of making any assumption other than arranging the data from a memetic perspective. In essence, having made the assumption that the memetic perspective is worth working within, the reader is able to see that the meme, at least within memetic terms, does exist, does evolve and that this evolution does result in the differential prevalence of these memes. Equally, the idea of an alternative hypothesis of the existence of some form of human agency, as has been introduced into genetics, is obviously useful.

In summary, genetics shows that memetics must work at the level of the meme and show how changes at this level are connected to macro level outcomes. Equally and ideally, an alternative hypothesis must be considered in which more macro-level explanations, such as brain level intentionality, compete with the memetic level explanation. Dennett (2000) sees this issue in terms of the need to show that differential success in copying is the overwhelming force in explaining the 'why' of knowledge emergence and hence the direction of social evolution. In order to do this he highlights that it is necessary to overcome the methodological challenge of describing the process by which variety is added to memes, despite the far lower copy fidelity when compared to genes. The next section shows how, using the sociological technique of content analysis, this thesis seeks to overcome this challenge.

### **Content analysis**

As a step in genetics, content analysis involves working out what the DNA alphabet soup encodes for in term of what happens when the gene is expressed. Can a food be digested in the case of humans who have diary products in their diets? Can water be stored more effectively by a cactus in a drought? Can a mate be caught more easily through a display of feathers in a tropical bird? In this way functionally annotated genomes are produced that display the ontology of the genes within a species related genome (Eisen, Spellman, O'Brown and Bostein, 1998). In memetics, content analysis is appropriate for the same reasons. Words, like DNA codons, tell the researcher little. It is group of words which have independent, self-contained meaning that need to be identified.

Content analysis is an important research technique in the social sciences that over time has been used to analyse the content of communication. It is used to analyse media content, for example TV advertising, promotional literature, health campaigns, and more bizarre areas of social life, for example pop music lyrics (Neuendorf, 2002). With the advent of the digital era and the knowledge age, content analysis has become even more popular with web-content analysis and e-mail content analysis. Defined in many ways, (see Neuendorf (2002) for an overview), definitions vary, but tend to include some, if not all, of the following elements: the need to be rigorous and systematic if not objective and replicable, summarizing as a step to analysis, and lastly, quantification. Where definitions differ is the extent to which they emphasise the role of context in establishing semantics over the use of single words to determine content. Related to this is a difference in the extent to which quantification is the only approach, as happens in word counts, or whether qualitative approaches are used to determine semantics beyond single words, followed by quantification of shared or repeated meaning. These differences are akin to genetics where in some quarters there is an emphasis on counting genes, and in others on determining the expression of genes and then counting the percentage of the sample population in which they appear.

Krippendorff, for example, does not require content analysis to be quantitative in any way and emphasises that:

*'... content analysis transcends conventional notions of content'*

(Krippendorff 1980:10)

and is

*'... a research technique for making replicable and valid inferences  
from data to their context.'*

(Krippendorff 1980:21)

Equally, Silverman states that the theoretical basis of content analysis is unclear and its conclusions can be trite if too much emphasis is placed on reliability through word counts



(Silverman, 2001). The concept of content in content analysis is considered by Krippendorff as not objective, as containing latent meaning and hence a method which, if purely used in the domain of quantification, especially of words, is likely to miss insights. In modern forms of content analysis, emphasis is placed on messages being symbolic-representational of human exchanges, possible channels both in terms of people and technology being constrained by context, communication creating social structure and interdependencies in the form of institutions and human relationships, and lastly, content residing in and being responsible for creating systems that are very complex and globally interdependent, especially with the advent of ICT.

Silvermann adopts a more simple approach, emphasising that word counts can reflect the content of social discourse.

*'... establishing categories and systemic linkages between them and then counting the number of instances those categories are used in a particular item of text.'*

(Silverman 2001:122)

Holsti (1969) places data in the context of exchange between a communicator and receiver. Important questions are what is said, when, how, to whom something is said, as well as why, and with what effect, making content analysis much more than counting. Neuendorf (2002) also talks of integrated approaches that include sender, receiver and takes into consideration the channel used. Gray and Densten (1998) provide an example of work in which latent meaning is investigated and in which as a consequence qualitative message analysis is linked with quantitative counting. Thus, although relatively theory free, content analysis does require that a theory driven definition of content is made *a priori* and the technique adapted to accommodate that definition.

Thinking in terms of memetic theory, content analysis, as defined in this more sophisticated way that emphasises the importance of content and semantics, becomes an appropriate choice of tool. Firstly, memetics is about the evolution of knowledge by which is meant changes in content and changes in frequency of content where content is the social knowledge that allows humans to relate to the world. Secondly, content in memetics does not mean words (see ontological status of memes in Chapter Two and the previous section)

but involves particles of meaning that can be transferred between people in context. Thus the more sophisticated form of content analysis is highly appropriate to memetics. Specifically, it can be used to identify memes by identifying content in discourse that has the ability to be transferred to others.

Krippendorff talks of the forms of inferences that content analysis can produce, namely systems, standards, indices and symptoms, linguistic representations, communications and institutional processes. Given the nature of memetics, inferences are most likely to be made in the form of systems. In particular, as he states, systems are composed of: components whose states are variable, relations that manifest themselves according to the constraints of the system and transformations of the relations and components that take place over time.

Obtaining systemic inferences from content analysis first took the form of journalistic trend analysis. Another systems notion of content analysis is the identification of predictive patterns especially in stories and narratives, by looking at the principal elements and the logic that relates these elements. Alternatively, patterns in terms of the networks of communication elements can produce sociograms. Examples of content analysis being used to analyse strategy / policy making / decision making events include Holsti (1969) who used content analysis to analyse the successive public assertions made during the 1962 Cuban Missile crisis. In this case decisions were viewed in terms of perceptions, expressions, values and emotions. Bales (1950) developed Interaction Process Analysis that yielded patterns of communication, evaluation, control, decision-making and tension reduction and reintegration. Overall systems approaches are interested in differences in messages between people and between circumstances and over time. Here attention is paid to differences in frequency of system components, the order of priority, what is deemed to be right and the logical associations between components (Gerbner, Holsti, Krippendorff, Paisley, Stone, 1969). In this thesis the most appropriate, indeed inevitable inferences, are of a systems nature. In particular, both identifying patterns in content logic and their inter-relationships between themselves through a communication network of social discourse is relevant. More recently there have been a number of examples of the innovative use of content analysis within organizational contexts. These include the network analysis of voice mail (Di Sanza and Bullis, 1999) and Larey and Paulus (1999) have used content analysis to analyse the transcripts of brainstorming discussions to analyse the effect of interactivity on idea generation.

The components of content analysis are data making, data reduction, inference and analysis. Data making primarily involves unitising, by which is meant distinguishing and segmenting the phenomena of interest into separate units of analysis. If too large a number of units exist then sampling must take place, but in either case each unit must be recorded in a coded and analysable form.

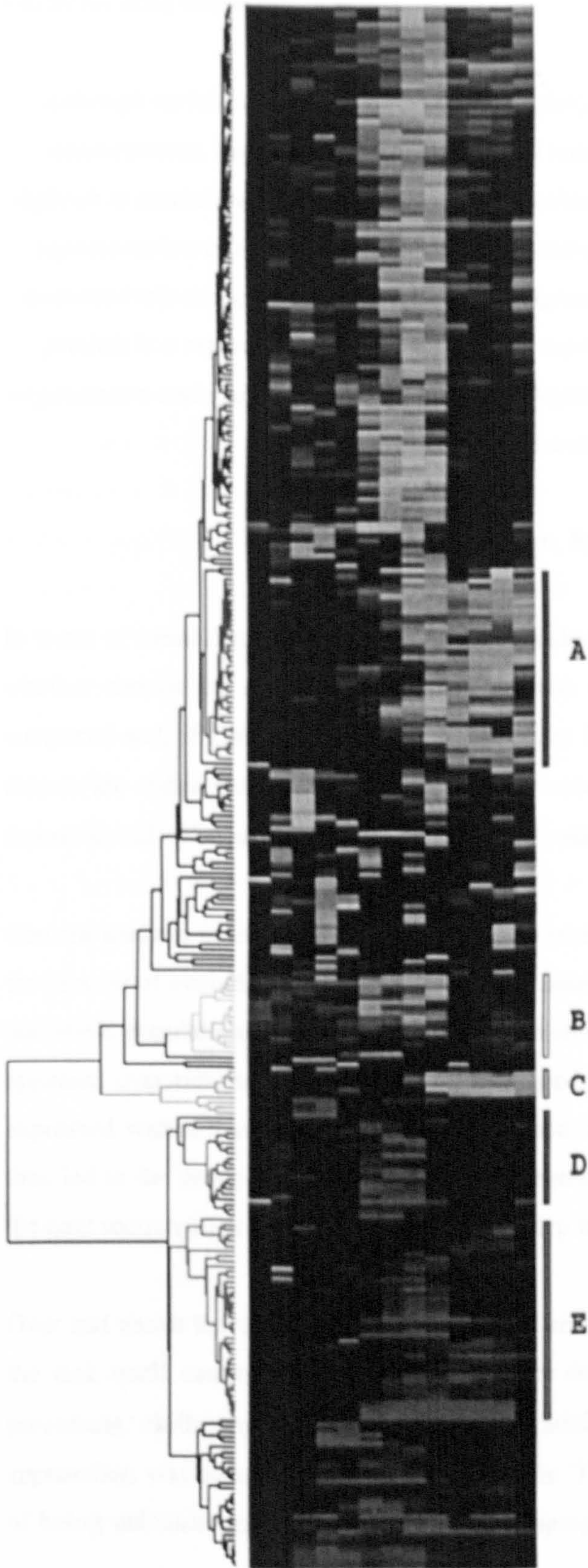
In memetic theory the necessary division into units involves the division of the data into memes (data making) and the reduction of the data in terms of related content. Content analysis can, in data reduction, not only be a form of making the data more manageable but can also be an analysis step. This is so in this work. Having identified memes within each case, these are then subject to a data reduction exercise using content analysis to summarise the data so that it can be better comprehended and interpreted as a whole. The technique of clustering forms the basis for this data reduction.

*'Clustering seeks to group or lump together objects or variables that share some observed qualities or, alternatively, to partition a set of objects or variables into mutually exclusive classes whose boundaries reflect differences in the observed qualities of their members'.*

(Krippendorff 1980a:115)

Krippendorff (1980a) in a specific article on clustering states that the technique involves finding units whose clustering results in a certain and constant level of effect on the observed differences in the data as a whole. Dendrograms are produced that indicate how units are merged into clusters and how these clusters are merged into higher-level clusters. This technique was used to analyse some 300 television advertising appeals (Dziurzynski, 1977) resulting in a final level of clustering of 4 clusters. Clustering is also used in genetics. Genes are clustered according to their functionality upon expression as a useful way of analysing gene expression data. (Eisen, Spellman, Brown, Botstein, 1998) Furthermore, clustering is combined with graphics as shown below:

Time



A

B

C

D

E

DIAGRAM 3.0

The format of this diagram is very similar to that produced here using memetics. Unsurprisingly geneticists (see below) see the procedure in very much the same way as the researcher does within this thesis:

*Although various clustering methods can usefully organize tables of gene expression measurements, the resulting ordered but still massive collection of numbers remains difficult to assimilate. Therefore, we always combine clustering methods with a graphical representation of the primary data by representing each data point with a colour that quantitatively and qualitatively reflects the original experimental observations. The end product is a representation of complex gene expression data that, through statistical organization and graphical display, allows biologists to assimilate and explore the data in a natural intuitive manner.*

(Eisen, Spellman, Brown, Botstein, 1998:14864)

In terms of memetics, clustering can be used in association with content analysis to assess whether memes are more or less associated with each other. So successive memes are compared and, if similar, grouped into categories (termed first order memeplexes). New memes are either placed in categories already created or, if insufficiently similar to the memes already placed in these categories, a new category is created.

Content analysis is used one further time when creating categories of emergence, whereby the process of evolution was elucidated. In this case rather than compare the memes within the whole population to determine clusters of memes with similar content, memes as they appeared over time in the discourse are compared with the memes that had already been expressed within that context, and the difference in knowledge content determined. This then led to the generation of categories of emergence, the details of which are provided in the next section on grounded approach, as this step involved a different method.

Over and above the theoretical logic of content analysis and the processual steps involved, the task itself can be aided by ICT. Software for content analysis that relies on ICT processing skills through word counts, or artificial intelligence for more semantic approaches, was considered for use in this thesis. The use of ICT does have the advantage of being unbiased and objective as well as helping practically to manipulate and present

data. However, all currently available Artificial Intelligence (AI) semantic software packages are substantially less semantically subtle than the human brain. So given the exploratory nature of the thesis it was decided to use the semantic power of the brain rather than ICT, but to use ICT to help manipulate and manage the data. Examples that justify this choice are provided in the empirical Chapters Four and Five. The software Decision Explorer is used to help in data management. Although this package was designed to create cognitive maps, it has been used to work more generally with qualitative data. In this case it is used to manipulate the data once semantically divided into memes by hand. Some of the programming facilities are used to aid the determination of prevalence and relationships.

In summary, content analysis is used in its most sophisticated form at three points within the empirical work-up. It is used firstly, to identify the memes, secondly to reduce the data by clustering these memes into groups that shared a high level of content and, lastly, in the first part of the creation of categories of emergence that characterise the process of knowledge production. Throughout ICT is not used to make the semantic decisions, it is used to make the management of a large amount of micro-qualitative data more practical.

### **Grounded approach**

Even by combining appropriate ontological principles from genetics with social science based content analysis, there are occasions within the empirical process when, what is needed to analyse the data is so exploratory that no precedent, either theoretical or methodological, exists. This happens twice, firstly when categories of emergence are generated and secondly when the 'why' part of the research question is analysed. It led to an investigation of the concept of working in a grounded fashion.

The area of grounded theory, originated by Glaser and Strauss (1967) and developed further in a certain, sometimes disputed, direction, by Strauss and Corbin (1990), is a confusing one (Langley, 1999). Whether this confusion is because the approach is fundamentally flawed, or because its use and development has led to mis-application, is open to debate. As Langley states the term 'grounded theory' is often used as a synonym for any kind of inductive theorizing. The problem is that many of the papers that state they use grounded theory, display little or no evidence of having followed each of the highly structured steps advocated by Glaser (2001). These steps involve the systematic comparison of small units

of data and the parallel construction of a system of categories that describe the phenomena being observed. As the categories are developed, the researcher seeks data that helps embellish the understanding of the category to the extent that the small number of categories the researcher ends up with serve to tightly integrate all the theoretical concepts into a coherent whole that is rooted in the original data. There are differences between the two founders. Glaser (1992) criticises Strauss and Corbin (1990), with the former claiming that latter has made the approach too rigid. Glaser distinguishes between theory generation and verification, saying that even the research problem can emerge from the data. More recently, Glaser (2001) emphasises the need within grounded theory to be systematic and to understand the difference between description and conceptualization.

Whether the approach is fundamentally flawed is a matter of opinion. What is disputed is the extent to which the abstract thinking underlying the categories are stipulated or not by theory. If they are not then the research becomes a matter of grounded theory, albeit it can be claimed that any data is looked at in a way that is theoretically impregnated (Silverman, 2001). If the data is looked at with some theory in mind, then the work is more of a grounded approach or a grounded theory strategy. In the former, the data create the underlying conceptualisation of the categorisation. In the latter, theory underscores the underlying conceptualisation of the categorisation. The distinction is fine however in the sense that Burgelman's work (1983) for example, is upheld as a piece of research in which grounded theory is used. However, theory is used in the form of the evolution theory based framework of variation-selection-retention. It can be argued therefore that the grounded approach to research is always a matter of theory development with some form of theory, albeit under-developed, forming the initial basis of the development of a series of categories as rarely, if ever, do researchers not approach data with some theory in mind. Glaser makes the distinction that Grounded Theory Methodology (GTM), as it he tends now to refer to it, above all involves theory development and not theory verification (Glaser, 2001). Following this stance, the definition of grounded approach used here is that of Stern:

*'...the strongest case for the use of grounded theory is investigations of relatively uncharted water, or to gain a fresh perspective in a familiar situation.'*

(Stern, 1995:30)

Thus on the occasions when memetics provides explanations that are very high level and general and which do little to explain real everyday events, a grounded approach in which the data is allowed to speak for itself is employed. In the two situations mentioned above a grounded approach is used.

In the situation of generating the categories of emergence, the theoretical concept of new knowledge emerging through imperfect copy-fidelity is explored. Content analysis could be, and indeed is, used to compare successive memes, but there is no precedent for what copy-fidelity looks like in empirical terms or how it can be described. A grounded approach is therefore used. The first two successive memes of the first case are compared in content terms and the degree of variation determined. A category is created and named to reflect the amount of variation and the mechanism by which variation has or has not been added to the knowledge pool, making the assumption copying is involved. Hence when a new meme adds no variation to the meme knowledge pool, the evolutionary step involved in creating that meme is named a 'repeat'. The next successive meme is then taken and compared with those before it using content analysis, the amount of variation established and, if appropriate, the same category used or a new category is created. This exercise is repeated until all memes within each case are categorised as to how much variation had been added to the meme knowledge pool at that moment in time. The exercise is repeated for the remainder of the Internet cases and then for the organizational cases. Having created the categories by looking directly at the data and saturated these with all the data, the findings are then viewed in terms of what the amounts of each category say about the process that resulted in the production of that knowledge content.

In the situation of answering the question, 'why does knowledge emerge?' once again the theory operated at a very conceptual level. In very general terms the 'why' of knowledge emergence is explained in terms of the complex social interaction of the system and the unit of selection being the meme, whose strategy might make it more or less likely to be copied. Exactly what complexity means, what strategies might look like or how they might operate in different contexts is vague. Furthermore, because of an emphasis on the meme being the unit of selection, the role of man in the system is not elucidated in detail. In particular his ability, unlike any other organism, to understand the system and thus potentially interact intentionally to alter its course, is not discussed. The process of answering the question of 'why does knowledge emerge?' therefore involves thinking in terms of the forces that the



theory and the data suggested might be operating to alter the course of evolution both at the level of the whole system and man within that system.

Firstly and present in very loose terms within evolutionary theory, especially if one includes complexity theory within the definition, there is the notion of community interactivity. This involves the notion that evolution can be in part explained by the social interactions that can happen, are more likely to happen and which do happen. In particular, evolution in some way must be a function of the dynamics of the sub-system that over time make certain interactions more or less likely. This is akin to the concepts of self-organization within which like-minded people become grouped into communities, but can also involve the concept that novel ideas emerge when communities are unknown to each other (Larcy and Paulus, 1999). It introduces the concept of systems being more or less closed to new interactions and hence to new knowledge. The theory, however, provides no more however than the concept that community interactivity matters suggesting the data must be investigated in a grounded fashion to develop this notion.

Secondly, the concept of rules about knowledge emergence is developed. This concept is in effect totally grounded in that memetic theory does not mention such rules. As such it is explained in detail in the analysis chapters, four and five. These rules appear to affect the future emergence of knowledge.

Thirdly, the concept of differential retention is created. Based loosely on the theoretical concept of meme strategies, whereby memes are thought to be more or less likely to be copied and hence retained, the category of emergence called non-retained is analysed in detail. Combined with knowing the knowledge content of each case through content analysis, the most prevalent memes in each case are identified and an analysis is made of the contribution such dynamics make to what knowledge emerged.

Lastly, the concept of reflexivity is developed. Once again this is loosely based on theory but became a concept only when looking at the data. The theoretical grounding is that as much as the theory says that the direction of evolution is a function of genes and memes in the case of genetic and social evolution respectively, an understanding of genetics has led to the ability of man to influence genetic evolution through genetic engineering. The thought is therefore that a form of memetic engineering might be possible and hence evidence for it

presented in the data. Once again, looking at the data with this in mind, memes are found that consist of reflecting on the preceding process of knowledge production. These are analysed in terms of their effect on the knowledge emergence process.

In summary, a grounded approach is needed in areas where the theory is so underdeveloped that the empirical process involves generating theory rather than verifying it. This element of theory development means that new ground is being covered for which no methodological precedent and little theoretical precedent exists. A grounded approach serves to fill this gap and allow tentative advances in theory development. The analysis cannot be considered, however, to fall within the domain of grounded theory as evolutionary theory driven principles lay behind the categorisation of the data, even if this categorisation was not preconceived other than it falling within this general principle.

### **3.5 The research question broken down into analytical stages**

The section above showed how the cross-disciplinary and exploratory nature of the research means that the methodology needs to be driven by a number of theoretical angles. It does not explain in detail how and when these are used during the process of answering the research question. In contrast to the previous section, this section therefore leads the reader through the sequential steps that are taken to answer the research question and describes when and how the relevant principles of genetics, techniques of the social sciences and the grounded approach are used. Examples are given to help in the understanding of these stages.

The research question is broken down into two sub questions that are the two main steps in the data analysis process. Each of these is described below. The 'how' question is a process approach to building theory, in which the emergence of knowledge over time between  $t_0$  and  $t_n$  is described and characterised. Answering the 'why' question in contrast is explained using a variance model in which forces or attributes of the system are elucidated and related to the direction and extent of knowledge emergence over that time period (Langley, 1999). Attributes are searched for that are common to all cases and that explain the differences between the cases.

## **How does knowledge emerge?**

**In this stage, each case study is successively structured and analysed to create a knowledge-based perspective of the data which is dynamic in that it is able to illustrate both knowledge content and the process by which that content has been produced. This is to answer the first part of the research question; 'how does knowledge emerge?'**

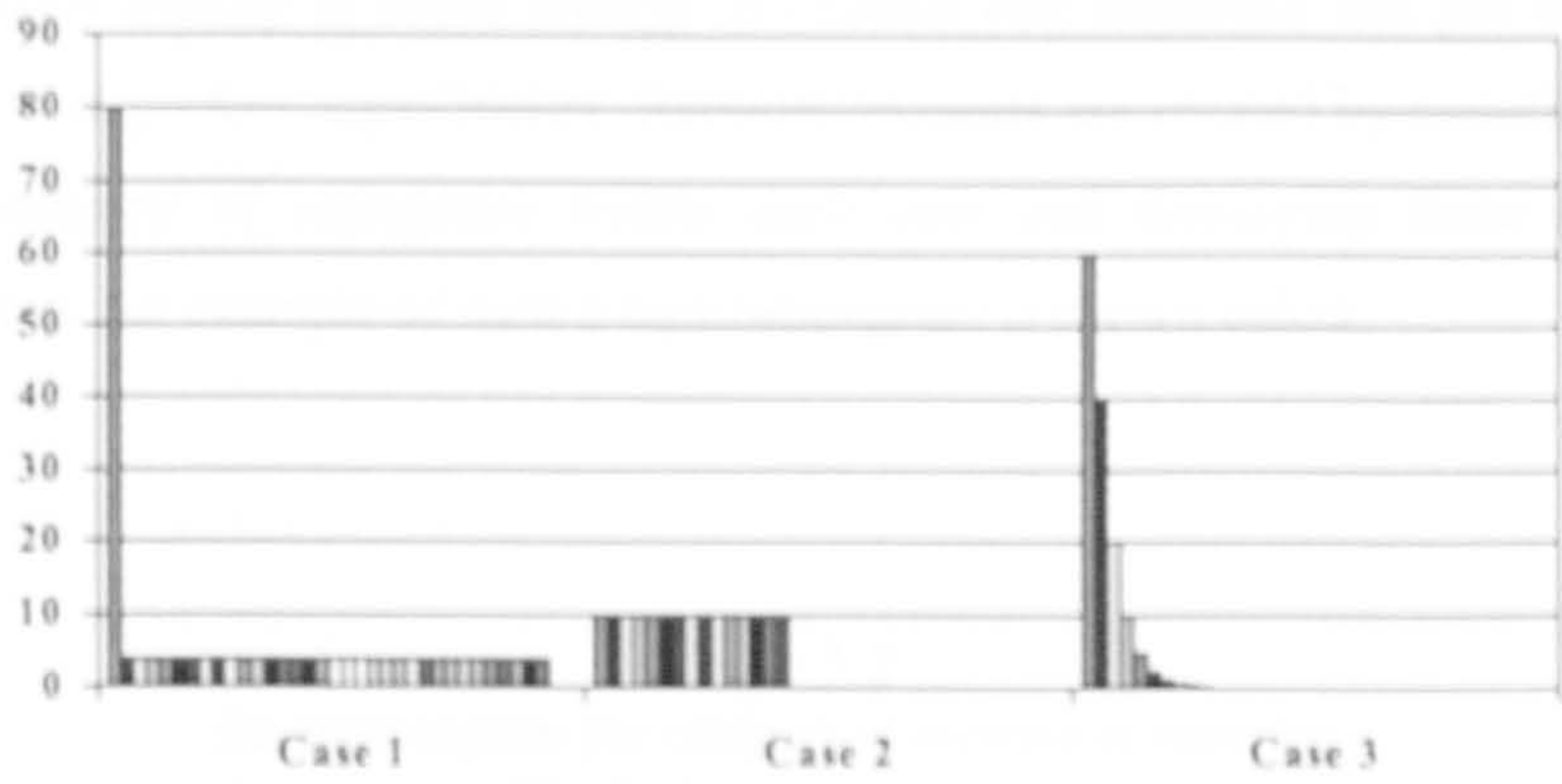
**Firstly, a knowledge-based perspective is created from the data. Memetic theory states that this involves dividing the data into a population of memes. Content analysis is used to decide, given the context in which the knowledge is emerging, what can be considered as the most appropriate way of dividing the data into self-contained particles of knowledge. The boundaries of memes are not easy to discern. The how analysis serves however not as a highly accurate description of the data but as a relative measure of the amount of content (in terms of breadth and depth).**

**Working, not with pieces of discourse created by successive social exchanges, but with a population of memes, the second sub-step involves establishing what knowledge that population contains. Using content analysis once again, but this time associated with the sociological technique of clustering used also in genetics (Natale et al, 2000; Volfovsky et al, 2001), content similar memes are clustered together in 'first-order memeplexes' that consist of similar memes. Then, if possible, the first order memeplexes are themselves clustered in to second-order memeplexes. This serves to reduce the data to a manageable form allowing the knowledge content within the population of memes or cases to be analysed. The memes and layers of clustering named 'first-order memeplexes' and 'second order memeplexes' are then displayed in dendrograms. These show the type and amount of knowledge present within the population, producing a view of the distribution of the knowledge content in that population which can be compared with other populations. A purely quantitative form of these dendrograms is then created in the form of histograms that show the number of memeplexes and the number of memes in each memeplex.**

**The clustering of memeplexes is not objective but in relative terms when comparing one case to another is sufficient to determine whether one case has more variety of content and a different distribution of content than another.**

**An example of such a histogram is shown below:**

**Chart 3.1**  
 Distribution of memes – X setting  
*(number of memes in each higher order memeplex)*



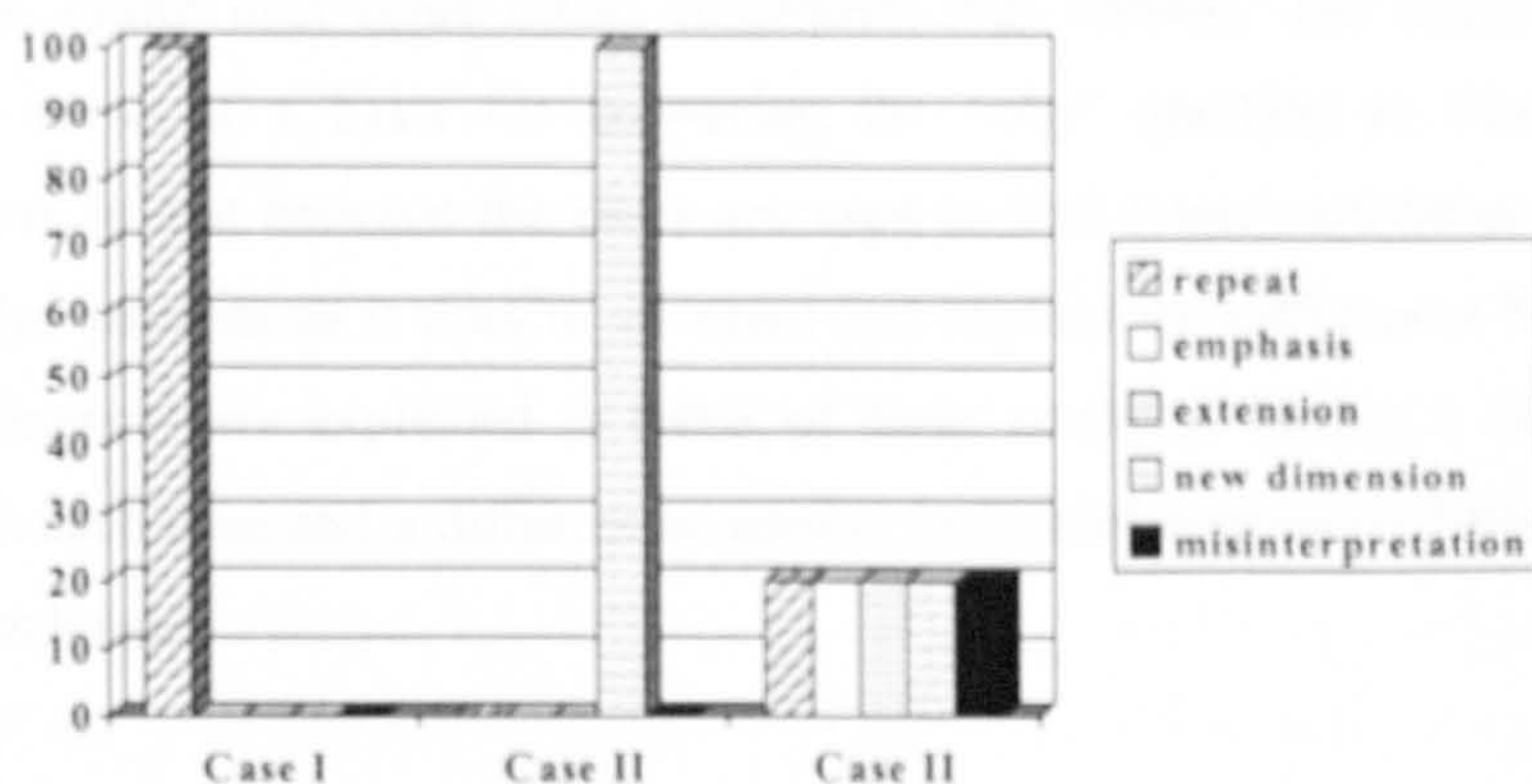
In this illustrative fictitious chart, case 1 is dominated by one meme and includes many other groups of content or memeplexes. This might occur for example in a senior cross functional management meeting where lots of issues are addressed but one issue is mentioned over and over and dominates the discussion. In case 2 there is less variety of content and the prevalence of that content is evenly distributed as in a brain-storming session. In case 3 there are fewer memeplexes (even less variety of knowledge than in case 2) and that smaller amount of variety in content is distributed in prevalence terms in a logarithmic fashion. This would be the type of discussion held in a closely knit community, for example scientists, that do talk about different things but tend to talk a lot about a small numbers of things that they deem important.

The ‘how’ analysis follows the evolutionary principles that what counts are changes in the distribution of content in terms of breadth (variety of content) and depth of content (numbers of times that content is referred to).

The outcome of this sub-step is however a static picture of the amount of content added to a conversation over time, so in order to fully answer the question ‘how does knowledge emerge?’ it is necessary to find a way of illustrating the process involved in creating that distribution. This uses the concept that evolution (changes in the distribution of knowledge) can occur at different speeds. Again, guided by memetics, the concept that knowledge when

transferred between people is not always copied perfectly is used to create categories of emergence that include all possibilities of mechanism of emergence from perfect to imperfect copying and all shades in between. A combination of content analysis to compare successive memes and a grounded approach to create categories of emergence is used, given copy-fidelity is about change in content and memetics has yet to explore the real nature of imperfect copy-fidelity. Replicationgrams are created by counting the numbers of each category of emergence within each case and displaying these in the form of a histogram. An example of such a replicationgram is shown below.

Chart 3.2  
Replicationgram per category of increase in variation  
(% of categories per case)



In this illustrative fictitious case, in Case I no new knowledge is created in that all categories of emergence are 'repeats'. Case II represents a brain-storming session in which all social transactions result in radically new knowledge, 'new dimensions'. In Case III the same number of social interactions add no knowledge ('repeats'), a little knowledge in the form of more detail about previous knowledge ('emphasis'), a little knowledge that extends the current knowledge pool in the conversation ('extension'), 'new dimensions', and 'misinterpretations' that involves knowledge that is newly created through mis-understandings.

The dendrograms and histograms, showing the percentage of each type of knowledge as a function of the whole population at different levels of clustering and replicationgrams showing the distribution of the categories of emergence, provide the researcher with a way

of comparing and contrasting different cases within the same and different settings. Questions asked include is there a substantial difference in the pattern of distribution of knowledge? For example, are the dendograms skewed to the left suggesting that the majority of the knowledge content lay in one or a few clusters or is the distribution of knowledge content more evenly spaced across the dendogram suggesting a more equal emphasis on different clusters. Equally how many clusters and levels of clusters are there? If the answer is a lot does this indicate a large amount of variety, or a few, indicating less variety?

#### **Why does knowledge emerge?**

Having created a picture of knowledge emergence in two different settings and within three different situations within those settings, from both the perspectives of content and process that could be compared and contrasted; it is now necessary to go the further step of asking why this, rather than some other, fingerprint was created. The charts from the 'how' analysis serve as a basis for answering the 'why' question in that similarities and differences in and between the cases are used to find system attributes that explain why knowledge emerges as it does in all cases and explain the differences between the cases. The differences are explained in terms of these attributes having a different or similar nature in each case and a different or similar pattern of interaction between the attributes within each case.

This involves two steps. Firstly, the forces determining the direction of the emergence of knowledge are elucidated and then man's role within that process is discussed. Underlying this analysis step is the assumption present both in evolutionary theory (see Chapter Two) and in the organization literature; namely that knowledge emerges from subjective, human interpretation and complex interaction between human beings (Cook and Brown, 1999). No assumption is made about human intentionality, knowing that traditional strategy literature assumes the manager has foresight and is perfectly economically rational, whereas memetics says the opposite. That said, as human social interaction is so complex that even sophisticated computer modelling shows that social systems are beyond the reach of our intelligent analysis (Johnson, 2001), it has to be taken into consideration research is unlikely, especially given it is qualitative and exploratory, will not be able to trace and explain emergence either.

As much as organizational literature has been criticised for not explicitly using a theory of knowledge emergence, evolutionary theory, a theory of the emergence of knowledge still provides little more than general guidance as to 'why knowledge emerges'. It does state that the dynamics of social interaction alter emergence and hence is a force within the system, but does not say exactly how this force operates, especially given that, as stated above, such systems are beyond explanation. Equally, the theory states different memes are copied differentially, but provides little other than some extreme cases of sources of differential copiabilty. Lastly there is the possibility that the data might contain evidence for forces that memetics has yet to identify.

So the 'why' part of the research is answered taking into consideration: that social interaction is complex to the extent it is beyond our complete understanding, but that perhaps we are able to elucidate its dynamics in some way; that (irrespective of intentionality) knowledge does emerge differentially in different settings and we might or might not be aware of this; in some way man does effect knowledge emergence as he is part of the system; and lastly that through an understanding of his role in the system, he can, as in genetics, influence knowledge emergence.

Having understood the forces at work in directing the emergence of knowledge, the second step involves determining the role of man. This is determined by comparing the different nature of the forces operating in the different settings and cases (contexts) to see how differences in these forces altered the nature of the knowledge that emerged. This allows for a comparison of the nature of these forces in the unmanaged context of the Internet as opposed to the managed context of the organization to be performed, knowing the difference in the nature of the knowledge that had been created in these two settings from the 'how' analysis. Comparing the two, the effect of the manager on the emergence of knowledge is elucidated with the aim of creating a better picture than is currently the case. The principle underlying this comparison is the same that applies to genetics; that an understanding and appreciation of our role in the system should lead to us being able to better influence that system.

### 3.6 The reliability of the methodological approach

This thesis is exploratory in the sense that the theory applied to the empirical setting is under-developed and a method had to be developed to empirically develop the theory as none existed. Furthermore, the data are qualitative which, in comparison with a quantitative approach, raises greater issues of reliability. Lastly, there is the issue of dealing with complex social settings at a micro level at which it is necessary to appreciate minute detail within the context of a much broader system in which anything could alter that minute detail. Obviously the research design detailed in this chapter sets out to answer the research question in the most appropriate way, knowing that the research has its weaknesses. In very practical areas however action is taken to militate against the research being unpersuasive. These are firstly to look at the traditional area of making qualitative data analysis more reliable, namely second coding which involves giving the same data to a second analyst and asking them to analyse the data according to an agreed procedure (Silverman, 2001). The multiple coding is examined and differences identified, discussed and resolved. Secondly, the professional nature of the relationship between researcher and the organization is considered. Lastly data is provided that justifies the decision not to employ Artificial Intelligence but to code by human brain.

As regards coding accuracy, multiple coding is one of the most obvious ways of improving and/or proving the reliability of qualitative data. Neuendorf (2002) considers multiple coding to be necessary in content analysis as she takes a very objective, quantitative view of content analysis. She reviews coding within content analysis and offers a number of approaches. Reliability statistics such as Cohen's alpha or Krippendorff's alpha can be used to provide a single coefficient across multiple coders. Two coder reliability statistics can be used pair-wise to identify coding weaknesses but are less useful as ways of describing overall reliability. Distribution reliabilities can provide a way of identifying outliers. These quantitative approaches assume that errors in coding are relatively few, what amounts to an error is known and that errors can be easily identified, categorised and resolved. However as Neuendorf states the computer program PRAM (Programme for Reliability Assessment with Multiple Coders) for example does most of the above in an automated fashion. None of these quantitative, automated approaches can be applied to this thesis, as it is so exploratory the researcher cannot state *a priori* what the errors might be. A lot of the data is very subtle and known as data that is difficult to encode. For example, the data contains



humour that is an important mediator of messages but also one that is very difficult to code (Neuendorf, 2001:147). This situation creates two problems. Firstly, it is very difficult to imagine finding anyone capable of coding all the data given the grounded nature inherent in identifying memes, clustering them and categorising the mechanism of emergence. Secondly, it is likely that given the exploratory nature of the thesis the variability is high, requiring the data to be analysed a second time. Consequentially, the decision is made to conduct a second coding exercise that looks at samples of data from each of the case studies. This is done with the aim of identifying the areas in the data and coding where reliability is a substantial issue and in determining the overall reliability of the coding.

The second coder was chosen not least because she was prepared, even enthusiastic, about the task, but also because she was someone who was used to creating meeting minutes of complex managerial discourse and to working within very innovative science-based organizations such as the one being studied. Lastly, the person was familiar with the Internet and chat rooms and how they worked. The second coder was provided with written material and more importantly, a 30-minute verbal brief. She was provided with excerpts of the six cases chosen at random, descriptions of the cases and a second-coder proforma that consisted of the transcripts divided into post or talks and tables used to classify the data into first order memeplexes and categories of emergence, albeit empty ones. The second coding is found in Appendix II. The sample included over 100 memes and 100 corresponding categories of emergence.

It was not expected that the coding would be reliable. As mentioned before even in genetics, a supposed science, currently there is a 50% difference in the number of genes identified, let alone differences in exact positioning and functionality that have yet to be compared. The purpose of conducting the second coding was several fold, as follows:

- Identify the amount of reliability.
- Establish the sources of lack of reliability such that they could be placed in a code-book for further research.
- Judge whether the sources of lack of reliability make the insights generated in Chapters Four and Five questionable.

Prior to the second coding the researcher was suspicious that the following areas of coding would exhibit low reliability:

- The number of memes in each 'post' or 'talk' as in genetics.
- The selection of the level of detail of content at which memeplexes reduced the data and the maintenance of consistency this level
- The exact wording of memeplexes.
- Differentiating between categories of emergence next to each other on the continuum from high to low variation and hence between repeats and emphasis, emphasis and extension, extension and new dimension.
- Furthermore the tiring nature of the coding meant that maintaining a constant and consistent level of vigilance was difficult.

The second coding exercise reveals that the above was the case, but also reveals other source of coding differences that were not forecast. The following table shows where the issues of lack of reliability lie, examples of each type of problem are given below. Each type of coding difference is classified as either being methodological by which it is meant that explaining these issues in a coding book would substantially reduced their occurrence or as coding differences. Coding differences involved subjective views that would, at least at this stage of development of the research and theory, be very difficult to prevent and can only be resolved after they occur through discussion between coders. Differences referred to as 'both' involve differences which could have been explained better in hindsight but which even so would be difficult to eliminate as they contain a large element of subjectivity. Each type of difference is explained in detail after the table.

TABLE 3.0 Categories of differences in coding

Type of difference	methodological or content	% of cases
Coder using different definition of content	Methodological	6/71=8
Humour not coded as content by second coder	Methodological	9/71=13
Researcher working at higher level of abstraction than the second coder	Both	6/71=8
Implicit meaning not coded as a meme by second coder	Both	8/71=11
Mis / lack of understanding of context by second coder	Both	11/71=15

Differences in category of emergence	Coding	14/71=20
Division of content (researcher and coder finding same number of memes but different memes)	Coding	1/71=1
Division of content (second coder finds more memes than researcher)	Coding	7/71=10
Division of content (second coder finds less memes than researcher)	Coding	9/71=13

In cases of 'coder using different definition of content', the second coder, unlike the researcher, does not treat cases where people agreed with previous posters or talkers as containing the same memetic content as the previous post/talk and the category of emergence as a repeat. That said, towards the end of the coding exercise the second coder does question whether she should. This could be easily remedied by giving examples in a code-book.

In cases of 'humour not coded as content by second coder', the researcher codes humour as content within memeplexes such as 'offensive humour'. The second coder tends not to code the humour. Arguably humour is not content. Neuendorf (2002) states that humour is one of the most difficult areas of content analysis. Given this, it is felt that it would be better to unequivocally state in a code book that humour should be coded and then the researcher can decide how to analyse it.

Throughout the second coding there is the problem of the researcher working at a higher level of abstraction than the coder. This has the effect of the second coder using words to describe the memeplex which are more specific to that meme rather than more general and hence at a memeplex level. This is considered a problem that to some degree could be dealt with in a code-book. It is however subjective and thus would inevitably result in differences in coding. It is, for example, an issue between the Internet setting and the organizational setting within the researcher's coding. The Internet data coded first has more variety than the organizational data and results in two layers of clustering whereas the organizational data has only one. It could be argued, somewhat correctly, that the Internet data when first coded into memeplexes was abstracted less than the organizational data, creating 'room' for a second layer of clustering. In a coding book therefore indications would need to be given as to what level of abstraction should be used as well as instructions as to how to maintain a regular level of abstraction across settings and cases. In this analysis it is counted as a difference only when it led to a questioning of the researcher's coding.

In cases of 'implicit meaning not coded as a meme by second coder', the problem that the researcher often codes less obvious more tacit meaning that was heavily implied in the post or talk but not said explicitly. This could have been explained better to the second coder and would therefore form part of a code-book, but even so the second coder would remain at a disadvantage in comparison with the second coder in that she / he would not know the setting as well as the researcher.

In cases of 'mis / lack of understanding of context', the second coder codes the memeplexes differently from the researcher because of a lack of understanding of the context when compared to the researcher. When the context was explained more fully the coder agreed with the researcher's coding. This could be prevented in a code-book by explaining the context more, or by exposing the second coder to the context during the data collection phase, even so it would be likely that there would be differences in coding.

In cases of 'differences in category of emergence' there is a difference either between 'emphasis' and 'extension' or 'extension' and 'new' but never is there a difference of more than one category when the categories are considered to lie on a continuum from high to low to no added variety. This will always be a matter of subjectivity so any additions to a code-book would still not avoid this difference occurring.

The remaining types of difference all relate to differences in how the content is divided up into memeplexes by the two coders and include 'researcher and second coder finding same number of memes but different memes'; division of content (second coder finds more memes than researcher)'; division of content (second coder finds less memes than researcher)'. It is an important difference and one that is not easy to resolve. Once again no extra explanation in a code-book is likely to eliminate such differences. Discussion between coders could and did resolve these differences.

Having looked at the type of differences in coding and explained how they might be or might be avoided in the future using a code-book, the effect of the differences on the reliability of the data is discussed. As can be seen in the following table, in only 5% of the data points did the second coding suggest that corrections should be made. There were however many differences, half of which were subjective coding issues ('coding'), 21% of

which were issues that implied better code-book explanations and subjectivity in coding ('both') and 34% that purely implied better code-book explanations ('methodological').

**TABLE 3.1 Analysis of coding differences**

<b>SUMMARY OF ANALYSIS</b>	
Number of memes	104
Number of categories of emergence	104
Total number of data points	208
Number of corrections identified post second coding as a % of the total number of data points	$10/208 = 5\%$
Number of coding issues	44
Number of methodological issues	21
Number of methodological / coding issues	34
Number of differences in coding as % of all potential differences	$34/(44+21+34)/208 = 34\%$
Number of methodological issues as a % of all differences (content +methodological +both)	$21/(44+21+34) = 21\%$
Number of coding issues as a % of all issues (content +methodological + both)	$44/(44+21+34) = 44\%$

Given this represents a sample of data, the corrections are not made in the data-set as a whole. It can therefore be assumed therefore that at least 5% of the data has not been coded as well as it could. This figure is likely to be more given that more errors might well accrue when a second coder needs to consider the population of memes as the whole case.

In summary, the reliability of the coding is far from perfect, especially if you take into consideration the general problem of level of abstraction. The major coding problems that cannot be easily made more reliable through better *a priori* explanation are the division of the content into the same number of memes and allocating the same category of emergence. Areas that are subjective but which could be improved somewhat through better *a priori* explanation include working to the same level of abstraction and understanding the context

such that implicit meaning can be picked up by the second coder and the second coder does not mis-understand the context. The exercise does reveal however that a second coder can be trained to code the data in a not too dissimilar way to other coders, at least to the point where the insights gleaned from the coding can be said not to be inaccurate.

Secondly there was the issue of the **relationship between the researcher and the data**. The complexity of social life, and in organizational life the additional complexity of intentionality and performance, means that conducting socio-organizational research, especially qualitative micro-level work such as that undertaken in this thesis, is far from easy. Data collection needed to be thorough and performed in the context of a detailed and general understanding of the organization as a whole. In the Internet setting this involved reading and re-reading the posts such that the researcher was very familiar with the material and in choosing chats that were composed of subjects about which she had a modicum of knowledge. It would, for example, have been difficult to analyse the Mars case without being a scientist by training. Equally as regards the organizational setting, it would have been difficult if it had not been for the fact that the researcher was very familiar with high-technology, science based organizations and had spent many years as a consultant, a job that teaches you how to become rapidly familiar with an organization and accepted by it. There is therefore, in the view of the researcher, great value in being a professional researcher by which it is meant having the experience of working within the type of organizations that are being researched and being used to becoming part of them whilst remaining detached from them at the same time.

Thirdly, it is necessary to comment on the impact of **performing the analysis by hand**. As much as it is difficult to determine where a meme begins and ends it is difficult to consider that any Artificial Intelligence would make this task more effective. By conducting word counts or semantic counts, Artificial Intelligence could make the process less time consuming but no Artificial Intelligence is currently available which is able to differentiate between subtle differences in the meaning of a word. For example:

Case	Post	Meme
Mars	75	2

1 foot = 12 inches

1 yard = 3 feet = 36 in

1 chain = 22 yrd = 66 ft = 2376 in

1 furlong = 10 ch = 220 yds = 660 ft = 23760 in

1 mile = 8 frlg = 1760 yrd = 5280 ft = 190080 in

Interesting system, really.

Or, like Mr. "Four Weddings" would say: "Excellent!"

...and

Case	Print	Meme
Gun policy	77	1

Interesting propagation of a numerical input error :-)

66 ft = 786 in, etc...

In both of these cases, the use of the word 'interesting' is sarcastic, yet the current level of Artificial Intelligence would not have identified the meaning as being so.

As regards researcher bias which Artificial Intelligence cannot have, having performed the task, it is difficult to imagine how one would feasibly know how to identify memes in such a way as to influence the implications of the research findings as a whole. The researcher's mind is far too engrossed on deciding what a meme is or is not to consider the implications of making one choice over another on subsequent analyses or insights. The conclusion is therefore that as much as it was tedious, challenging and time consuming to perform the identification of memes by hand, it is very difficult to imagine how the use of Artificial Intelligence would have improved the quality of the outcome.

### 3.7 Reflections on the Research Strategy Implementation

There are a number of reflections worth noting about the method involved here. Specifically what it did and did not attempt to do and what issues arose. The major reflection is the emphasis on knowledge dynamics rather than knowledge stock. Other issues included standards for comparison and what was considered to reside in the knowledge pool.

The research strategy is designed to elucidate knowledge dynamics rather than knowledge stocks. The 'how' part of the analysis involves reducing the data (and therefore the knowledge content of the social exchanges) in a way that is more manageable and indicative of the variety within that knowledge pool and hence an analysis of content. The method is not designed to assess knowledge stocks in the sense of accessing what resides in each head of each subject involved in the conversation being had in each case. The

emphasis is on knowledge creation within the knowledge space created within the social system under scrutiny and hence the variety produced over time.

There was also the issue within the 'how' analysis of with what successive analyses should use as a comparison. For example in terms of content of category of emergence each successive meme was compared with, not the previous meme, but with the whole knowledge pool preceding that meme. So in the case of a category of emergence - Was each meme a matter of a radical or not increase in content compared with the knowledge in the whole of the knowledge pool preceding that meme?

The analysis of content creates a foundation upon which to explore the 'why' question as this needs a what on which to base the investigation of why that rather than any other content is emerging. Knowledge as an embodied construct into people's minds or artefacts is not considered. The latter for reasons already explained, the former because at this stage in the strategy making the memes being exchanged in the room have yet to be embodied into products, patents or written processes.

As regards standards for comparison within the 'why' analysis, the two settings provided a basis upon which comparisons could be made. For example it was obvious that the Internet setting cases contained far more variety than the organizational cases. The pattern of a brainstorming session would be expected to be different from that created if validating or correcting a report. Understanding this led to looking at more subtle differences in variety production within cases. Extreme cases provided other indications or standards of where analysis could For example the extremes of the Mars case where the community remained intact and constant throughout the conversation and the Gun case where the community interactivity led to new community formation allowed the researcher to look for more subtle impacts of community dynamics in the other cases.

Lastly what the analysis could not take into consideration was highly manipulative behaviour such as a person voicing knowledge that he or she did not believe in. Without access to the competitive memetics within the mind it is not possible to interpret the data in this way. Nor was the researcher able to be certain that all knowledge in the room, particularly in the form of body language or what was not said was taken into consideration.



### **3.8 Conclusions and next steps**

**This Chapter details now the research question 'how and why does knowledge emerge' is converted into a comprehensive research strategy on the basis of memetics, a theory of the emergence of social knowledge and on the basis of known methodological approaches. The constraints of the theory mean that whatever the chosen research strategy, only an incomplete and imperfect explanation of the data can be created. Nevertheless this it is considered that the research will still have an impact on the development of a knowledge-based view of the firm.**

**The research strategy involves a qualitative case study approach to two different settings of knowledge emergence that allow for between setting and between case study comparisons. Each case study is either an Internet or organizational discourse. The methodology involves a mix of principles and tools drawn from the most methodologically advanced branch of evolutionary theory (genetics) appropriate and well established sociology methods (content analysis) and the use of grounded approach where neither evolutionary theory nor sociology provide guidance.**

**The exploratory nature of the research means that there are methodological weaknesses within the research. The most important weakness is the subjectivity involved in creating a population of memes from each case and codifying the memes for their content and mechanism of emergence. It is felt that, although the data cannot be treated with pure objectivity, the alternative option of using Artificial Intelligence is a worse option and that any subjectivity is not associated with purposefully skewing the data in one way or another and is insufficient to alter the results dramatically. Equally, it is highlighted that as much as genetics is scientific in a supposed positivistic way, these problems exist in that field too. Furthermore, the second coding exercise reveals areas that need specific attention in further work in the form of a code-book and areas that are still likely to cause differences in coding that can only be resolved through discussion between coders. The second weakness is the limited scope of the research; much more work needs to be done to decide whether memetics can become a substantive field within organizational research. This issue of the thesis being the start of a longer research journey is discussed in Chapter Six.**

The next two chapters successively report the data analysis of the Internet cases and the organizational cases. The Internet cases serve to raise questions that need to be answered when considering the contrasting setting of the organisation.

## **CHAPTER FOUR**

### **Data analysis and Insight generation: Internet setting**

#### **4.0 Chapter overview**

The research question, 'how and why does organizational knowledge emerge?' is first explored in the setting of the Internet, using three separate chat rooms as cases. This setting provides a contrast to the organizational setting, analysed subsequently in Chapter Five, in that it is non-organizational, not 'managed' and commonly described as self-organized. Having this contrast is considered wise given the exploratory nature of the thesis.

The first three sections of this chapter prepare the scene. Section 4.1 describes the data collection process. The second section details the three Internet chat rooms that make up the three cases. Section 4.3 summarises the data analysis process. Section 4.4 explores the question of 'how does organizational knowledge emerge?' Divided into three sub sections, sub-section 4.4.1 shows how a functionally annotated 'menome' is created whereby the population of memes present in each chat room are identified. Sub-section 4.4.2 details how the content of these memes is analysed using content analysis and clustering to create dendrograms and more simple histograms of each chat room, which are then compared. Lastly, sub-section 4.4.3 covers how categories of emergence responsible for the creation of this content are identified and discusses how these vary across the three chat rooms. Section 4.5 provides a commentary on the analysis performed to answer the 'how does knowledge emerge?' question. Moving on to 'why does knowledge emerge?', section 4.6 is divided into four sub-sections, each of which details the attributes of the system that are identified as affecting the emergence of knowledge. Section 4.7 provides a commentary on the analysis performed to answer the 'why does knowledge emerge?' question and includes a discussion on intentionality and managing knowledge. Section 4.8 discusses the implications of the analysis and insights generated in the Internet setting on the organizational setting. Section 4.9 provides a conclusion and a summary of the next steps.

Internet chat rooms are chosen and the data collected. A multi-step analysis process creates the insights. The question 'how does knowledge emerge?' is answered in three steps. Firstly, the data set corresponding to each chat room are divided into knowledge particles,

akin to memes, with each data set analysis producing a unique population of memes. This analysis step results in a functionally annotated 'menome', equivalent to a functionally annotated genome. Secondly, each population of memes is characterised in terms of its knowledge content, creating a qualitative and quantitative dendrogram per data set that shows the differential expression of the range of content, which is also converted into a purely quantitative histogram. Thirdly, the knowledge-based process that produced this content is elucidated and results in replicationgrams, which show the amount of each type of replication that occurred to produce that differential distribution. Next the question 'why does knowledge emerge?' is investigated by analysing the data to determine what the attributes of the knowledge system are that are responsible for the nature of the knowledge that emerged as revealed by the 'how' analysis. The how analysis is necessary to determine what the why is explaining. Following on from this, the role of man in the unfolding of these attributes of the system to produce that variety of knowledge is discussed to decipher how knowledge emergence is 'managed' within this setting.

The collection and analysis of three Internet chat room data sets determines that the knowledge present within these examples of social interaction can be divided into independent pieces of knowledge using content analysis. To be classified as 'independent', the particles had to contain sufficient content to be transmittable between people, making such particles akin to the theoretical notion of memes. Further details of how the empirical process led to a better definition of the meme are provided. It is discovered that these 'memes' are not physically discrete in that the researcher is unable to state with any certainty where in terms of words a 'meme' begin or end. These 'memes' are, however, discrete in terms of their relatively obviously containing a distinct and functional proposition or statement about the world. This ontology is similar to that of genes where the physical beginning and ending of a gene is difficult to determine as much as the whole genome, equivalent in social terms to a discourse can be easily mapped, whereby using the alphabet of DNA, the sequence of letters and words is determined. The 'memes' identified in this way are the theory driven unit of analysis.

The social evolution that resulted in these, rather than some other populations of memes, is then characterised. Using content analysis and the technique of clustering, whether each meme can be more or less associated with other memes is determined, creating clusters of memes (termed memeplexes). Amounts of memes in clusters are counted, allowing for the

differential distribution of these clusters of content within the population to be determined. Qualitative and quantitative dendrograms are created within the software Decision Explorer to manage this analysis process and to graphically illustrate the type, amount and combining the two, the differential distribution of content in each population. Simpler, purely quantitative histograms are also created using this data. Then, noting that the content of these memes alter over time, content analysis is used to compare successive memes and a grounded approach used to create categories of the emergence of new content, using 'amount of variation added' as the discriminator. Graphically these are displayed as replicationgrams, showing the percentage of each type of imperfect replication or copying due to differential subjective interpretation.

Each of the three sets of dendrograms, histograms and replicationgrams reveal a unique set of knowledge dynamics. Each case (or memome/population of memes) has its own memetic fingerprint, just as each genome has its own unique fingerprint. Comparing the three sets reveals that there are however little difference between the fingerprints. So, although the actual content of the chat rooms is very different, the distribution and amount of variety in the population and the amount of the varying imperfect replication mechanisms that result in that differential distribution of content is not substantial across the cases. This suggests that the dynamics of knowledge emergence differ little within this setting. How they do differ is described.

It is debateable as to whether what is considered as memes within this thesis are indeed memes and or can be considered as knowledge outside of evolutionary theory (see Chapter Two). They can, for example, be considered as themes or subjects. This is however what the theory states memes are and what knowledge is. To be a topic or subject, firstly what that is must contain enough knowledge to be a topic or subject and secondly it must be a topic within the minds of someone who uses that knowledge to relate to the world in a certain way. That said the thesis has not proven memes exist or that social life must be explained in the terms of social evolution. It uses the concept of the meme as a content-based unit of analysis to manage data to obtain a 'handle' on the variety of content within a discourse. The boundaries of memes are determined by considering when ongoing discourse includes enough meaning to be considered as a topic or subject or meme. Memeplexes are then formed by associating related content in a way that minimises loss of detail in a consistent fashion. As discussed in Chapter Three, the second coding exercise

reveals that this step is difficult as it is difficult to work consistently at the same level of detail both at within and between coder levels. That said this problem exists as mentioned before in genetics and can be alleviated, and was alleviated, to some degree through negotiations between coders. It is important to note that the exercise of dividing the discourse into memes and into memplexes is not aimed at being entirely accurate about whether a meme or a memplex exists, but to get a 'feeling' for how much knowledge variety exists within the data and what is the distribution of that variety. This is defensible given it is this level of analysis and accuracy that is needed to be able to perform the why analysis that follows. The analysis only needs to be accurate enough to be able to make broad comparisons that can lead to an understanding of the underlying system dynamics at play.

Having been able to show how knowledge emerges within the chat rooms by using a theoretically grounded, knowledge-based unit of analysis, the analysis moves on to determine why the knowledge that emerges has as revealed by the 'how' analysis, indeed, emerged. By this it is meant that the empirical data is analysed to determine which forces are acting on the context to make the range and depth of variety wider or narrower and more or less prevalent. Using a theory driven approach when possible and a grounded approach when not possible, the amount of variety in content and the differential prevalence of that content are seen as a function of the systemic forces, community interactivity, differential retention, knowledge emergence rules and reflexivity. These concepts are created by knowing through the dendrograms, histograms and replicationgrams how the knowledge content differs whilst trying to develop concepts that are common to all cases but also explain the differences because they are different in nature between the cases. Thus community interactivity is common to all cases but its exact nature (open or closed) explains the differences between the cases.

The how analysis describes how the interaction of each individual creates variety. Agreement between individuals on content creates communities. Community interactivity is seen in part as being the extent to which the system is open to all, if not why not and/or, in contrast, whether access is restricted in any way. The fact that Internet is a system open to all who have physical access to this form of community interactivity means that chat rooms promote a wide range of variety of content. This is thought to be because the more people are able to access a context, the more likely it is that within the collective there will

be a greater range of variety of content that can be expressed. The data suggests that this freedom is modulated by the speed at which the knowledge system becomes more or less closed to new social interaction and by the extent to which the system contains one or more communities that interact in a certain way. This notion of community interactivity is an explanation of the effect of social interaction that goes beyond the description of what happens at each individual encounter but which is unable to explain each individual encounter.

Another attribute of the system, which serves as a force acting on knowledge emergence, is differential retention. In each context there appear to be ways of expressing content that result in that content being preferentially retained. These sources of preferential retention tend inevitably to reduce the range of variation but do increase the prevalence of that content. Equally there are also memes that are never retained. These serve to increase variety but contribute little to prevalence and hence depth. The sources of differential retention are different in each case. They supply more than a 'how' description on the basis that they are a function of what has happened in the minds of the people before they enter into this discourse, making them more or less likely to find certain knowledge content and certain meme strategies (such as scientific rationality as is the case in the Mars case) attractive.

As mentioned before it was not practically possible to identify all the differential retention dynamics. The data is too complex to do anything other than identify the extremes of what was most often retained and what was very infrequently, if ever, retained. This system attribute is more than a description of how the knowledge emerged in that it pulls on the concept of meme strategies and develops it to conclude that communities are made up of people attracted by the same kind of knowledge.

Another force seen as effecting knowledge emergence is the nature of the rules present within the context that dictate the type of knowledge emergence 'allowed' in that context. This attribute affects future knowledge emergence. This took the Terms of Service of the Internet Provider, Netiquette, intolerance of Spam all of which is explained in detail in this chapter. These rules have the effect of making the production of a good deal of variety likely as they prohibit repeat posting of the same content and the advertisement of a cause,

promoting instead, the posting of different views and the debate of issues. These rules affect future knowledge emergence.

Reflexivity, looking back on the nature of knowledge emergence, appears in different forms as self-reflection within the system's boundaries, collective reflection about the systems boundaries and reflection beyond the systems boundaries. Unlike rules of knowledge emergence that affect the dynamics of knowledge emergence to come, reflexivity is about reflecting upon what has happened. It has varying effects on the emergence of knowledge, increasing and decreasing the range of variety and depth of variety as well as having on occasions no effect on either. There is very little of it but it is present and is highly important as a sign of the ability of man to alter the dynamics of knowledge emergence.

In each case, all attributes of the system seem to be in operation with their combined force being responsible for the evolution. In some cases however one predominates, in others they are more of equal force. As regards intentionality and agency, the assumption that knowledge emerges in a system that man is not central to and hence not in total control of, but is part of, means that the system must be beyond complete explanation. So, in the areas of the system that are very complex, evidence is not found other than 'evidence' which describes how the system is beyond our control. Below each system attribute is explored in terms of intentionality.

As regards the concept of community interactivity, intentionality must feature very little for, although we might choose to meet some people, we often accidentally meet others, and even when we do choose to meet people we cannot forecast what knowledge might emerge as a result, as we are not that aware of the exact knowledge we have in our own minds, let alone what others may have in theirs. At a community level evidence is found for how collective and community dynamics influence knowledge emergence. Equally as context is created by differential retention dynamics within that series of social interactions, it is difficult to imagine how an individual or group of individuals can direct or be in control of this aspect of knowledge emergence. The ability to empirically elucidate these differential retention dynamics is however revealed and the differential retention dynamics in this setting are shown to be different for each case. As regards rules of knowledge emergence we can imagine how these may be set up to create a certain type of knowledge as the future unfolds. Evidence is found for these rules, although evidence that they were set up



intentionally is difficult to discover, other than when the rules are not adhered to and people object and try to rectify the situation. As regards the last system attribute, reflexivity, we can imagine that here we do have the choice to be reflexive about the emergence of knowledge and hence control what knowledge emerges to a great deal. Evidence of reflexivity is indeed found, but not for all theoretically possible forms of reflexivity, nor is there much evidence of reflexivity. Commonsensically however it is not practical to stop and reflect on every social interaction and its effect on knowledge emergence. Man's role within each attribute therefore shifts from low intentionality to high intentionality as the system attributes are considered in the order of community interactivity, differential retention dynamics, rules of knowledge emergence and reflexivity, in that some system attributes are easy to control than others.

Conducting this analysis is not simple, but there is no reason to see why it cannot be repeated within the organizational setting. That said the analysis raises a number of questions which need to be considered in the organizational setting. These include whether the dendrograms, histograms and replicationgrams can be created in the same way and/or whether they will be different, and whether the attributes of the system will be the same and operate in the same way. In particular, in the 'managed' context of the organization it will be interesting to see whether there is more reflexivity about knowledge emergence and more types of reflexivity present within this intentional, goal-directed setting when compare with the 'unmanaged' setting of the Internet.

#### **4.1 Data collection**

The advent of e-mailing through the Internet has created the opportunity for virtual communities supported by Internet Service Provides (ISPs). A form of such communities exists as 'chat-rooms'. These are virtual places where any person with access to the Internet can enter into discussion with others about a certain subject. ISPs provide the service of structuring these chat-rooms into subject areas and sub-subject areas as well as providing the functionality that allows people to set up new chat rooms by 'posting' an opening e-mail and 'posting' replies to any e-mail within the chat-room. E-mails within chat rooms are referred to as 'posts' and senders of such e-mails as 'posters'. Internet etiquette or 'Netiquette' states that such chat-rooms should be tolerant of diverse views and posters should enter into debate rather than use chat rooms as vehicles to promote their own cause

(for which home pages should be set up). Chat-room content which abuses this freedom is termed 'spam' and those that abuse the freedom are known as 'spammers'.

The chat rooms used as data within this thesis were chosen on the basis of their ability to meet three selection criteria. Firstly, for ease of analysis and comparison all needed to share a common layout and structure. Hence the chosen rooms emanated from within the same host ISP, namely *deja.com*. Secondly, exhibiting a combination of approximately 100 posts and less than 50 authors was a selection criteria employed to ensure each chat room contained a reasonable amount of data, a dynamic data set and a restricted resource pool to ensure sufficient, but not too much, complexity lay within the data. Lastly, three increasingly complex chat rooms were chosen. The first involved a single community discussing a real event amongst themselves. The second chat room involved a debate between communities about what one community considers as a social construction and the other a past event. The third chat room also involved a debate between communities, but one that involved everyday events, diverse interpretations and views of these events as well as a discussion regarding the implications of the events and views on policy making. The cut off for the data was the day of selection of the chat room, meaning all posts posted on the day of data collection were collected as data. It is highly likely more posts were sent to the chat room after data collection. These data were not taken into consideration. Each chat room was considered as a case study, allowing for 'within' case and 'between' case analysis and comparison.

Having decided on the three chat rooms, data collection took place. Each single post existing as part of the chat room on the day of data collection was printed out along with the structure of the chat room that detailed which post was in reply to which post. These print outs of the posts and the structure of the replies are provided in Appendix III. Extensive reading and re-reading of the posts took place to create a level of familiarity with the data before any structuring or analysis of the data took place. Posts varied in length from a few words to a number of pages.

## **4.2 The chat rooms**

The first chat-room is entitled 'Mars Climate Orbiter screw up and news media', ('Mars chat room'). In this chat room scientists discussed the failure of a mission to Mars, due to

confusion amongst scientists from different nations working with different scientific units, in the face of a controversial media report that was, the first poster claimed, also scientifically inaccurate as regards its use of units. Contributors to the chat room were seemingly informed and interested scientists rather than journalists. The chat room was relatively simple appearing to be about rational scientific facts, albeit being played out in a social context.

The course of the debate started at the point of a news media report being deemed to be in part scientifically inaccurate. It led to a discussion of the public understanding of science as well as a discussion about the exact nature of the confusion around the units. This in turn led to a much wider discussion of the range of units that exist especially between nations, the conversion of scientific units and even the use of calculators in performing conversions. The limited amount of complexity in the chat room arose from the detailed discussions about conversion units and the public understanding of science extending to include subjects that ranged from the worth of HP calculators to the nature of science but with a very heavy emphasis on scientific facts.

The second chat-room, 'Why fear God?' ('Religious chat room') was more complex. Rather than being about explaining an event, this chat centred on a debate as to what being in 'fear of God' should mean. Contributors to the chat room were a mixture of atheists and religious people, most occupying what could be considered as relatively extreme views, apart from the original poster who was open to new views.

The course of the debate started with the first poster asking the question 'Why fear God?' This led to the offering of different definitions of fear. The conversation moved on to differing religious and atheist's views on religion and being religious. Comments were also made about the type of people who are and who are not religious and whether religion is a 'virus', with the tone of the posting becoming quite personal and offensive on occasions. The discussion then moved onto a new definition of fear with which the original poster was relatively comfortable. The complexity arose in this chat room from the nature of the debate being about religion which some might consider as a social construction, others a fact and because the entry point was fear rather than a straight battle between believers and atheists.

Lastly, the 'Stop the Guns: A million Americans against killing chat-room' ('Gun policy chat room') was chosen as it too, like the Religious chat room, represented a debate between two communities, the 'anti' and 'pro' gun lobby. The debate was however more complex as it contained 'facts' about gun usage, just as scientific facts appeared in the Mars chat room, but was also involved diverse views, as in the Religious chat room, and had the added complexity of incorporating the impact of varying personal experiences on the views of the posters. It also contained spam and a discussion of what should be considered as spam, making reflexive discussion an element of the chat-room.

The course of the debate moved from a request to sign a petition on a home page to discussions about whether indeed legislation to make guns illegal would have the desired effect of reducing violent crime, to comparing Britain with the USA, to a discussion of whether the request to sign the petition was spam or whether the chat room represented a free exchange of views. The chat room data ended dominated by spam and anti spam debates. The complexity in this chat room arose from the subject becoming one of freedom linked to gun legislation, to the use of the Internet and to being American.

In summary, the chosen chat-rooms were all rich in data, rich in data of a different kind and interesting in their own right through odd quirks, namely the failure of the Mars mission being due initially to a lack of consistency in knowledge between Imperial and SI units, religion being the most quoted theoretical meme and the Gun policy chat room containing 'spam' accompanied by discussions about the nature of spam, which can feasibly be considered as memetic engineering and the ability to recognise memetic engineering respectively.

### **4.3 Data analysis**

As described in Chapter Three, four steps of analysis are required for this first stage of data analysis. The first involves defining the memetic population by dividing the data into memes, the most micro but functional unit within the data, creating a knowledge-based unit that served as the unit of analysis. Then, using cluster analysis to group content similar memes into clusters or memeplexes as they were called, dendrograms are created to reveal the range, amount and therefore the distribution of the variant knowledge within the population. Using content analysis again, the extent to which new memes varied from

previous memes is determined and characterised and, using a grounded approach, types of emergence are created. In counting the amount of each type of replication, a replicationgram is created showing the different categories of emergence.

The second stage involves questioning why that knowledge had emerged, assuming that knowledge emerges in systems that are larger than the organization itself. What attributes of the system determined the direction of the emergence of knowledge over time, both in terms of type of variant knowledge and the prevalence of each type of variant knowledge, are elucidated. This is achieved using a grounded approach and indicative theory, where possible, and results in the elucidation of four forces that alter knowledge emergence, namely community interactivity, rules of knowledge emergence, differential retention and reflexivity.

These two stages of data analysis, namely, analysing firstly 'how' and then 'why' knowledge emerges are explained in detail in the following two sections. The sub-steps of the first stage of analysis and each of the four attributes of the system form sub-sections.

#### **4.4 How does knowledge emerge?**

How knowledge emerges is determined in three steps. Firstly, the data are divided into independent meme like knowledge particles to create a population of 'memes'. These particles are then characterised in two ways. The type, amount and hence distribution of the variety within the whole population of memes are analysed by creating dendrograms of each chat room using content analysis and the associated technique of clustering that place content similar memes in the same memeplex. Furthermore, the longitudinal process by which this variety is created and hence knowledge emerged is analysed. This is achieved by comparing newly created memes with previous memes to create categories of changes in content using a grounded approach and in counting the amount of changes in each category replicationgrams are created. The outcome of this exercise is two fold. Firstly, an understanding of the amount of variety in the conversation in terms of breadth of content (how varied is the content) and depth (number of times mentioned) and the process by which that variety was created (rate of change for example dramatic and sudden versus incremental). There is no correct amount of variety just an appropriate amount for the task in hand. Secondly, the analysis is crucial in being able to have a base upon which the why analysis can be formed. Specifically, the attributes of the system determined in the why

analysis have to be common to all cases and therefore be system attributes but also be able to explain the differences between the cases.

#### 4.4.1 Generating the knowledge-based perspective: Identifying the Population of 'Memes'

Content analysis is used to divide the data within each case into 'memes' or particles of knowledge that contained sufficient knowledge for the particle to exist independent of a single person and therefore be potentially transferable from person to person. These, for ease of writing, are termed memes but at this point in the thesis empirical evidence for only one of the theoretical characteristic of memes had been found, that of the existence of self-contained particles.

As regards the process of identifying memes, in some cases it is relatively easy to decide when too little data or too much data is included in a potential meme for it to make sense when taken in isolation of the mind that harboured it. The three examples taken from each of the chat rooms, and reproduced below, illustrate this point. The first piece of data from each chat room represents an example of what is considered too small an amount of knowledge to be considered as a self-contained transmissible meme-like entity. Whereas the second piece of data from each chat room contains sufficient functionality to be considered as a self-contained transmissible piece of knowledge. All coding of the posts into memes is provided in Appendix III.

N.B Source data are provided in a different font and between inverted commas – e.g. 'I agree with the previous poster'. The mini-table prior to each piece of source data indicates from which chat room, which post numbered in chronological order of posting and which meme, numbered successively per post, the data has been sourced.

##### EXAMPLE 1

Case	Post	Meme
Mars	1	3

##### Non-Meme

'oh yes the old avoirdupois yard '

##### Meme

'JPL said that its preliminary findings showed that Lockheed submitted acceleration data in the English – or avoirdupois – system of measuring, which utilizes miles,

yards, feet and inches as well as pounds and ounces instead of the metric system -- kilometers, meters, kilograms and gram.

Oh, yes, the old avoirdupois yard! Now not only do we have to worry if NASA figures are in nautical miles or statute miles, but we also have to check out the avoirdupois miles. No wonder it was all screwed up.'

In this example, although the avoirdupois yard exists, has meaning and could be transferred independently of any other content, in this context to consider the meme to be purely the phrase 'oh yes the old avoirdupois yard' would result in missing out the point of using the word in this context; namely that it is an imperial rather than metric unit.

## EXAMPLE 2

Case	Post	Meme
Religion	1	1

### Non-Meme

'I think this is one of the most forceful ideas that have kept me away from the church.'

### Meme

'Why should I fear God? I think this is one of the most forceful ideas that have kept me away from the church. If god is so full of love, joy, and forgiveness, why should he be feared? Shouldn't he be loved instead? I don't understand many things in Christian beliefs.'

In this example, only if what the nature of the idea involves and what the person does not understand about the idea is included, does the phrase 'I think this is one of the most forceful ideas that have kept me away from the church' make sense and the meme reflect the meaning as expressed in context.

## EXAMPLE 3

Case	Post	Meme
Gun policy	1	1

### Non-meme

'Ethnic and religious minorities have been singled out as special targets.'

### Meme

'Each year, gun violence kills or wounds more than one hundred thousand innocent children and adults. Ethnic and religious minorities have been singled out as special targets. Recent shootings have shown that this crisis is reaching epidemic proportions.'

In this example, without the added content, the meme is not self-contained as it does not include the targets, namely gun violence of epidemic proportions.

This process of identifying memes was repeated post after post, chat room after chat room until all posts in each of the cases had been classified into memes. This exercise was not easy or without problems. Just how discrete 'memes' are and where they begin and end was impossible to decipher. Examples of this methodological problem are provided below, using the same data given in the examples above.

### EXAMPLE 1

Case	Post	Meme
Gun policy	1	1

'Each year, gun violence kills or wounds more than one hundred thousand innocent children and adults. Ethnic and religious minorities have been singled out as special targets. Recent shootings have shown that this crisis is reaching epidemic proportions.'

In this example, it could be argued that this particle not only contains sufficient knowledge to exist independently of its host, but that it contains sufficient content to exist as two memes, with the following data counting as a meme in its own right.

'Each year, gun violence kills or wounds more than one hindered thousand innocent children adults.'

The fact that this content qualifies the nature of the singling out of minorities, as explained above meant that the choice was made to count this data as one rather than two memes. Whether this decision was 'right' is however debateable. It means a meme as defined by working through this empirical data, has to include content that if considered as a separate meme results in what is left of the meme losing 'a lot' of meaning.

### EXAMPLE 2

Case	Post	Meme
Religion	1	1

'Why should I fear God? I think this is one of the most forceful ideas that have kept me away from the church. If god is so full of love, joy, and forgiveness, why should he be feared? Shouldn't he be loved instead? I don't understand many thing in Christian beliefs'.

This meme could also exist as above or be classified in the following way by including some words at the start of the meme and by eliminating some words at the end of the meme.



**'Maybe some one can answer this for me. Why should I fear God? I think this is one of the most forceful ideas that have kept me away from the church.'**

The additional sentence at the beginning encourages a reply but is arguably not an essential part of the meme as without it the smaller version of the meme can still stand-alone. It makes little sense on its own however. It is therefore argued it should be included. Equally the latter part means the rest makes far more sense and therefore it is argued that this should be included too.

### **EXAMPLE 3**

In other cases it is clear that within a post there are a number of distinct and discrete memes, even though deciding exactly where one begins and ends is problematic. An example of this is provided below.

<b>Case</b>	<b>Post</b>	<b>Meme</b>
<b>Religion</b>	<b>1</b>	<b>1 and 2</b>

**'Maybe someone can answer this for me. Why should I fear God? I think this is one of the most forceful ideas that have kept me away from the church. I find it quite silly frankly! If god is so full of love, joy, and forgiveness, why should he be feared? Shouldn't he be loved instead? I don't understand many thing in Christian beliefs. I also don't get why you all post these prayers that look like they are worded in old English! I know some of them are right out of the bible, but for kids, and people not having a great knowledge about these things, it would be much easier to understand if they were in modern words.'**

Here there are obviously two memes, a meme about fearing God as well as a meme about the use of old English. The sentence 'I don't understand many things in Christian beliefs' can be considered as part of both memes making it difficult to state exactly which words should be included in which meme despite there obviously being two particles of knowledge whose content and meaning can exist independently of each other.

The populations of memes or menomes that results from this analysis corresponded to a different number of posts and contained different numbers of memes, but not radically so (see Table 4.1), suggesting that from this perspective the three chat rooms are not markedly different. The exception is perhaps arguably the religious chat room where there are fewer memes and fewer memes per post. The number of memes indicates knowledge density of the whole population whereas the number of memes per post gives an idea of the type of interaction taking place. In this setting, based on e-mails, each post does contain on average

more than one meme whereas one might presume other forms of social interaction, such as speech, might contain less memes per talk, where a talk is defined as the data contained in a discourse before another person starts to speak, making it equivalent to a post.

**TABLE 4.0 Memes per post per case**

<b>The Menomes (population of memes per chat-room)</b>	<b>Mars</b>	<b>Religion</b>	<b>Gun policy</b>
<b>Number of memes</b>	<b>281</b>	<b>158</b>	<b>244</b>
<b>Number of posts</b>	<b>103</b>	<b>109</b>	<b>123</b>
<b>Average number of memes per post</b>	<b>2.7</b>	<b>1.4</b>	<b>2</b>

Having performed the task of dividing the discourse-based posts into memes, it can be concluded that whilst it is possible to create a memetic perspective that is fairly robust and defensible, (by which it is meant that it is possible with some accuracy to divide discourse into particles of knowledge that contain stand-alone, independent content), it is not that possible to specify exactly where in terms of words the content of the particles begins and ends. This implies that the ontology of memes lies in their semantic content rather than in their physical nature as a series of words. This claim regarding the ontology of memes is akin to that found in genetics and proposed by Dennett as being the same in memetics (Dennett, 2000). DNA codons (equivalent to words) are relatively easily identified with the advent of molecular biology and automated sequencing of DNA in the way that it is easy to determine words in social discourse. What is far more difficult to determine however, is the beginning and ending of a gene and its ontology in terms of how it creates a relationship with the world. Thus groups of researchers acting independently to sequence the human genome have arrived at substantially different conclusions on the length of the human genome (counted in base pairs of DNA codons) and how many genes it contains. Equally, only very recently (Wright et al, 2001) have researchers begun to provide a functionally annotated human gene index where functionality (read ontology) is placed directly onto the genome. Effectively the cases, or data sets of words, become 'menomes', memetic equivalents of genomes, once they have been divided into functional memes.

Driven by the theoretical (and philosophical notion) that the ontology of memes lies in their semantic meaning, as this is what is copied imperfectly through complex social interaction,

the empirical work begins to define in practical terms what a meme is and is not. Thus memes, according to this analysis, are:

1. Usually more than a word and less than pieces of discourse said by one person at a time.
2. They are themes, or subjects within discourse that take a particular stance with respect to the outside world.
3. Meaning that has sufficient content to be transferred to others operating within the context in which the meme is being expressed. Indeed, it can be said that memes create and define context.
4. Are context specific in that they have a meaning within that context and relate to and rely on other memes within that context for meaning.

What memes are not, according to this analysis includes:

1. Words that stand-alone when taken out of context. To consider words out of context to be memes would result in more micro units of analysis that have less functional meaning akin to the codons of DNA in genes.
2. Equally, memes are not whole pieces of discourse uttered in an uninterrupted fashion by any one person at some point in time containing several themes. These represent a different discourse-based unit of analysis that is more macro than memes, perhaps in a loose way equivalent to chromosomes.
3. Phrases that are self-contained stand alone particles but which gain far more meaning when considered as part of a bigger data set with which they are associated in a certain context. They are self-contained particles that contain substantial meaning and which allow the words around them to also be incorporated into memes.

This analysis does not prove memes exist. It uses the concept of people relating to the world through topics, subjects and views to determine the amount of variety in gross terms that exists within a social discourse. The next step of amalgamating memes into memeplexes serves as a basis upon which the amount of variety and depth of variety exists in each case within the setting. The individual memeplexes or indeed memes are not used as much as what they suggest about how far the discourse has moved from its original content and how much of that content has been related to by one or many voices.

#### **4.4.2 Knowledge content: Memetic population characterisation**

Having divided the data into 'memes', the next step in data analysis involves characterising the content of the identified memetic population. Given the research question, this involves determining the type, amount and hence distribution of knowledge content within the population.

Two sub-steps are involved in this process. The first analyses the population to determine how similar or not the memes are. This results in each meme being associated or not, at two different levels, with other memes in what, within content analysis, is referred as a dendrogram that uses the technique called clustering (Krippendorf, 1980). Having performed the cluster analysis, the second sub-step involves conducting a prevalence analysis of the clusters. Graphically, the clusters or memeplexes are arranged so that the most prevalent second order memeplex is at the left of the dendrogram and the first order memeplexes corresponding to that second order memeplex are also placed in order of prevalence from most prevalent to the left and least to the right. Decision Explorer graphics are used to create the dendrograms (Charts 4.1, 4.2 and 4.3 - see end of chapter) and to access and manage the large volume of messy qualitative data with relative ease. Simpler histograms are also created of the number of memes in each memeplex (Charts 4.4 and 4.5 - see below).

It is worth noting that the dendrograms are best viewed by far on a computer screen within the software package that allows them to be manipulated and seen at varying levels of detail. The printed examples found in the back of the chapter (Chart 4.1, 4.2, 4.3) do however show how they are created and can be viewed from bottom up and hence in the order (Chart 4.1, 4.2, 4.3) or can be viewed from top down (Chart 4.3, 4.2, 4.1). Chart 4.1

shows a post divided into several memes, Chart 4.2 shows a meme from that same post (and other memes) clustered into a memplex. Chart 4.3 shows that memplex (and other memplexes clustered into a higher level memplex). It should be noted that some memes as they are not similar to any other content, could not be clustered into memplexes. The high level dendrograms and the corresponding qualitative and quantitative second order memplexes are given at the end of the chapter (Charts 4.9 (Mars) Chart 4.9.1 (Religion) Chart 4.9.2 (Gun policy).

Specifically, as regards the first sub-step, by looking at all the memes within each chat room, the extent to which the memes related to each other is identified. In content terms each meme is more or less similar to all other memes. This allowed memes that differ least in content to be grouped together into higher-level categories of memes called first order memplexes. The amount of variety was such that the process of clustering is repeated at the level of these first-order memplexes to group these into second-order memplexes if possible. The idea in clustering is that some concepts (in this case memes) can be regarded as one with minimal loss of detail. Using the principle of minimal loss of detail, all memes in each chat room are categorised as belonging to a previously created category or memplex, if that is not possible a new category is created.

#### EXAMPLE 1

Throughout the chat room Gun policy there were, for example, references to spam:

Case	Post	Meme
Gun policy	9	1

Spamming is a violation of the Terms of Service of nearly every ISP – including this one. Not to mention it is a serious violation of Netiquette.

This meme is clearly about the role of the ISP's Terms of Service in defining and banning spam and hence resulted in the creation of a first order memplex 'role of ISPs in spam'.

#### EXAMPLE 2

Case	Post	Meme
Gun policy	76	1 and 2

Uh, sorry for popping your balloon here, but wouldn't it be better to talk to de ja new Usenet service through which he posted these articles, rather than his email or website. It's the Usenet spamming that should stop, right?

This post was considered to contain two memes; one about the 'role of ISPs in spam' and one about the 'promotion of action of reporting spam'.

### EXAMPLE 3

Chat room	Post	Meme
Gun policy	94	1

Well folks, good news and bad news. The good news is that the folks at Homepage.com honored their terms of service and shut down the page.

This details what the ISP has done about the spam.

Case	Post	Meme
Gun policy	117	1

Deja only lets you submit posts to four groups at a time.

This meme tells you a particular element or facet of what the ISP considers as spam.

All of these were included in the first-order memeplex 'role of ISPs in spam'. There were eight other first-order memeplexes about spam formed from clustering other memes from other posts as follows:

1. Promotion of action of reporting spam.
2. This is spam.
3. This is not spam.
4. Reporting spam as opinions you do not agree with is censorship.
5. Reporting of spam is not censorship as genuinely anti-spam.
6. Deciding whether something is spam according to whether you agree with it or not is logically wrong.
7. Your requests to report spam are spam themselves.
8. Spamming about spam not intentional.

Each of these categories is very separate in either traditional content terms or in how the poster states he or she relates to the world. For example, stating whether something is or is not spam might be considered as similar in content but as the content creates a different relationship with the world, hence these were considered as separate.

In some cases, the meme is so unlike others it exists at a higher level as itself as there are no other memes that could be joined with it to create a memeplex. These memes, which existed

at low levels but which were too dissimilar to other memes to be cluster with others, add a lot of variety but little, if any depth, of content.

### EXAMPLE 1

Keeping to the chat room Gun policy, examples include:

Case	Post	Meme
Gun policy	49	1

Yes, just like Bill Clinton is useful to female interns.

### EXAMPLE 2

Case	Post	Meme
Gun policy	106	1

Progun lobbyists like chef770 says it is okay to sell your own guns to felons, sexual deviants, people with records of violence, drug dealers etc.

Given these are pretty 'off the wall' statements it is not surprising they could not be clustered in to memeplexes.

Viewing the analyses all together, three sets of insights ensued. These are insights on methodology, particularly the issue of reliability, qualitative insights on the nature and variety of content and quantitative insights on the amount of variety in each case.

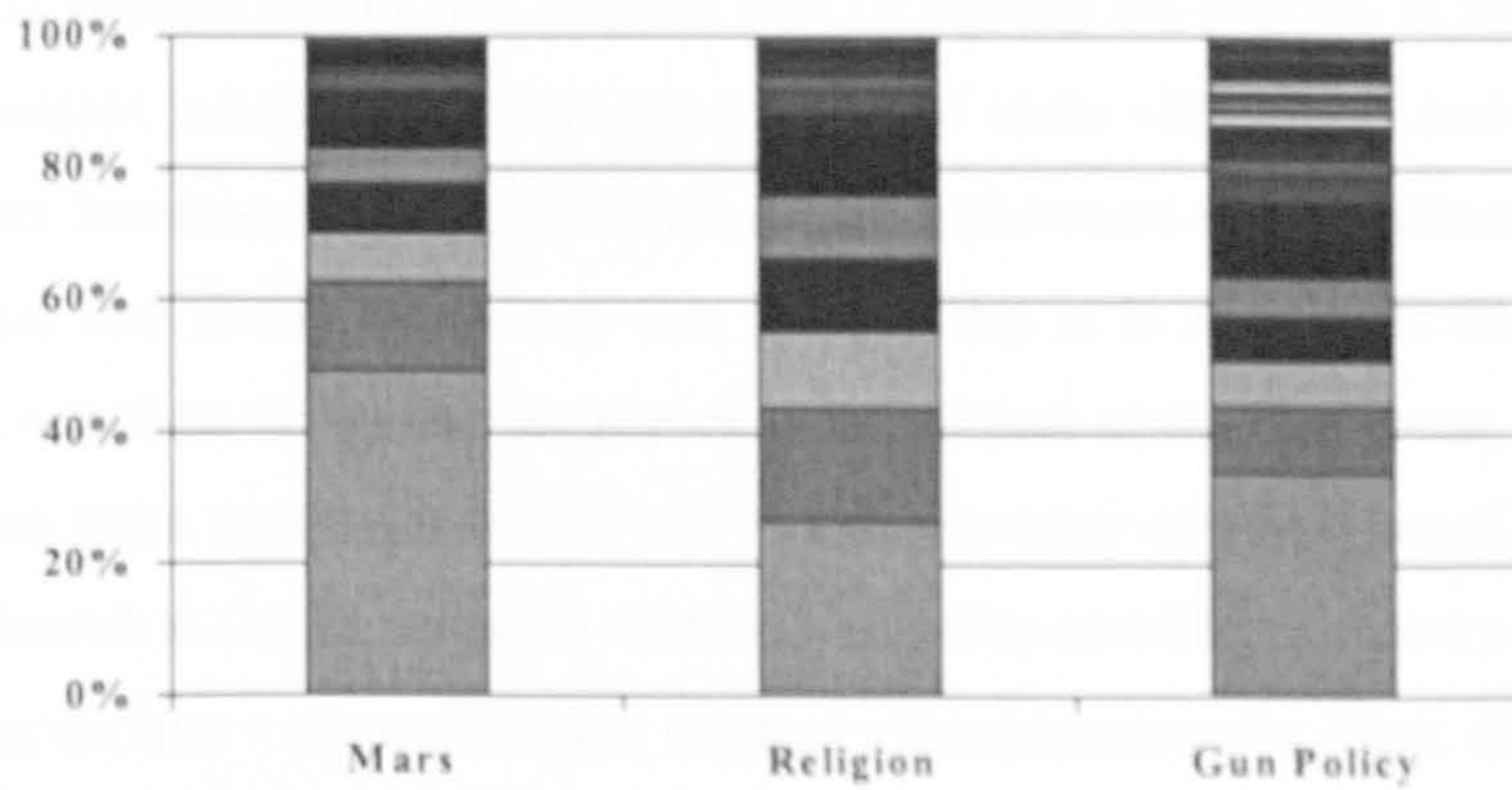
As regards method, one of the dangers in completing this step in the analysis is considering prevalence at the same time as deciding whether a new category (or memeplex) exists. It led to the temptation in the case of a low prevalence meme not to bother with creating a new category and hence to define memes based on their prevalence rather than variety of content. Other dangers include becoming tired and therefore careless in assigning and creating categories, standardising a standard minimal loss of content across the population at each level and mis-interpreting the data through lack of careful reading or own researcher bias. Reliability is addressed in the Chapter Three in the form of a second coding exercise performed on a sample of the data.

Given the subjectivity of the division of the data in to memes and memeplexes, despite the reliability of the coding, care had to be taken not to create too detailed insights from this analysis. Using the qualitative and quantitative dendrograms and quantitative histograms of the same data certain statements can however be said with a degree of confidence. The

histograms are shown below and the dendrograms are at the end of the chapter. Chart 4.4 shows the distribution of memeplexes per case in a stacked histogram, whereas Chart 4.5 shows that same distribution in an unstacked histogram.

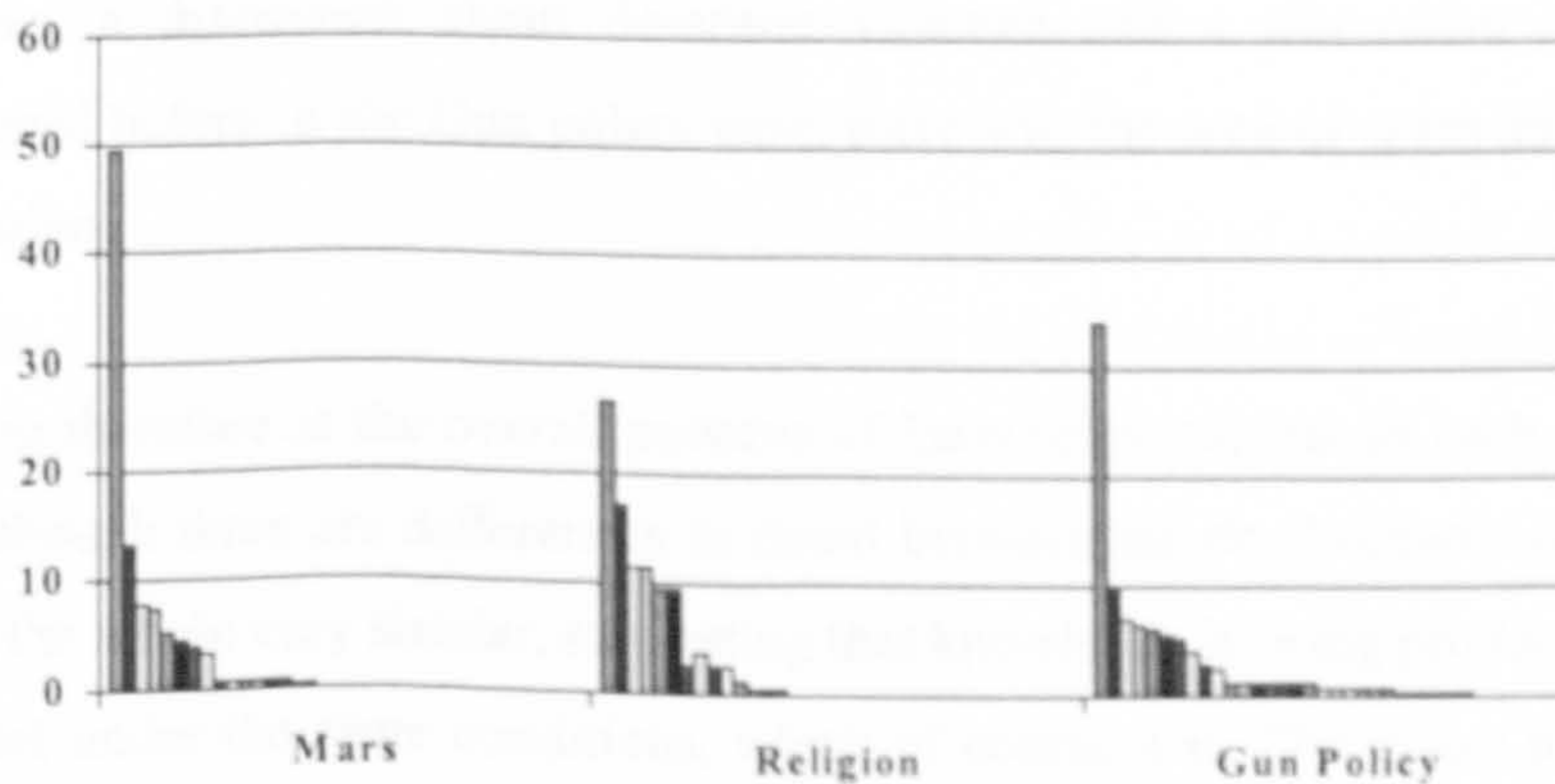
**Chart 4.4**

Distribution of memes – Internet setting  
*(number of memes in higher order memeplexes)*



**Chart 4.5**

Distribution of memes – Internet setting  
*(number of memes in each higher order memeplex)*



In terms of concentration of content, the Mars case contains the most variety within one memeplex (as there is so much content about conversion factors that is very similar).



Equally the Gun policy case contains much variety within one memplex because of the repeat posting. The Religion case has the most evenly distributed variety amongst the memplexes.

The Gun policy case contains the most breadth of variety and hence most varied content. In quantitative terms it has the most second order memplexes, first order memplexes, most first order memplexes without second order memplexes and most number of memes with no first order. This analysis feels intuitively correct as the content of this chat room did expand far beyond its title and original post of signing the petition to stop guns. Indeed the most prevalent second order memplex is that of spam with others including the nature of democratic freedom. Consequentially the case is far more about a discussion of the nature of freedom and liberty than about Gun policy. This is in contrast to the Mars Case where the most prevalent first order memplex is the subject of the chat room, namely facts about conversion units, and is accompanied by far fewer other memplexes. The religious case is not dominated to the same extent as the Gun policy and Mars cases by one very prevalent memplex and has a similar number of other memplexes as the Mars case and less than the Gun policy case.

Looking more at the qualitative side of the data it could be seen that in all cases dramatic variety is produced. For example, in the Mars case there is quite extensive emergence of knowledge in terms, for example, of building a community around HP calculators and emotional attachment to them. In the Religious case there was a bizarre discussion of cadavers, a discussion about domestic violence and a discussion about T-shirts. As mentioned before in the Gun policy case, there was the area of spam and what is and what is not spam.

Looking therefore at the overall patterns of knowledge content in each case it can be seen that although there are differences in detail between the dendrograms and histograms they are on the whole very similar, suggesting that knowledge is being produced in the same way or rather under the same conditions, which of course it is. The extent to which knowledge being produced under different conditions might produce notably different types of dendrograms remains to be seen in the next chapter when the organizational data is analysed. These analyses can provide a standard against which the organizational cases can be compared.

Despite the methodological weaknesses of identifying memes and clustering them, this step in data analysis shows the amount and depth of variation in content across each of the chat room populations. It suggests that all involve the production of large amount of variety. It did not however show how that variation had been created. As such it is a snap-shot photograph of memetic content, rather than a dynamic video, akin to genetic maps which can be created when studying genes that have evolved over many centuries, if not millennia, where the exact longitudinal process of creating variation is unknown.

#### **4.4.3 The process of knowledge emergence: Creating categories of memetic evolution**

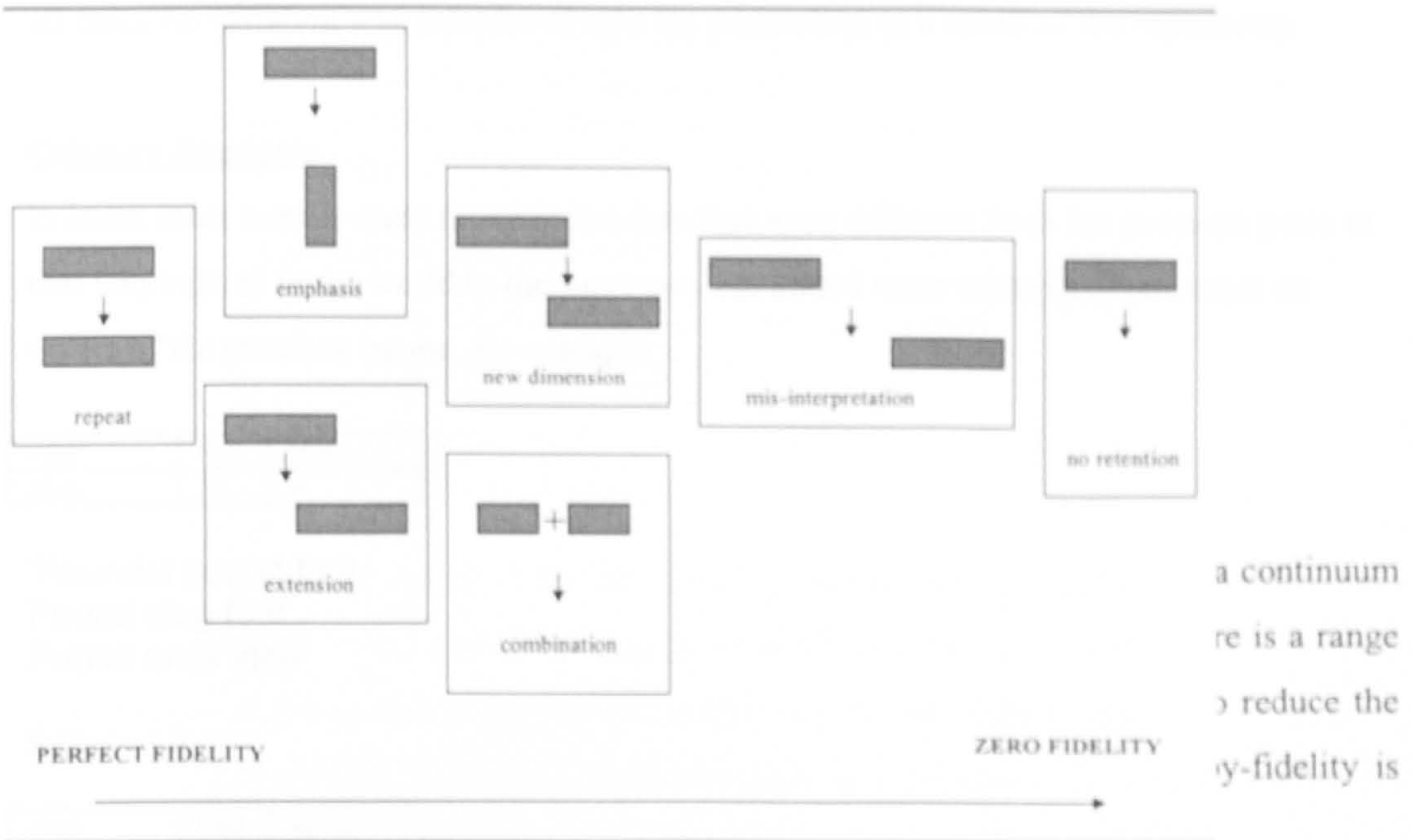
Having divided the data into 'memes' and determined the type, amount and distribution of the variation of knowledge within the population, it is necessary to elucidate how that variation had emerged. In this sense the thesis is interested in whether the variation in content of memes is introduced in small, incremental steps at each social interaction or whether the variation is introduced in a few steps during a limited number of social interactions or some other combination of big and little increases in variation. In memetic terms this means that the nature of copy-fidelity of each social interaction needs to be determined in terms of the amount of variety added to the content at each stage. Memes can theoretically be retained in two ways, perfectly or less than perfectly. So the second challenge of this stage of data analysis is to elucidate the nature of copy-fidelity. As mentioned before, content analysis is used to compare each meme with the preceding knowledge pool and a grounded approach used to determine the nature of the variation that emerged. The analysis is used to determine categories, each of which are created for each new case of added variation that is found as the data are analysed longitudinally from meme to meme. Within each case, if the mechanism of added variation is covered by a previously created category, then no new category is created if not, a new category is created. Hence, all forms of imperfect fidelity to be found within the data are captured.

There is a complication in this analysis because whereas genetic interaction is one on one, social interaction in memetic evolution is not. Thus during (a) sexual reproduction there is no memory, the genes have *an* opportunity to replicate. In memetic evolution there is no easy way of telling whether the meme is an imperfect copy (subjective interpretation) of the

previous post or whether he/she is interpreting other knowledge talked about earlier in the discourse. Two categories for each form of replication could have been created detailing whether the variation was related to the previous post or to some previous post. It was decided, however, that what is important is the nature of the replicative variety and not the exact meme that is the source of the replication and whether it is retained rather than at what point it is retained. This was not a matter of laziness as the both ways of analysing the data were performed before it was realised that the easier approach was in fact more logical! So one category is created for each type of imperfect copy fidelity irrespective of whether the variation originated from the immediately preceding post or any other preceding post in that population of memes or 'menome'. The forms of replication discovered in the data and their corresponding mechanisms of transmission are provided below in the table, illustrated graphically and explained in more detail subsequently.

**TABLE 4.1** Internet categories of emergence

<b>Category</b>	<b>Sub-category</b>	<b>Nature of fidelity</b>	<b>Amount of variation added into the population</b>
<b>Repeat</b>	From previous population	Near or absolute perfect copy-fidelity	None
<b>Emphasis</b>	Added detail	Medium, imperfect copy-fidelity	Moderate
<b>Extension</b>	Additional lateral knowledge	Medium, imperfect copy-fidelity	Moderate
<b>Combination</b>	Two pieces of knowledge so strongly associated with each other that they form a new meme	Both imperfect and perfect at the same time	Moderate
<b>New dimension</b>	A new theme to the chat but one if taken out of the context would not obviously be part of it	Low, imperfect copy-fidelity	High
<b>Mis-interpretation</b>	Deliberate and not	Very low, imperfect copy-fidelity	Very high sometimes disjointed
<b>No retention</b>	Within whole population	Zero copy-fidelity	Variation reduced



Category Repeat

In these cases, memes found in the data were either exact or very near repeats of previous memes. For example, the meme below about spam is repeated three times.

Note: although this is a long meme, all of the content contributes to the concept of spam (defending the consideration of a previous post as spam, how it can be considered as reportable spam and how to report it as spam) that cannot easily be divided without the smaller particles losing meaning.

Case	Post	Meme
Gun policy	4, 6,7	1 and 2

I have the information everyone here needs to report this site as spam to the hosts was stupid enough to use his actual account to send it. Anyway, ajcongress-ne.org post under in some groups as [psego@usa.net](mailto:psego@usa.net)). Anyway the addresses below are to report the spammer. Please keep reading to report the SITE hosted in the spam, guncontrol.homepage.com By the way, this spam was posted to HUNDREDS of USENET newsgroups, so make sure you mention that in your complaints. The host of the spam site:

[hostmaster@RAPIDSITE>NET](mailto:hostmaster@RAPIDSITE>NET), [abuse@rapidsite.et](mailto:abuse@rapidsite.et),  
[abuse@nameservers.net](mailto:abuse@nameservers.net)[Abuse@verio.net](mailto:Abuse@verio.net)

These memes were repeated twice in posts 6 and 7 having originally appeared in post 4. In all cases no variation was introduced into the population as a result of the replication.

### Category Emphasis

In some cases memes were found in the data that were different from the previous posts in that they related to the world in the same way but added more in-depth detail about an aspect of the previous meme, for example:

Case	Post	Meme
Mars	23	4

'Poundal pound foot  
Pound slug foot  
Pound snail inch'

followed by:

Case	Post	Meme
Mars	24	2

Of, course we are left with the contradiction that a snail is even more sluggish than a slug itself

Here, there is obvious humour in adding a fictitious snail inch unit to the real snail foot (yes such a thing does appear to exist), which is then commented on further. So in these cases copy-fidelity was somewhat imperfect and the result of the replication was the addition of moderate variation into the population.

### Category Extension

In some cases memes found in the data were extensions of the previous posts in that the content of the previous post was added to and therefore extended into new terrain, for example:

Case	Post	Meme
Mars	1	1

'Maybe some one can answer this for me. Why should I fear God? I think this is one of the most forceful ideas that has kept me away from the Church. I find it quite silly frankly! If god is full of love, joy, and forgiveness, why should he be feared? Shouldn't he be loved instead? '

followed by:

Case	Post	Meme
Mars	2	1

'The word 'fear' in the phrase 'fear of God' has two meanings, fear in the sense of being afraid and fear in the sense of respectfulness. According to various Christian theology and Biblical scriptures, one should fear (afraid sense) God because he is a vengeful God, who avenges the righteous and pours out his judgment on the evildoers of the world etc.; and one should fear (respect) God because he is the author of life, loves you, and he is the triune God etc.'

In these cases, copy-fidelity was also somewhat imperfect and the result of the replication was the addition of moderate variation into the memetic population. In the above case information was added about the definition of fear.

### Category New Dimension

In some cases memes found in the data had substantial added dimensions to them that differentiated them from extensions. The test of whether a replication could be classified as an extension or a new dimension was that if one took the meme as a stand-alone would one have guessed it was part of the same chat room. Substantial doubts that it has not resulted in the meme being classified as a new dimension, for example:

Case	Post	Meme
Gun policy	78	1

'I have the information everyone here needs to report this site as spam to the hosts was stupid enough to sue his actual account to send it. Anyway, ajcongress-ne.org post under in some groups as [psego@usa.net](mailto:psego@usa.net)). Anyway the addresses below are to report the spammer. Please keep reading to report the SITE hosted in the spam, guncontrol.homepage.com By the way, this spam was posted to HUNDREDS of USENET newsgroups, so make sure you mention that in your complaints. The host of the spam site:

[hostmaster@RAPIDSITE>NET](mailto:hostmaster@RAPIDSITE>NET), [abuse@rapidsite.et](mailto:abuse@rapidsite.et), [abuse@nameservers.net](mailto:abuse@nameservers.net)[Abuse@verio.net](mailto:Abuse@verio.net) '

was followed by:

Case	Post	Meme
Gun policy	79	2

'to me, the real value of the internet is that is can be sued to promote the dissemination of ideas a function necessary to maintain and improve a democracy, not to sell more GAP clothes and make dot.com investors jet rich.'

In these cases copy-fidelity was low and the result of the replication was that substantial variation was added to the memetic population, in the form of the role of the Internet in

promoting a democracy of ideas as against the Internet being used for commercial ends moving the discussion on substantially from reporting spam.

### Category Mis-interpretation

In some cases memes were found that were mis-interpretations of the previous post. In some cases this the mis-interpretation was deliberate involving a play on words, in other cases this category of replication involved an unintended mistake. Examples of both are provided below.

Case	Post	Meme
Mars	75	2

'1 foot = 12 inches  
1 yard = 3 feet = 36 in  
1 chain = 22 yrd = 66 ft = 2376 in  
1 furlong = 10 ch = 220 yds = 660 ft = 23760 in  
1 mile = 8 frlg = 1760 yrd = 5280 ft = 190080 in

Interesting system, really.

Or, like Mr. "Four Weddings" would say: "Excellent!"

followed by:

Case	Post	Meme
Gun policy	77	1

'interesting propagation of a numerical input error :-)

66 ft = 786 in, etc...'

In this case an intended play on words is used to create a mis-interpretation of the word interesting. An example of an unintended mis-interpretation is given below:

Case	Post	Meme
Religion	56	1

You're a Winnipegger!?!? I am soooooooooo embarrassed...  
People.... This nut is NOT representative of the people you'll find in the peg.

This meme has no place in this chat room and was in fact the result of someone replying to the wrong chat room yet the lineage continues for five posts. In these cases, copy-fidelity was very low and a high amount of variation was added, often to the point of creating quite a discontinuity in the emergence of knowledge.

**Category No Retention**

Lastly there was the category of no retention of the meme, it never being replicated in the whole population or in the next post, for example.

Case	Post	Meme
Mars	54	4

'On the other hand there is no way to forget that there are 100 centiliters in a liter.'

This notion that SI units are easier to remember is never repeated. In these cases copy-fidelity was zero and the effect of the replication (or absence of it) was a reduction in the amount of variation in the memetic population.

Having categorised each memetic evolution within each chat room, the amount of each type of copy-fidelity was calculated making it possible to compare the amounts of each category within each case, as follows:

**TABLE 4.3 Categories of emergence per case**

Chat room	Sources of increase in variety*										Decreases*	
	repeat		emphasis		extension		new dimension		mis-interpretation		no retention	
	#	%	#	%	#	%	#	%	#	%	#	%
Mars Total 281	45	16	129	46	30	11	75	27	2	1	14	19
Religion Total 158	7	4	32	21	62	40	55	35	2	1	31	56
Gun policy Total 244	72	29	20	8	95	39	55	22	2	1	27	67

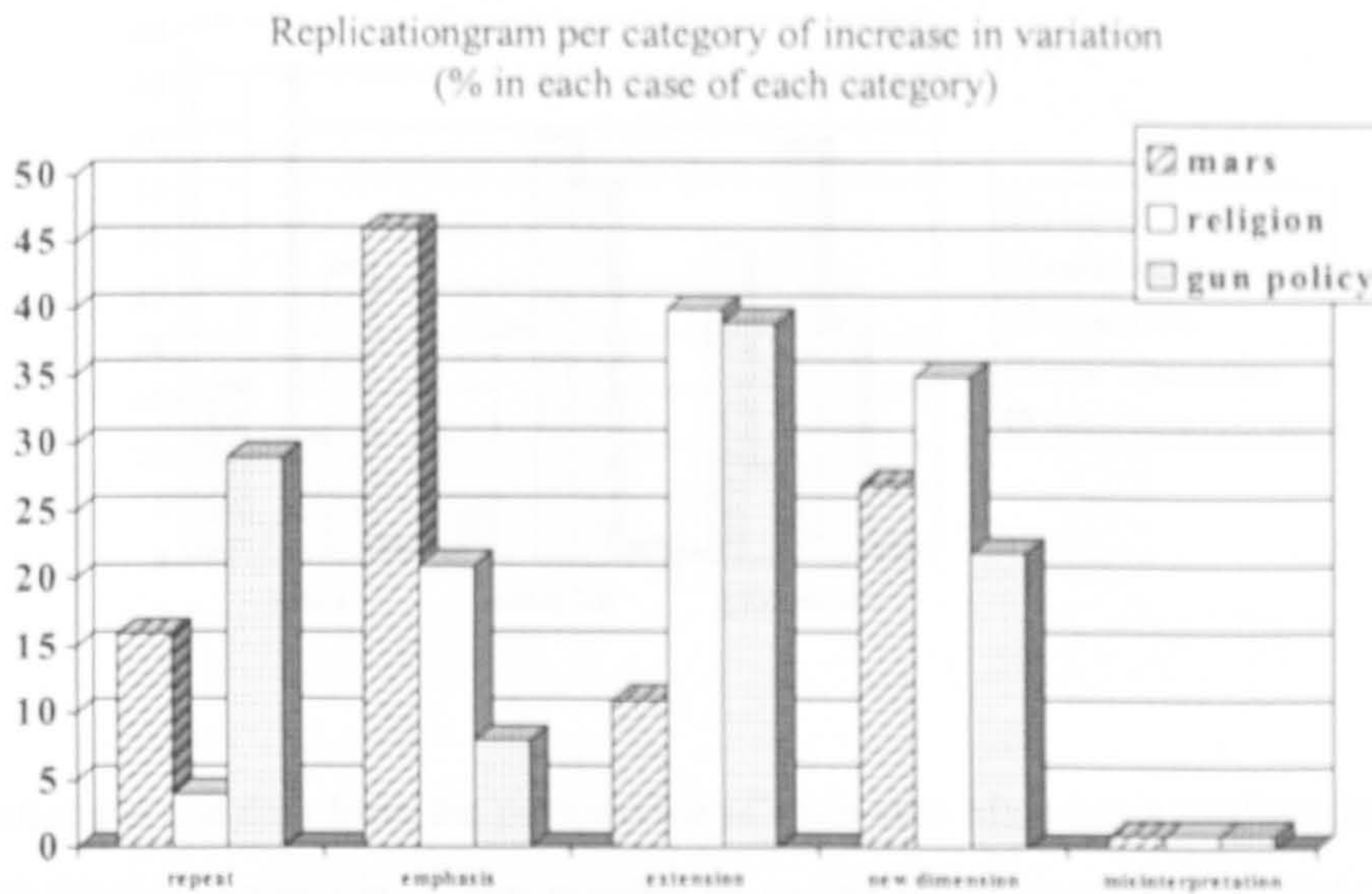
- \* For increases in variety 100% equals all categories of copy fidelity  
For decreases in variety 100% equals all new memes (new + mis-interpretation)

The data in Table 4.3 representing increases in variety are also reported in histograms to create 'replicationgrams' (see Charts 4.6, and 4.7). The first replicationgram (Chart 4.6) details the percentage of each category in each case whereas the second replicationgram (Chart 4.7) divides each case into each category. Chart 4.8 shows the relative incapacities



of each chat room to absorb new variety in any form. The charts reveal that every case had its unique variation fingerprint, as is the case with genetic replication.

**Chart 4.6**



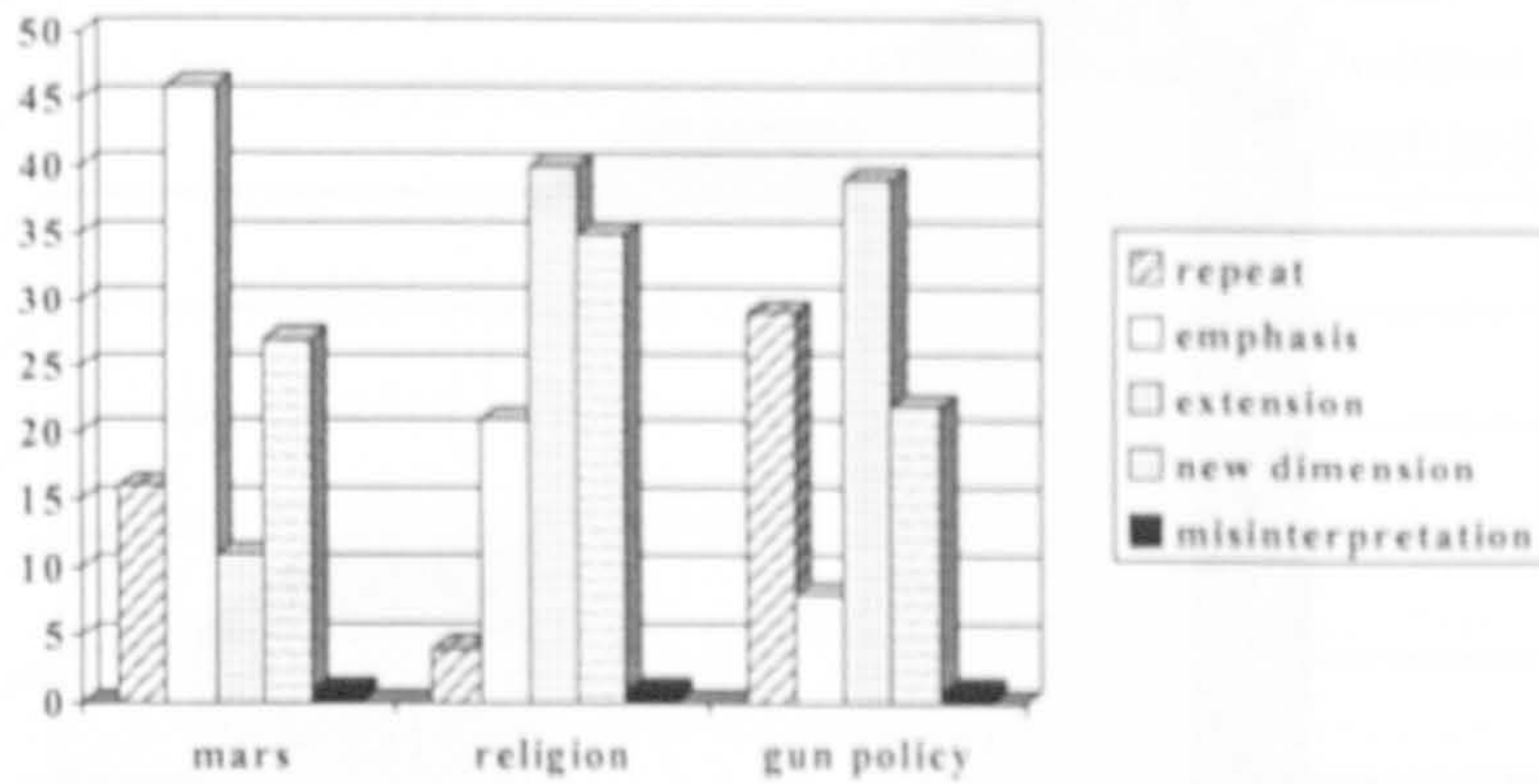
Looking at the data from the point of view of distribution of each category of emergence across the cases (chart 4.6), the cases differ in the amount of repeat content which they contain. Case Gun policy is high because of the number of repeated postings of the request to report the site as spam, Case Mars is also relatively high as it contained a number of repeat postings in terms of scientists agreeing with scientific 'facts' posted previously. The Religion case had very few repeats with everyone having a particular opinion about things.

As regards emphasis, Mars has the highest percentage representing presumably the cases where added details were given about conversion units. Religion less so and Gun policy even less, not surprising as these chat rooms were where most divisions of opinion lay.

As regards extensions that added variety, Religion and Gun policy had equal numbers whereas Mars had few, presumably because the theme centred on conversion units. New dimensions were very similar, suggesting all had the same levels of newness entering into the population. Mis-interpretations were identical.

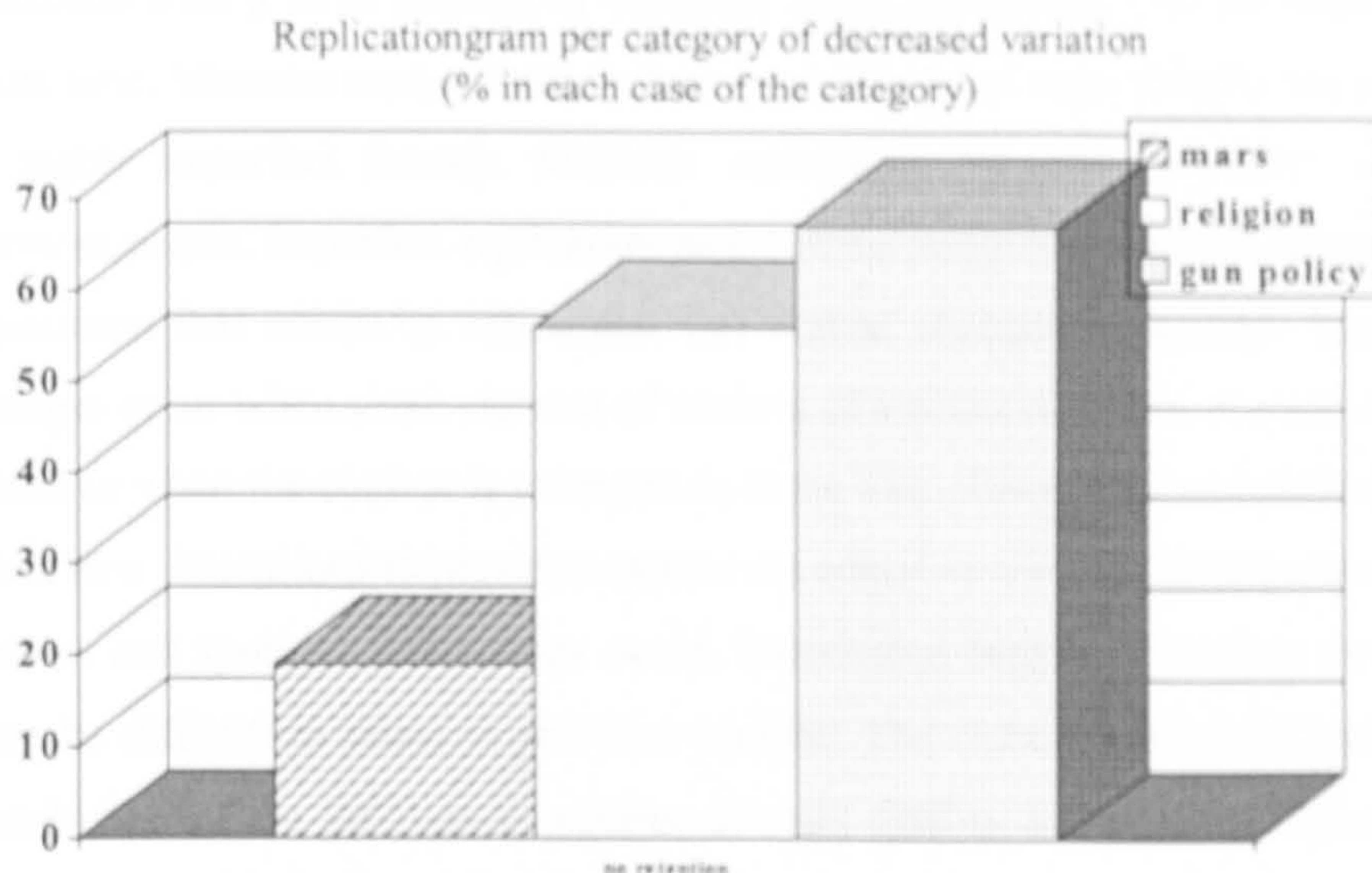
Chart 4.7

Replicationgram per category of increase in variation  
(% of categories per case)



Looking at the data from the perspective of each case Mars has a medium level of repeats, a high level of emphasis, a low number of extensions, a moderate to high number of new dimensions. Religion has very few repeats, a low-to moderate number of emphasis, a high number of extensions and a high number of new dimensions. Lastly, Gun policy features a high level of repeats, a low level of emphasis, a high number of extensions and a moderate level of new dimensions. This is consistent in that all cases have a large amount of variety. Furthermore, Mars is dominated by additions to conversion factors (high number of emphasis), Religion is dominated by great debate (large amounts of emphasis, extension and new categories) and the Gun policy, which is co-dominated by a large amount of debate (extensions and new dimensions) and also by the phenomenon of repeat posting about spam.

Chart 4.8



As regards non-retained memes, in the Mars case new memes are retained most often where as in the religious case new memes are retained far less often and in the Gun policy case new memes are retained even less often. This is unsurprising as there is the most vehement disagreement in the Gun policy case and the Religious case, where two or more communities enter into debate, whereas in the Mars case the subject contained less variety presumably because it involved one community of people that tended not to debate about the big issue of how the satellite had fallen but discussed various conversion factors.

These profiles show how the increase in variety shown in the dendrograms and histograms is created. So in the Mars case variety is added mostly in small steps and a few big ones countered by a number of repeats aided by a high retention of new memes. In the religious case, variety is relatively even between all categories and countered by very few repeats and once again a low level of retention of new memes. The Gun policy case features variety added mainly through extensions, some emphasis, a good deal of new dimensions but is countered by many repeats and a moderate number of non-retained new memes.

In summary, as regards emergent variation, it can be said on the basis of the empirical data that memes are rarely copied perfectly or near perfectly, as is the case with genes, meaning variation is frequently introduced into the memetic population. The time interval between exchanges of memes during social interaction is rapid in comparison with the exchange of

genes during (a)sexual interaction. The combination of rapid replication and high level of imperfect replication of memes results in memetic evolution being much faster than genetic evolution with a large amount of variation being introduced into the population within a short time. Memetic replication involves a continuum of copy fidelity from perfect fidelity to highly imperfect fidelity. Memetic replication can involve perfect replication of a previous meme. Imperfect replication ranges from small to moderate changes in content to replication that results in substantial and radical changes in content. Small to moderate changes occur when some element of content of a previous meme is emphasised and detail added or when the content is extended in some way. Substantial and radical changes occur when new dimensions to previous memes are added or when misinterpretations of previous content and spurious interactions occur, introducing highly innovative content which can even be difficult to relate to previous content. The overall amount of replication and the distribution of the different categories of copy fidelity within these replications within a time period of memetic evolution results in more or less variation being introduced into and removed from a population of memes over that same time period.

#### **4.5 Commentary on the analysis performed to answer 'how does organizational knowledge emerge?'**

On the basis of this first stage of data analysis of this unmanaged setting of Internet chat rooms, it can be said that knowledge emerges to create a unique fingerprint that can be characterised in two ways. Firstly, the emergence of knowledge can be characterised in terms of content; determining the type of content and prevalence of content and hence distribution of variation in content across the data set. This can be illustrated in the form of dendrograms. Dendrograms are unique, but are more or less similar. They are not accurate in the sense of being easily repeatable or highly objective but are sufficiently representative of the data such that comparisons between dendrograms can be made which reveal how much breadth and depth of variety of knowledge exists within the strategic conversation. For example, the dendrogram may have a long tail of memeplexes and memes (Gun policy case). There may be more or less memes clustered in first order memeplexes which in turn are clustered into the same second-order memeplex making the dendrogram have a heavy left hand side (Mars case and to a lesser extent the Gun policy case). Alternatively the content may be more evenly distributed as in the Religion case, albeit that there is still a skew towards the left. The only circumstance where there would not be a skew and hence an even distribution would feasibly be in a well facilitated brain-storming session, where

the rules of brain-storming should mean that each new content is given the same amount of attention. This example illustrates how comparisons can be made that reveal broad differences in the content of a conversation. The analysis allows these broad comparisons to be made about how much variety and depth of variety in content there is in an exchange of knowledge between people.

Once again it is worth noting that the term 'knowledge' is being used whilst acknowledging that what is being looked at is not the knowledge harboured in the minds present, but what knowledge is being exchanged in that moment in time which might or might not be incorporated into artefacts at a later stage.

Secondly, the analysis reveals whether the knowledge has been added to incrementally and hence through a series of adjustments in the form of extensions and emphasis or more dramatically in the form of new dimensions or even mis-interpretations. These profiles therefore represent what type of knowledge emergence is occurring in process terms. Each data set of knowledge emergence has its own fingerprint, thus comparisons between data sets should reveal differences and similarities from which insights can be drawn.

When comparing the profiles of these three cases one sees that the distribution between the categories is uneven, representing what is happening in the cases. However, although there are some differences between the distributions of categories within the cases, they are not substantial, suggesting that the process of knowledge emergence is not that different between these same cases. It is supposed that, for example, the profile of a well-facilitated brain-storming session would be expected to contain many new dimensions and extensions but few, if any, of the other categories of emergence and hence have a very different profile from that of the Internet cases.

#### **4.6 Why does knowledge emerge?**

Having elucidated how variant knowledge emerges, dies, survives and becomes more prevalent, the analysis moves to consider why knowledge might emerge, become more prevalent and die. The quest for an explanation needs however to be put in the context of the assumptions the thesis is built upon. These are namely:

- 1. Knowledge emergence is a matter of subjective interpretation of meaning during repeated social interaction.**
- 2. The concept of human intentionality is generally predicated on man being in control of the above system, of which he is plainly not in perfect control.**
- 3. To assume however that he is not in any form of control is equally absurd as he is part of that system and has in some arenas (such as genetics) developed an understanding of that system that has led to the control of it in ways which were previously unimaginable (gene therapy). Which leads to what type of control is evident in the data and what effect does it have on knowledge emergence?**

**These assumptions are kept in mind when comparing the variety of knowledge in each case and trying to find concepts that explain what is happening in each case which is assumed to operate in the same system but which produced different knowledge. The analysis starts at the most basic level of knowledge creation as defined in evolutionary theory, namely that it is dependent on social interaction and therefore its nature must be dependent on the nature of social interaction. It looks for meme strategies to the extent that at this stage of the development of the theory, proof of meme strategies would be unfounded, but consistent differences in the type of knowledge retained might be found in different communities and settings. A tendency to always retain certain knowledge or not retain other knowledge would act as a driver of the system. Evidence is also looked for that supports the notion that man might at least in part drive the direction of knowledge emergence, not knowing or pre-judging what that evidence might look like or what that system attribute might be.**

**What is evident within the data is that the different cases exhibit different levels and types of community interactivity that mean the system as a whole is more or less open to new variety. Furthermore, although individual meme strategies cannot be elucidated, it is possible to discern within the data that certain knowledge is retained more often than other knowledge. Another system attribute that is not mentioned in the theory but for which there is evidence is rules of knowledge emergence. These can be imagined as potentially being intentional and a level of evidence is found to support this. Lastly, evidence is found for what genetics has shown can be a way in which man can control the system, namely using an understanding of how the system has worked in the past to direct it more in the future, a**

concept given the title reflexivity. Interestingly, the data does not exhibit evidence for all theoretically possible forms of reflexivity, nor does it exhibit much reflexivity. The situation is therefore not as managed as it could perhaps be.

So to summarise, following the logic described above and using a theory driven approach whenever possible, and a grounded approach when required, the direction of the emergence of knowledge is seen as being a function of a number of attributes of the system, namely community interactivity, differential retention, rules of knowledge emergence and reflexivity. These attributes are common to all cases of knowledge emergence but their exact nature in each case explains the differences between each case. Taken together the nature of these system attributes in each are said to characterise the dynamism of the system each case takes place within. The nature of these attributes is seen as altering the amount and type of variation (range) and the depth of variation, (prevalence) of knowledge.

It is discovered, however, it is impossible to explain past emergence completely or forecast future emergence completely. Equally, it is discovered that more could feasibly be done to direct knowledge emergence in this setting than is currently the case through enhanced levels and types of reflexivity. Whether one would want to is another matter! A section that explores the implications of the insights on the analysis of the organizational setting follows this section.

The remainder of this section focuses on each of the four attributes of the system identified as being responsible for social evolution. Each section introduces and explains the concept stating to what extent it is based on memetics and evolutionary theory and if so how. Following on from this, evidence for the concept is presented.

#### **4.6.1 Community Interactivity**

The analysis of why knowledge emerges in terms of the concept 'community interactivity' is theory driven, in the sense that evolutionary theory states knowledge emerges through social interaction. Evolutionary theory states that the emergence of knowledge is a function of memes adding variety through individuals subjectively and differentially interpreting knowledge expressed by others. These others then collectively agree, or not, with that interpretation thereby creating collectives of knowledge or communities or practice and

interest. Evolutionary theory is therefore in agreement with Giddens's structuration theory (1984) that proposes a duality where both individual and social existences are co-constructed in the domain of everyday interaction. The phenomenon involves both individual involvement in the process of creating knowledge and a degree of collective agreement, or not, as regards the knowledge content. Different individual interpretations create variety. Collective agreement creates prevalence. Individuals harbour the products of past processes of the production and selection of knowledge, which they might or might not express. Communities, not only bring the possibility of social interaction, but also have their own dynamics of changing agreement on content. These two elements of individual involvement and collective agreement create communities. Community interactivity therefore becomes a matter of who interacts with whom and what emerges as a result.

What the data suggests is that whether communities interact is dependent on how closed they are to new variety and when they do interact whether they share enough knowledge to become involved in some exchange that creates a lineage of memes sufficiently long to create new knowledge and hence a new community.

Three aspects of the system appear to alter controllability. Firstly, who meets who in the everyday interactions that result in knowledge emergence is not controllable by any one. People exhibit free will in whom they chose to meet but also often do not have total control over whom they meet, nor do they want to. People attend networking events with the intention of meeting new people but without knowing whom exactly they might meet. Casual everyday conversations with people in corridors, on streets, and on public transport are not planned but are accidental. Secondly, even if people meet very intentionally, the knowledge that any mind harbours cannot be controlled totally either in terms of what knowledge they have in their heads, or what knowledge other people have in their heads when they meet, either intentionally or accidentally. Lastly, even though on occasions (e.g. in psychotherapy) we might reflect on whether we wish a 'meme' to be in our heads or to enter our heads, we do not spend every moment of every day deciding whether knowledge should or should not enter our minds. In this sense we are not, cannot be and do not want to be, in total control over what we have in our heads.

The emergence of knowledge being unpredictable in terms of who meets whom and what emerges as a result can be illustrated using the example of chat rooms. Note this is different



from finding evidence for how community interactivity directs emergence at the individual level. In the case of who meets whom, posters might intentionally join a chat room but cannot know or control whom they interact with. Posters do not know what knowledge others have in their heads indeed do not really stop to think much about what knowledge they might have in their own heads. Equally although they might on some occasion reflect on whether the knowledge they have allowed, or are just about to allow, to enter the heads (see reflexivity section) is something they 'want' to enter their heads, they do not do so in every case of social interaction and hence process of knowledge emergence in which they participate.

Even the 'decision' to enter the chat room is to some degree beyond their control with factors influencing that 'decision' lying in a much broader system. For example, physical access to the Internet varies from country to country affected by, for example telephony costs that are high in Italy (low Internet access per population member), low in America where calls are sometimes free, to the UK where they are not free but not costly. Many other examples can be given of very complex streams of events leading up to, or not, any individual becoming, or not, involved in a social interaction. Once inside the chat room any poster cannot be in control of what knowledge he or she may be exposed to.

What we are left with is the notion that there is a system that we are part of and therefore influence. The system is however out there in the sense of being made up of some many people and interactions that we cannot possibly foresee exactly what will happen. The system is also in there in the sense of our free will but collectively this means we also do not and cannot control the system as it is made up of others people's freewill (whether or not that freewill is truly free of a matter of the past accumulation of memes and what memes one happens to come across. There is a need therefore to unpack what the system is about from a grass root level to understand what drives it and where better to start than at the basis level of who meets whom and what emerges as a result.

Although evidence cannot be found to explain who interacted with whom and how the interactions affected knowledge emergence, the 'how' analysis did show this process to be affected by every single interaction. Every social interaction affects knowledge emergence and every possible social interaction could affect knowledge emergence. Furthermore, every unpredictable social interaction results in a type of knowledge emergence that cannot

be predicted. That said, at a community level patterns may be found. Furthermore, these community level dynamics can differ between cases making community interactivity a concept that has explanatory potential.

The Mars case, despite the title, only seems to contain people who are very knowledgeable about science rather than news media people despite the initial title that appeared to involve both communities. This is probably because the chat room belonged to the thread of science. The absence of non-scientists can also perhaps be attributed to the title, which would tend to put off people who are inquisitive but lack knowledge of science. There was however some debate amongst the scientists about the need not to be wholly accurate about science in order to make it appeal and be understood by a broader audience. Although it is difficult to say specifically why the title as it stands attracted those that it did, it is not difficult to imagine that had the chat room attracted journalists the ensuing emergence of knowledge would have been very different, erring much more on the public understanding of science (third most prevalent second-order memeplex) than scientific units (most prevalent second-order memeplex) as was the case. Whatever caused exactly this chat room to be confined to a single community and to a community of scientists is difficult to say but it can be recognised that by doing so less variety is created (see 'how' section 4.4).

The Religious case attracts two groups of people, atheists and religious people, perhaps because the title being in question form is inviting of alternative views as opposed to the Mars case that contains a judgement within the title. So from the start of the conversation two communities are present. This creates a more dynamic situation in which knowledge is transferred between two communities and does eventually result in the creation of a new community in the form of a definition of Christian fear that is not extreme and to which a non-Christian could adhere. This 'community' appears in the chat room to contain only one person, the original poster. This case is therefore more open to new and novel interactions than the Mars case. This can be connected to the greater variety of knowledge produced within it. A more open system appears to encourage variety.

The Gun policy case is a far more complex case of four communities bound together by the concept of freedom but separated by different views on gun policy and freedom and what is spam and freedom. The conversation however starts with two communities, as does the religious case. Two new communities emerge as the content within the conversation

expands. Posters belong to different opposing communities. Thus some are pro guns and consider the spam as spam. Others are anti guns and consider the spam as spam etc. Despite the four communities sharing different views, the system remains open seemingly through the sharing of the concept of and interest in freedom across all four communities. Through the interaction of these multiple communities even more variety seems to emerge than in the previous cases (see 'how' section). Therefore there seems to be a need for some sense of loose community in order for vibrant exchange to happen in order in turn for variety to emerge.

#### 4.6.2 Differential retention dynamics

Memetic theory states that the prevalence of memes within a population will differ and that this difference depends on whether they possess 'strategies' that increase their likelihood of being copied. Thus, according to memeticists, the computer virus Melissa, which consisted of an e-mail and 'I love you' attachment, was rapidly replicated across the globe because the meme strategy had a strong and wide appeal. This aspect of memetic theory assumes that at every interaction with knowledge, humans do not stop and think about what might be attracting them to a piece of knowledge and whether that is a 'good thing' or not. They might, on occasions, do so and this aspect of knowledge emergence is covered in the reflexivity section. Given however that this does not happen in every case, it is suggested that on occasions knowledge emergence might be affected to a lesser or greater extent by the differential retention of memes whereby certain memes are preferentially retained whereas others are very much not retained, without people realising it or having the time to stop and realise it. Retention dynamics are important because they reveal what knowledge has little chance of becoming embedded in artefacts or embodied in people's minds as the knowledge is rarely exchanged.

The theory is however lacking in detail, as only examples of meme strategies that are broad and hence independent of context are provided. In this thesis where context is much more specific, and in which very much more subtle, differences in prevalence need to be explained, the challenge becomes much greater. That said, what is easily copied ('preferential retention') and thus becomes context, and what is never copied ('no retention') can be determined and analysed as follows. The term retention dynamics is used rather than meme strategies as the thesis does not prove memes exist let alone meme

strategies which are logically even more difficult to 'find' and analyse than memes. That said in placing retention dynamics in the 'why' rather than 'how' section the suggestion is that such dynamics drive the direction of knowledge emergence in some way. They become a concept related to context and the creation of context and what makes a community stay or not as a community as the knowledge in it evolves 'risking' that if new knowledge is formed more communities might be created and other ones die.

### Mars Case

In the Mars case preferential retention appears to be about being rationally scientific, humour and the emotion of being a scientist as shown by the analysis that follows. The most frequent second order memeplex and the most frequent first order memeplex of the Mars case are 'facts about units and conversion factors' (49.5%) and 'national and within nation differences' (#32)(# = number) respectively. The remaining second order memeplexes are humour (13.2%), 'public understanding of science', (7.8%), 'cause of failure' (7.5%), 'the nature of science' (5.3%), 'correction of posters getting things wrong (4.6%), 'emotional attachment to scientific instruments/tools' (3.9%), and 'the nature of human error in science' (3.2%). The majority of the remaining first order memeplexes within this most frequent second order memeplex are diverse facts about conversions factors between different scientific units with a range that starts with those relevant to the failure of Mars to obscure ones such as slugs (#9) and troys (#9)! First order memeplexes not directly referring to conversions units include 'national and within nation differences' (#28), 'sources other than HP calculators of conversion factors' (#9), 'professional standards/acts of law' (#1) and 'HP calculators as sources of conversions factors' (#1).

It can be seen from this analysis that the subject matter of the chat-room is elevated from the cause of failure in the mission to Mars and explaining that cause of failure to non-scientists, to a wider discussion dominated by facts about different scientific units and conversions factors in general and to a lesser extent by more general discussions about science. From this it would appear that what is attractive is science, in particular objective facts about science and to a far lesser extent the impression others have of that objectivity. The fascination with science and accuracy is typified by the population of memes within the memeplex 'facts about scientific units and conversion factors' being boosted by memes that were to do with units and conversion factors but which were not relevant to the Mars

mission failure. In all cases the memes tend to be statements of 'fact' rather than diverse views about a subjective matter.

This view is further validated by the nature of the most prevalent first order memplex, 'within and between nation differences' (#33) within the second order memplex 'facts about scientific units and conversion factors'. It is interesting because this first order memplex consists mostly of facts about the nature of the different scientific unit systems operating in different countries and only rarely referred to the need to amalgamate these and never to the fact that they are social constructions and are not therefore facts. The exceptions are a couple of references to historical reasons for countries ending up with different systems. So even in an area that could be considered as subjective, the emphasis is on objectivity and any discussion of a subjective take on the content is not replicated to any significant extent.

Other comparisons can be made between first-order memplexes that are frequent and those that are not within the same second order memplex to help in substantiating this finding. Taking the example of the prevalence of 'gallons and litres' (#3) versus slugs (#9), the 'gallons and litres' include no humour, no discussion of national differences and ends when the point is made that the example of litres is being used to show that even SI units can be confusing. What does stop the lineage appears to be the conversion of the subject from objective details of gallons to litres conversions to a subjective discussion of how easy units are to remember. Contrastingly 'slugs' in which all posts are very technical and factual have 3 humorous posts out of 9.

Outside of this general tendency to scientific objectivity as against social subjective construction, there is a lot of humour in this chat room and a sudden show of emotion. What is humorous appears to be preferentially retained despite the subject matter being far from humorous, starting as it did discussing the failure of the mission and the failure of journalists to understand the failure of the mission. The sudden show of emotion revolves around the ownership of HP calculators and attachment to them. Emerging from a reference to an HP calculator as a source of accurate conversion factors, the discussion emerges to include how amazing they are and how good it is to have owned one for many years. This show of emotion could be related to a number of other memes that talked of the joy of being a scientist.

What appears to be preferentially retained in this chat room is therefore knowledge that was highly rich in content reliant on objectivity, sometimes accompanied by humour or the emotion of being a scientist. It suggests that should a poster wish for his or her post to be retained the type of post should be scientifically informed and objective, include some humour and preferably refer to the joy of being a scientist without appearing too emotionally overt about this feeling. This would not guarantee the post being retained, especially if the content was unattractive but would increase the chances of any unattractive content being retained. (Note: such memetic engineering is not necessarily ethical!)

Looking at the new memes that are not replicated within the population and the time period studied provides a further check of this insight. If these are found to contain any hints of pure fact, humour or emotion and pride, especially around science, the insight would be weakened. Equally it would not be surprising if the non-retained memes include any that deal with subjectivity.

#### Non-retained Mars Chat room new memes

#	Post #	Content	Retention?
1	3	Interference of government in science as cause of problems in science	Making objective failure in units subjective
2	12	Alternative use of HP calculator	Some humour
3	16	Professional standards organisations / acts of law	Making objective failure in units subjective
4	22	Thank goodness we never adopted Metric Time	Humour
5	25	My old Halliday and Resnick source of conversion facts	Emotion
6	29	Different systems causing confusion within science	Making subjective objectivity overtly subjective
7	31	Attachment to science – 'the story gets curioiser and curioiser'	Humour / emotion
8	40	The effect of national differences on real life	Making the subjective more subjective and everyday
9	44	Dogbert humour	Humour
10	63	Emoticons on the net	Humour
11	63	Conversion story as cover up	Making subjective objectivity overtly subjective
12	64	Ease of understanding SI system	Making objective subjective
13	95	Self-reflection – here is a bit of trivia	Making subjective objectivity overtly subjective
14	95	Off subject trivia – nothing to do	Objective reasoning to subjective

	with differences in units but there is a difference on the maps in Canada versus US in sections	reasoning – must be a non-science explanation for differences
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In the non-retained memes, there is a number of memes that are involved in making the objective, subjective. Humour does appear, but thinking more carefully, all the other content associated with the humour is replicated. This suggests it is not the content of the humour which is attractive but the humour that makes the content associated with the humour more likely to be retained. Thus, although emoticons (Internet and mobile phone language that uses symbols to indicate emotion rather than words) are not retained, the content that the reference to emoticons was associated with is retained. Humour in this sense appears to be a meme strategy that increases the chances of a meme being retained if, in this context, it is associated with humour. Once again the inference is not that humour is, or indeed is not, intentionally created but that posters may not be aware of the fact because they do not reflect upon it, that humour can increase the chances of content associated with it being retained even if the humour is not retained. This does raise the issue of whether humour should be coded as content, as happened, and which proved to be a controversial in coding (see section 3.7 on reliability) but again its importance suggests that it should be coded in some way either in terms of the humour being considered as content or the content associated with the humour being coded as content but it not being lost in the coding that content was associated with humour.

However, there is some divergent evidence, post 40's comment about the effect of national differences on everyday life is not retained, despite it being about objective real life cases of confusion over units, but this could be considered as making the objective subjective by revealing that units are social constructions. There is divergent evidence in post 25 in that, although there is emotion expressed in association with the source of conversion factors 'Halliday and Resnick', the meme is not replicated whereas it is when HP calculators are associated with being a reliable source of conversion factors.

In summary, the strategy that appears to be most successful in this context is a non-strategy, meaning the meme relies on being very content laden and factually straightforward as a mechanism to ensure replication. This can sometimes be aided by humour about that content and emotion about being a scientist. What is less attractive is subjective talk and explanations. There are however no absolutes, it appears to be a matter of what tends to be more attractive and what tends to be less attractive.

## Religious Case

As regards the Religious Case in order of decreasing frequency the second-order memplexes are 'areas of oppositional debate' (26.6%), 'nature of fear' (17.1%), 'religion as very negative' (11.4%), personal offensiveness and banter (11.4%), 'nature of believing' (9.5%) and 'reflection' (9.5%). Unlike in the Mars case the memes are hotly debated. Two communities fight each other within 'areas of oppositional debate', 'definitions of fear' and 'personal offensiveness and banter', whereas 'religion as very negative' are populated by atheists and 'the nature of believing' is mainly populated by believers.

This case represents the antithesis of the Mars case in that the subjectivity of religion is debated with believers stating religion was real and atheists stating that it is not. Within the case there are two sub-systems of people, those that find religion attractive and those that find it not attractive. It appears that what is attractive about this chat room is the possibility it gave to people to debate the nature of social construction.

What atheists appear to find unattractive is contained within the second-order memplex 'religion as negative' (11.4%) and includes as first-order memplexes 'religion as dangerous - a virus/brainwash / addiction / abusive relationship /master slave relationship', 'links between Christianity, domestic violence and psychological illness', 'religion as fear + ignorance = superstition or other similar equations'. Example of these memes include:

Case	Post	Meme
Religion	15	1

And you are suffering from a lifetime of daily Hypnotism.

Although, confronted with every day reality each day .....  
you cannot deal with it.

Instead... you chose to hide behind faith, beliefs, myths and  
whatever your brain-washers tell you

Case	Post	Meme
Religion	79	2

Wishful thinking with a good dose of delusion thrown in for flavor. "Faith=  
evidence; curiosity = diversion from the truth"



In addition there is a discussion as to what accounts as evidence and the truth, in particular the situation of presenting to atheists quotes from the Bible as evidence being unhelpful 'quotes from Bible as evidence / truth' (#4).

Logically therefore what would not be attractive to a continuation of exchange of memes between the two communities would be anything that, as in the Mars case, crossed the subjective-objective divide. Anything that would alienate the two communities a lot would also be likely to halt exchanges. Again confirmation of this claim was sought by looking at non-retained memes within the case.

#### Non-retained Religious Chat room new memes

#	Post #	Content	Retained?
1	6	If answer is parrot talk don't know where I am getting it from as have not been to Sunday school	Subjective – objective truth
2	9	Extensive quotes from Bible	Subjective – objective truth
3	14	Atheists weak minded fool running away from truth	Subjective – objective truth
4	16	Science not true – you believe in little balls that explode into galaxies!	Subjective – objective truth
5	17	To all of us searching for God, harsh words, and trashing thoughts turns us away	Subjective – objective truth
6	19	You are my normal vision of a Christian that knows it all	Subjective – objective truth
7	20	Would you settle for a hole in the ground – offensiveness	Offensiveness
8	30	Trying living life somewhat more!	Offensiveness
9	35	Unquotable highly offensive anti religious	Offensiveness
10	54	In reference to being off subject – 'Boy, somebody's got waaaay too much time on their hands here.'	Irrelevance
11	59	Hoping another off subject thread dies a death	Irrelevance
12	67	Right to send children to atheist school	?
13	82	Should not treat Bible any differently from other religious books	?
14	82	'He does not claim to an atheist he is an atheist'	?
15	82	Which simply means not theist – not believing in any religion	?
16	83	Personal offensiveness	Offensiveness
17	84	Silliness to point of offensiveness	Offensiveness
18	91	Personal offensiveness	Offensiveness
19	101	Christians doing a lot more anthropomorphizing of God than they omit'	Subjective – objective truth
20	107	Quotes from the Bible	Subjective – objective

			truth
21	109	Fear is about loving you say well you should add or else	Explicit reflection on meme strategy

It is found that of the non-retained memes a large proportion of cases, (33%), are about passing through the subjective-objective divide in that either side is questioning the objectivity of the other side's view. Twenty eight per cent of the remaining cases contain offensiveness, which is also not likely to encourage retention by the opposite party. The remaining 28% of cases are more difficult to evaluate and as such were considered as divergent evidence. In 2 cases (10%) through the introduction of a lot of variation the exchange has become rather irrelevant and the memes involve pointed this out.

In this chat room therefore what is preferentially retained are views that cross the objective-subjective divide, but which did so in a way that is not extreme and is not offensive to either party. Within each sub-collective what is attractive is very different. In the religious sub-collective there is evidence of being attracted to the ability of religion to explain the unexplainable whereas in the non-religious people there is a desire not to be attacked by the 'religion virus' but on the other hand they desire to understand religion.

#### Gun policy case

The knowledge which is preferentially retained in the Gun policy case at a second order memplex level is the notion of spam (34%), national differences in Gun policy (9.8%) and the nature of cause and effect (7.0%). Hence the knowledge content that is retained above all is not the initial subject of the chat room. What is present in the chat room is therefore a mixture of knowledge imparted by those attracted to the chat room by its title and what, once within the chat room, is contributed on the basis of what is being talked about which is not always Gun policy. It is therefore difficult to analyse what is preferentially retained as the data is inextricably linked with these community interactivity factors.

What is retained, against the odds, considering the dominance of spam and the title of the chat room, is the material on the first and second amendment and the nature of democratic freedom. What is not retained (see below) is either memes designated as spam, off subject, extreme view or minor views or facts.

Taken as a whole, the chat room seems to possess complicated dynamics. The initial post in the form of the request to sign a petition is not retained, as it does not fit into the rules of operating on the cases, and is hence spam. It diverted the conversation into a discussion of whether or not this is spam. This is preferentially retained, as is other related knowledge about the nature of individual freedom. Big issues seem therefore to be what interests this community rather than minor issues or views. The issue holding the communities of 'spam', 'gun policy' and 'being a free American' together under a single large community banner is 'freedom'.

Once again this insight is confirmed by looking at the non-retained memes. These include spam and minor facts and views on issues. Memes related to freedom in any form are not present within the non-retained data.

#	Post #	Content	Retained?
1	1	Facts about degree of violence	Designated as spam
2	1	75% Americans support guns	Designated as spam
3	1	Government taking no action	Designated as spam
4	1	Sign petition	Designated as spam
5	3	Offensive against anti-gun lobbyists	Offensiveness
6	5	Start a petition	Designated as spam
7	12	So what's wrong with getting rid of damned guns?	So vague as to be meaningless and arguably not a meme
8	13	Guns needed in countryside	Minor fact
9	13	Other factors influencing gun violence i.e. presence of police (in Philadelphia)	Going off subject
10	15	Off subject – car turn signal being ripped off in Philadelphia	Off subject
11	17	Difference between theory and practice	Minor view
12	27	Role of education	Minor facts
13	27	Relationship between exposure to guns and effect on view about Gun policy	Minor facts
14	38	Use of guns to protect yourself – wrong to punish those that have suffered already	Minor view point
15	43	Guns as a source of evil	Extreme view
16	43	Getting into heads of those that are violent	Minor view
17	43	The enjoyment of owning a gun	Extreme view
18	49	Off-subject Bill Clinton and interns!	Off subject
19	50	Alternative sources of violence other than guns	Minor fact
20	50	Getting rid of criminals	Extreme views
21	61	Even if ban guns people can still be killed by other means	Extreme views
22	62	Questioning of the press as a reliable source of facts	Minor view

23	68	Facts – but what is considered in the statistics as violence?	Minor view
24	71	Most spam as off topic and not helpful	Minor view
25	83	Kill those who want to take away our guns	Extreme view
26	90	Utter silliness	Off subject
27	109	Guns providing job security	Minor facts

Looking at all the cases, in conclusion, there is a distribution of prevalence of content within each case. Certain memes are more likely to be copied than others, whereas other types of memes are less likely to be copied. It could be imagined that if one was aware of this analysis that it could be forecast as to whether a new meme would be copied easily or not in that context. There is however no commonality amongst the cases as to what is or is not retained. What is common to all is that the manipulation of differential retention dynamics is despised, in that spam is prohibited as part of the rules of the chat room. It is quite easy to imagine that had spam appeared in the Mars and Religious cases it would have been rejected in some way. In essence differential retention was very democratic within this setting as manipulation of the dynamics was frowned upon at a collective level. This leads to an analysis of and commentary on these rules, stated in the following section, which were also revealed to be an attribute of the system that affected the emergence of knowledge.

#### 4.6.3 Rules of knowledge emergence

Although not referred to in the theory, evidence is found for rules of knowledge emergence that are the same across the cases and are therefore standard within the setting. Using a grounded approach, two types of memes within the data are identified. The first, to be expected, is knowledge which created a relationship between the mind that is expressing it and the world in terms of the portion of the world the chat room is about. However another type of meme is present within the data, namely knowledge about the process of producing knowledge. This type of meme does not appear in the Mars Case or the Religious Case but does appear in the Gun policy Case where it takes the form of discussing what is and what is not spam. These memes about knowledge emergence appear in the broader system of the Mars and Religious case in that all operate within the same ISP domain and hence adhere to the agreement that chat rooms are not be used to promote a piece of knowledge as a cause.

Examples of this type of meme include the following:

### EXAMPLE 1

Case	Post	Meme
Gun policy	9	land 2

Well let's see:

1. Spamming is a violation of the Terms of Service of nearly every ISP – including this one. Not to mention it is a serious violation of Netiquette

2. It is fine and dandy to have their site, but bombing newsgroups to advertise it and clogging people's bandwidth is unacceptable.

This is the first objection to the chat-room initial poster using the chat room, not to chat but to exchange views, but to promote a cause and, even worse in terms of Netiquette, a petition to support that cause.

### EXAMPLE 2

Case	Post	Meme
Gun policy	91	land 2

Regardless of my opinion on guns and gun control, I don't consider his post to be spam. It was ON TOPIC in the appropriate newsgroups.

Pursuing this as spam is nothing more than person A's attempt to silence person B simply because person A doesn't like person B's opinion.

This is a point in the chat room where the debate is about what is spam which is a form of knowledge that is not allowed to exist within the chat room.

### EXAMPLE 3

Case	Post	Meme
Gun policy	117	1

Trying to remedy that. Deja only lets you submit post to four groups at a time, so I don't know why so many appeared here.

This is an example of a specific rule of the ISP being reported within the chat room.

An example that does not directly refer to spam but does relate the need for such rules to exist if the knowledge emerging from chat rooms is to be a certain type, is the following:

### EXAMPLE 4

Case	Post	Meme
Gun policy	79	2

To me, the real value of the internet is that it can be used to promote the dissemination of ideas a function necessary to maintain and improve a democracy, not to sell more GAP clothes or make dot-com investors rich

Whereas in this case of Gun policy, what is a violation of the rules became a subject of the room itself, in the other chat rooms these rules are not discussed as they are adhered to, but they do alter the emergence of the knowledge. This suggests that knowledge-based systems either implicitly or explicitly have rules about how knowledge should be transmitted within that system, if these rules are changed, a sub-discussion about this change can emerge. The rules can be imagined to have an effect on the knowledge that is produced within the system. In the case of chat rooms the rules mean that the emergence of knowledge is dynamic and produces a lot of variation as no meme can be advertised, as it is on a website. The chat room knowledge climate is one of debate rather than either the promotion or the search for facts by an individual. Indeed, in each chat room the distribution of knowledge in the dendrograms can be seen to be extensive with a number of off subject memes that do not relate directly to the chat room discussion being tolerated.

In summary, there is evidence that social interaction occurs within systems which are bounded by the rules of knowledge emergence that alter the knowledge that is expressed. People interacting with that system abide by the rules and if not the rules can become a subject of the knowledge emergence process. What is not known is the extent to which these rules are intentionally created. Did someone decided that the Internet chat rooms should be based on such rules, was the decision a conscious one or was it a function of the memes that person has accumulate over time? It is, at least in this thesis, impossible to tell. Albeit that there is a move to reinstate the rules when they are violated, suggesting there is a degree on intentionality in creating rules designed to create variety. What is obvious from the data is that these rules can themselves be complex and do evolve, which begs the question to what extent in any managed, intentional or goal-directed system is someone ensuring that the rules reflect the type of knowledge that is desired? The answer lies in the reflexivity section below within this chapter and the analysis of the managed, goal-directed organizational system analysed in the next chapter, Chapter Five.

#### 4.6.4 Reflexivity

As explained at the beginning of the section, although it cannot be easily proven whether human intentionality exists and if so in what form, evolutionary theory and computer simulations of complex systems suggest that knowledge emerges in a such a complex way that it is impossible to control perfectly or direct exactly. Given this, and knowing that man does have the ability to understand evolution at least at some level, this sub-section

searches for evidence that man reflects on the dynamics of past knowledge emergence and uses those reflections to influence or redirect the future direction of emergence. Such evidence if it were to exist would suggest memes are not totally in control!

The analysis does reveal some evidence of posters reflecting on the emergence of knowledge. In the Mars case, one poster comments on the original error of the scientific units, mis-interpretation being due to two communities of scientists, engineers and physicists having allowed knowledge to emerge which was open to mis-interpretation. In this case therefore the reflexivity is about the emergence of knowledge outside of the chat room borders. The reflexive meme has little, if any, effect on knowledge emergence as it does not lead to a discussion on this subject.

In the Religious chat room, reflexivity is manifested in the form of self-reflection:

#### EXAMPLE 1

Case	Post	Meme
Religion	55	2

'hey, I am just rearing to the debate'

and more critically in the form of:

#### EXAMPLE 2

Case	Post	Meme
Religion	1	1

'They are designed to "razzle-dazzle" your mind (like T.V. commercials) until they can insert the "Jesus hype virus" in your mind'.

Here the poster is questioning whether he should have let a certain meme into his head. A similar case of reflexivity occurs during post 106 when comments are made regarding the use of the mysterious language, in which religion is often expressed, sometimes having the effect of making religion viral. This reflexive meme has the effect of alienating the two communities and so can be said to inhibit knowledge emergence in the sense of the communities striving to create a definition of fear that both communities agree to.

In the Gun policy case there is even more explicit and prevalent reflexivity in the form of the 'spam' discussion. Here the initial poster is accused of bad 'Netiquette', on the basis the poster is using a discussion group as a way of advertising a cause. This content is intertwined with the main memes of Gun policy in terms of whether the people who classify the initial post as spam are really just anti her stance against guns. It is also intertwined with

the debate on the memes regarding the American First and Second Amendment in terms of whether reporting spam is itself censorship and anti-freedom of speech. This reflexivity is thus about whether the rules of knowledge emergence are being broken. The reflexivity has a dramatic effect on knowledge emergence as the reflexivity dominates the discourse and leads to an overall dominance of the subject of freedom of speech, rather than Gun policy, within the chat room. Furthermore, the community who agrees that the initial poster's content is spam, appreciate that the control of these rules of knowledge emergence lies beyond their control with the ISP. The greatest irony is that one member of the collective even breaks the rules which he complains other people are breaking and produces his own spam in order to attempt to increase the number within his community. Arguably this can be classified as a very clever case of memetic engineering, albeit that the poster claims his actions are not intentional (post 117).

In summary, there are several types of reflexivity. These include reflexivity operating at different levels within the system, reflexivity about the system attributes and reflexivity about the outcome in terms of process and content. With respect to the system levels reflexivity exists as self-reflexivity; reflexivity about the system; and reflexivity about knowledge beyond the system's boundaries. With respect to system attributes there is reflexivity about differential retention dynamics (Religion case) and rules of knowledge emergence (Gun policy case) but not really about community interactivity or reflexivity about reflexivity, which is effective learning. As regards outcome there is reflexivity about the process (copy-fidelity in Mars case) and the content (rules of emergence affecting the variety of content in the Gun policy case). These sources of reflexivity are reported in a table below.

**TABLE 4.4 Sources of reflexivity**

<b>SYSTEM LEVELS</b>	<b>SYSTEM ATTRIBUTES</b>	<b>ONGOING OUTCOME</b>
Outside of system	Community interactivity	Process – copy fidelity
Inside system	Rules of emergence	Content - variety
Self-reflection	Differential retention dynamics	-
-	Reflexivity (learning)	-



The effect of the reflexivity on subsequent knowledge emergence varies from no effect, as the reflexivity is not retained (Mars case), to a negative effect in that the reflexivity inhibits knowledge emergence between two conflicting communities (Religion case), to a positive effect in terms of stimulating knowledge emergence (Gun policy case). In the Mars case the self-reflexivity regarding the human error aspect of the discovery of science provokes no further emergence of knowledge. This might be because this piece of reflection is like other unattractive memes in that system, namely about the subjective social side of scientific discovery. Perhaps if the self-reflection had been retained and resulted in emergence, the chat room might have attracted scientific journalists rather than scientists. In the religious case the reflection stifles the emergence of knowledge in making religion less appealing to atheists and distances the two communities. The religion collective definitely disagrees with the implications of the comments about religion being a virus. In the Gun policy case reflexivity appears to promote the emergence of knowledge by stimulating a related discussion on spam and inhibits the emergence of knowledge about Gun policy. Interestingly it does result in the communities being kept together through the emergence of content about freedom.

It needs to be seen whether, in a 'managed' organizational setting of knowledge emergence, evidence can be found for all possible sources of reflexivity and whether reflexivity affects knowledge emergence to a greater degree.

#### **4.7 Commentary on the analysis performed to answer 'why does knowledge emerge'?**

The four attributes of community interactivity, differential retention, rules of knowledge emergence and reflexivity together explain the 'why' of knowledge emergence. They were 'discovered' by comparing the how analyses of the four cases. What is possible in knowledge emergence terms is altered by who meets whom and what emerges as a result, which is a function of how open or closed communities are to new social interactions. Closely related to community interactivity is the notion of retention dynamics (loosely based on meme strategies) that suggests each community has a tendency to prefer to retain certain knowledge over and above other knowledge. Rules of knowledge emergence appear to be a way of controlling (to some extent and for certain periods of time) the type of knowledge that is created in the future, most specifically how much variety is created.

Reflexivity appears to be the ability to judge and examine the dynamics of past knowledge emergence and to decide whether to alter them.

The degree to which each affect knowledge emergence, how and how the attributes interact is unique to each case. In this section, each case is taken and described in terms of the mixture of system attributes that produce the knowledge that emerges. Following that, comments are made about the implications of the findings on man's role in knowledge emergence. In reading this commentary it should be remembered that the stance taken assumes that even if man can act intentionally at an individual level, he does so in a system that he cannot control or understand perfectly because it is too complex.

In the Mars case, the overriding force is differential retention that results in scientific facts being preferentially retained and subjectivism being rarely retained, creating a closed community of scientists which in turn inhibits community interactivity. Adherence to the rules of knowledge emergence does however mean that within that closed community variety is still expressed. That said more content is contained within one memplex in comparison with the other cases, possibly because only the one community is operating within the context. The lack of subjectivism seems to limit the variety that can be produced. Very little reflexivity is present in this case and so this force does not affect knowledge emergence.

In the Religious case, as in the Mars case, the rules of knowledge emergence that promote variety in chat rooms are adhered to. Here, however in contrast to the Mars case, the system is kept open because of differential retention that accepts the knowledge that exists in both communities (that religion is an objective fact and that religion is a social construction one does or does not believe in). Indeed, the openness results in the beginnings of a new community associated with the original poster accepting a definition of fear that is not extreme in the direction of either non-religious or religious people. Reflexivity is present in slightly greater quantities and in a different form than in the Mars case, but is not retained and does not affect emergence to any degree.

In the Gun policy case, the rules of knowledge emergence are not adhered to in the opening post. This creates a complex social environment in that four communities co-exist and co-evolve around two subjects with many different combinations of views being held by different posters on these subjects. Variety is concentrated in one memplex around what is,

and is not, adherence to the knowledge rules. Other than that a lot of other variety still exists within the population (more than in the other cases) as both objective facts are debated and subjective interpretations made there of (as in the Mars and Religion cases) and of social constructions such as Gun policy laws (as in the Religion case). This along with the non-adherence to rules seems to create the multiple communities. Differential retention seems to result in the retention of freedom-related content memes that cover the content of all communities and therefore appear to keep the system open. Non-adherence to the rules of knowledge emergence, ironically by someone objecting to the initial violation creates a degree of retention of one meme about reporting the initial violation as seen in the high number of repeats. Reflexivity about knowledge rules is very prevalent and alters the emergence of knowledge.

In all cases therefore, it is possible to identify attributes of the system that 'behave' in different ways and result in different forms of knowledge. The dynamics are complex with the attributes interacting and reinforcing or countering each other. As regards intentionality, it is shown that reflexivity can alter knowledge emergence directing it towards a goal (in this case this goal is maximum variety of content) but that all potential sources of reflexivity are not present in this setting and so perhaps knowledge is not directed to the extent it can be through the mechanism of understanding emergence. Equally, as regards intentionality, evidence is found in the Gun policy case that suggests however intentionally a system may be set up to produce knowledge of a certain type (for example by instituting certain rules of emergence), ongoing reflexivity is important, if not vital, in monitoring whether the system has evolved through combinations of community interactivity, differential retention dynamics and changes in the rules into a system which no longer reflects that intentionality. Even then, as is in the situation in the Gun policy case, it might not be easy to transform a complex system into what was intended even if clever tactics are used (e.g. using spam to fight spam).

#### **4.8 Implications for the organizational setting**

As regards transferring the insights gleaned as to the 'how' of knowledge emergence from the Internet chat rooms to the setting of organizations, there is every reason to think that memes exist in organizations as self-contained particles of knowledge that pass from one mind to another, that can be clustered together and that have a wider or narrower variation range and a greater or narrower prevalence. There is also no reason to think that the same

categories of copy-fidelity might exist in organizations, albeit organizationally specific categories might also exist, and the distribution of these categories might vary dependent on the organizational context under study. There is no reason to think that dendrograms and replicationgrams of organizational knowledge creation cannot be created, albeit that they might be notably different from those of the Internet setting, and hence show that knowledge creation in organizations is different than in Internet chat rooms. Specifically, Internet chat rooms are 'intended' to produce variety whereas organizational knowledge is usually produced within some kind of restrictive framework, even in an innovative company.

Equally, as regards the 'why' of knowledge emergence one would expect that the system attributes of community interactivity, differential retention, rules of knowledge emergence and reflexivity would explain the emergence of organizational knowledge, albeit that other concepts might be needed. Just as however, the memetic perspective of process and content of organizational settings might be different, one might expect the way in which system attributes operated to be different. Above all, given that organizational settings are 'managed', it would be expected that reflexivity would be highly prevalent in most, if not in all, of its theoretically possible forms.

Whether this is the case is explored in the next chapter that covers the analysis of the organizational setting. Specific questions that the analysis of the Internet data suggest, which need to be asked of the organizational data are:

1. Do organizational dendrograms look radically different from the Internet dendrograms? If so why?
2. Do organizational replicationgrams look radically different from the Internet replicationgrams? If so why?
3. Within organizations is there evidence of the nature of collective social interaction altering the direction of knowledge emergence? Is the nature of social interaction different in the organizational setting? If so how does this difference affect knowledge emergence and how is it managed?

4. **Is there evidence for preferential retention in organizations? How does this affect knowledge emergence? Is this a source of good or bad organizational performance and how are they managed?**
5. **Is there evidence of knowledge emergence rules? Are these rules different from those operating within the Internet setting? How do these rules affect knowledge emergence and how are they managed?**
6. **Is there evidence of reflexivity? Is there more or less reflexivity than in the Internet setting? Is the reflexivity a source of good or bad organizational performance and how is it managed?**

If the 'how' and 'why' of knowledge emergence does prove to be applicable, at the most with only minor modifications, to the organizational setting, this last question regarding reflexivity will be of greatest importance because it will reveal whether the organizational setting is less or more 'managed' (in complexity systems terms) than the organizational setting. This statement is made on the basis that reflexivity appears to be able to direct knowledge emergence towards greatest 'fit' between emergent knowledge and intended knowledge over time. As such reflexivity of knowledge emergence can be considered as the ultimate source of sustainable organizational advantage if it is presumed that, however intentionally a knowledge system is set up as time passes and through complexity, it is likely to produce less appropriate knowledge.

#### **4.9 Conclusions and next steps**

The analysis of the Internet setting is performed using memetics as a theoretical back-drop. It reveals that it is possible to divide discourse into knowledge-based units of analysis and analyse these for knowledge content and knowledge process. Using the concept that memes exist as semantically independent particles, which are imperfectly and differentially copied through subjective interpretation of meaning over time by people as they socially interact, fingerprints of knowledge emergence can be created. These fingerprints consist of dendrograms that illustrate the nature and variety of knowledge content and replicationgrams that characterise the process by which that knowledge content emerges per case (or population of evolving memes). Whilst not accurate as independent fingerprints

they do allow the comparison of knowledge emergence between the different cases. Has the discourse produced a great deal of variety or very little? Has the variety been produced through incremental steps or a few large jumps? What has been the speed and rhythm of change? The fingerprints of the Internet cases are unique but not radically different from each other. This analysis makes up the 'how' part of the research question.

The how analysis is not perfect in that memes are difficult to identify and difficult to cluster. It can also be debated as to whether they are knowledge. The analysis does however allow the nature of the discourse to be understood in terms of whether a lot or a little variety is produced during the conversation and whether this variety comes about smoothly or in jumps. The analysis creates a view on whether, in relative terms rather than absolute terms, a conversation has drifted or stayed true to an area. Knowing the nature of the conversation allows the researcher to begin to decipher what underlying dynamics appear to be affecting variety production leading to the why analysis.

The system in which this process and content unfolds is examined to determine its attributes in order to answer the 'why' part of the research question. Comparing and contrasting what knowledge and how knowledge is produced in the cases (and therefore the results of the 'how' analysis per case) four attributes are discovered that explain knowledge emergence in these cases. These attributes are common to all cases but their exact nature differs and these differences explain the differences in knowledge process and content between the cases. Each attribute is evaluated to determine the extent to which it appears controllable. Each of these attributes are summarised below.

Firstly, the term community interactivity is coined to explain the effect of individual involvement (differential interpretation) and collective involvement (agreement on interpretation) on the direction of emergence. In order for knowledge to emerge, individuals must have physical or virtual access to others, they must be able to relate to the memes being expressed by the person they are socially interacting with, must interpret them and then express themselves. What makes a difference is who meets who and what emerges as a result. This attribute of the system is uncontrollable in that: firstly, individuals cannot control exactly whom others meet and arguably whom they meet, at least all of the time, and nor do they necessarily want to. Secondly, because what is in anyone's mind is a function of these past imperfectly controllable events, no individual can control or have

control over what knowledge emerges when two people do meet. Thirdly, although people can reflect on whether they wish certain knowledge to enter their minds, they do not do so on an everyday basis, let alone for every piece of knowledge they encounter. That said, at a higher level of communities of interest and practice, evidence is found that suggests that the direction of emergence is altered by how closed or open the system is to the interaction of novel people and memes and what interaction takes place between communities who occupy any knowledge space. The Mars case, for example, is relatively closed, the religion case has two communities that struggle to interact whereas the gun policy case is more fluid and contains four communities.

The system is also characterised by certain knowledge being preferentially retained over other knowledge and some knowledge never being copied within the system. Patterns of 'differential retention dynamics' are found in each case. What knowledge is differentially retained in each case differs.

A further attribute of the system is the existence of rules that are shared at the collective level and which influence what type of knowledge is produced in and by that system. In this setting the rules of emergence are identical across all cases, although they are not adhered to in one case.

Lastly, reflexivity about the process of knowledge creation appears across the cases albeit in different guises and with varying effects on the emergence of subsequent knowledge. It does not appear in all its theoretically possible forms.

The knowledge that emerges in each case is seen as the function of the strength and exact nature of these attributes as well as what happens when they interact. Specifically, in this setting and therefore across all of the Internet case, the emergence of knowledge is seen as particularly free in that access to the system is open to many and remains open to many and all emergent knowledge is tolerated, whereas the promotion of knowledge is prohibited. Each chat room has sources of differential retention that create context and define what knowledge is most likely to be retained in that context as it emerges, in turn altering how closed or open the system is to new interactions and making the knowledge content very different between the cases. There is some reflexivity, but not enough, to affect this free form of knowledge emergence except in one case. Above all knowledge emergence in this

setting is directed by adherence to rules of knowledge emergence that create a great deal of variety. This in turn promotes very free and open social interaction that allows differential retention to emerge, rather than be set at the start, and which also appears to support reflexivity if that strong source of direction (rules of knowledge emergence) is lost. In the sense Internet chat rooms are set up to create great variety, the system dynamics do result in the creation of variety. It can be therefore claimed that as 'unmanaged' and self-organizing as Internet chat rooms might appear in the traditional sense of the word they are in a way managed and organized.

The implications for organizational knowledge emergence are several, all in the form of unanswered questions. These fall into three categories: can and is the 'how' of knowledge emergence explained in the same way in the organisational setting; can and is the 'why' of knowledge emergence explained in the same way in the organizational setting; is there evidence of far more reflexivity that has been shown to direct knowledge emergence in the goal-directed organizational setting when compared to the 'unmanaged' Internet setting?



Chart 4.1  
Post level dendrogram example

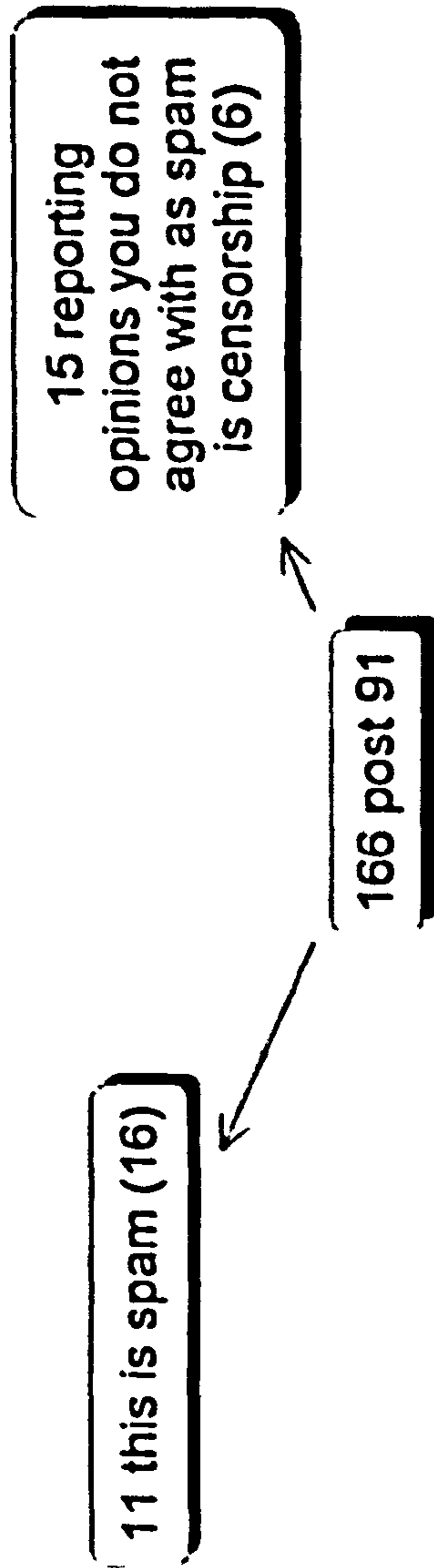


Chart 4.2  
First order  
Memberplex  
Example

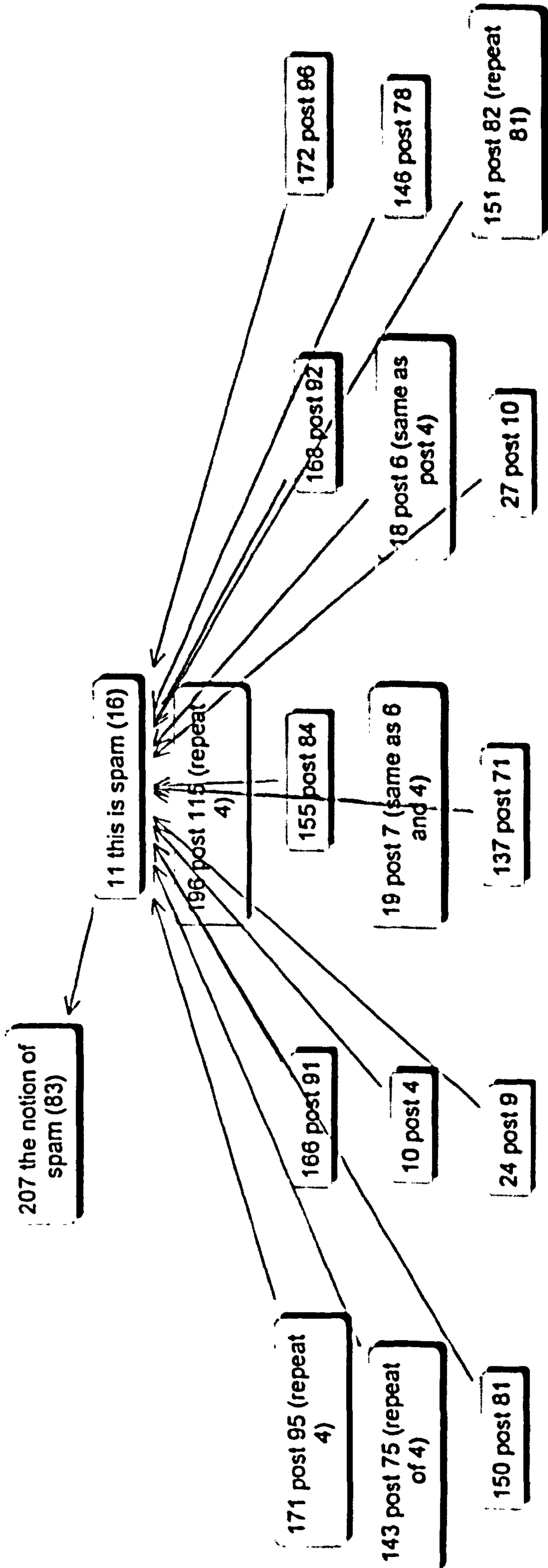
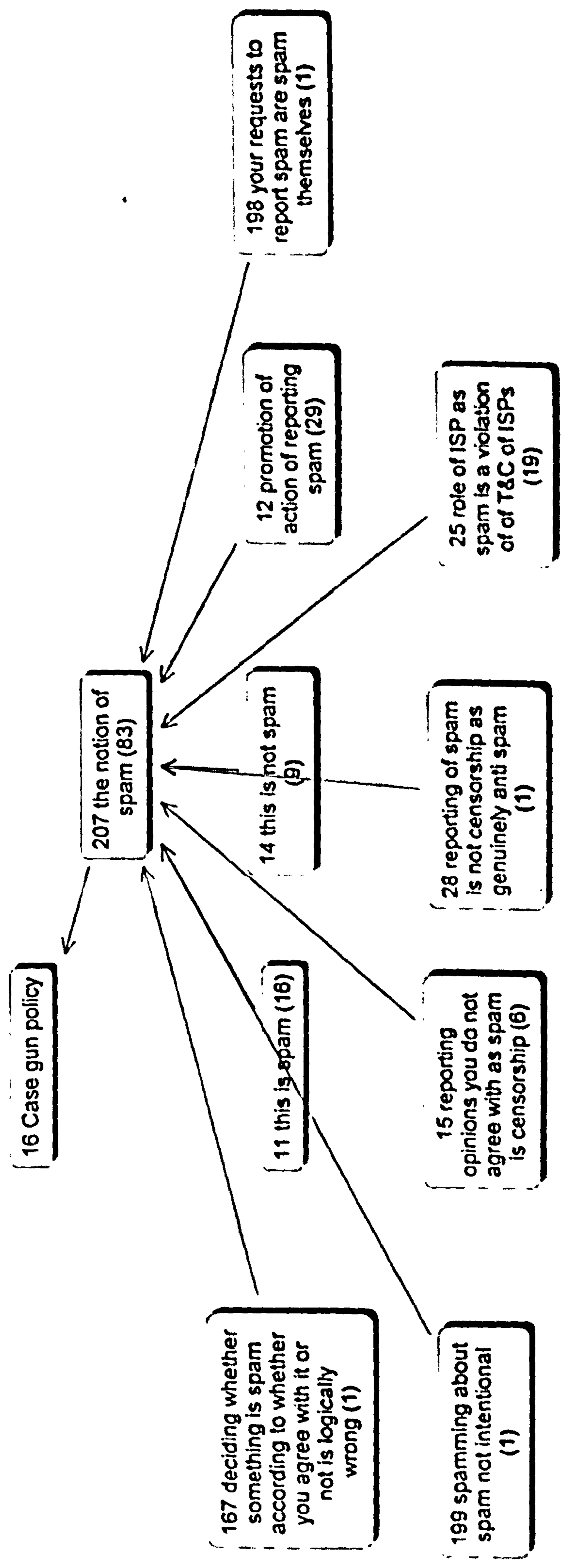
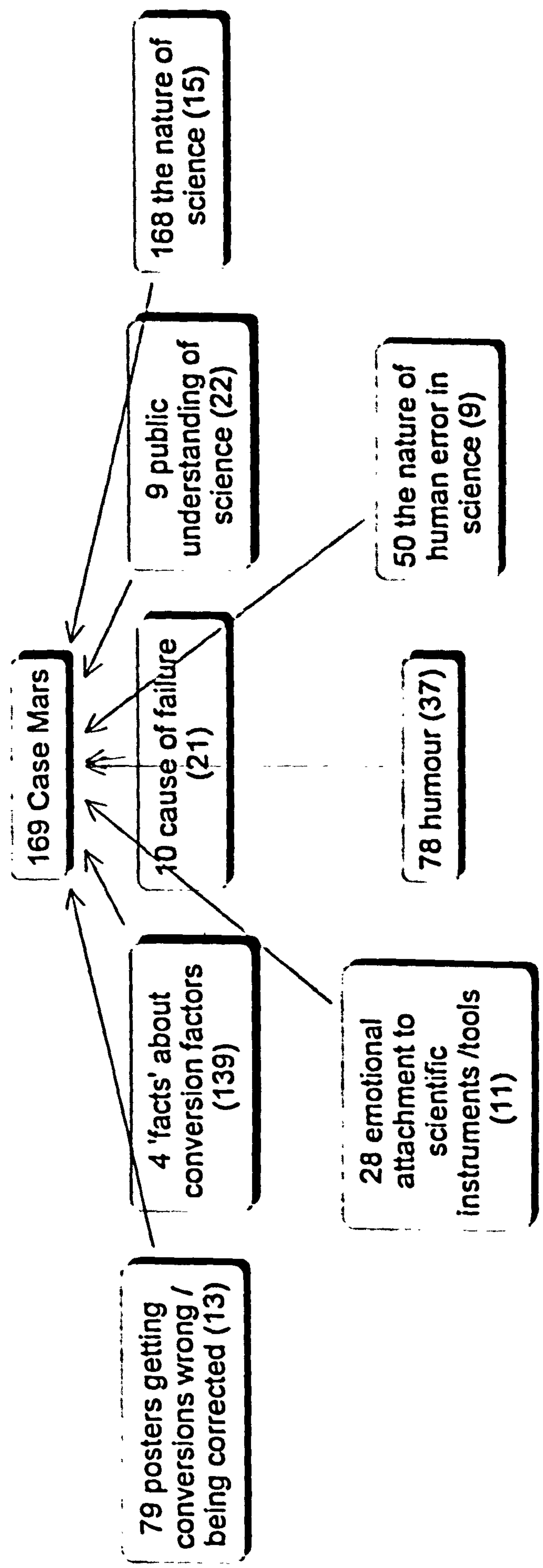
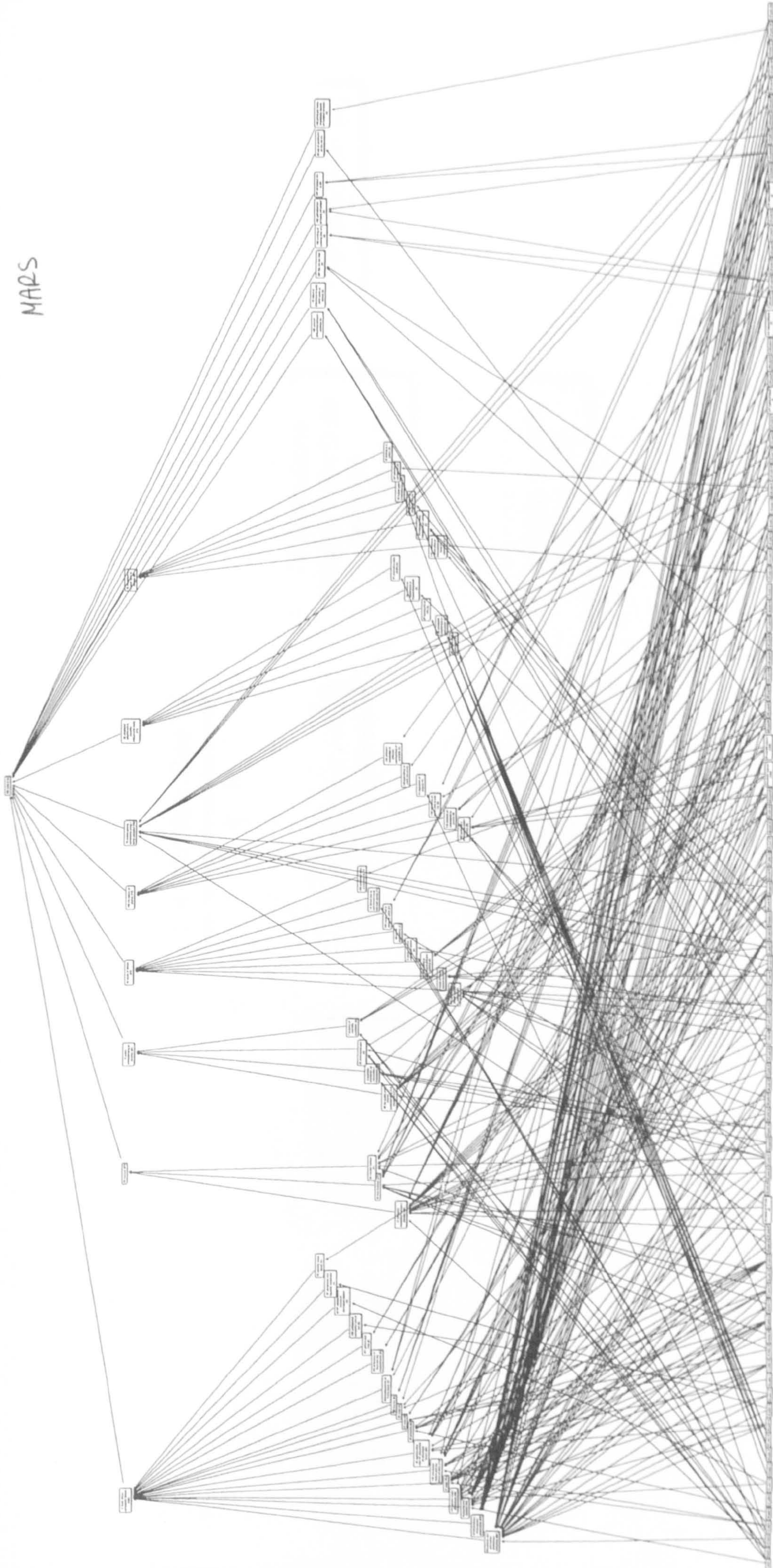


Chart 43  
Second order  
memorplex  
example

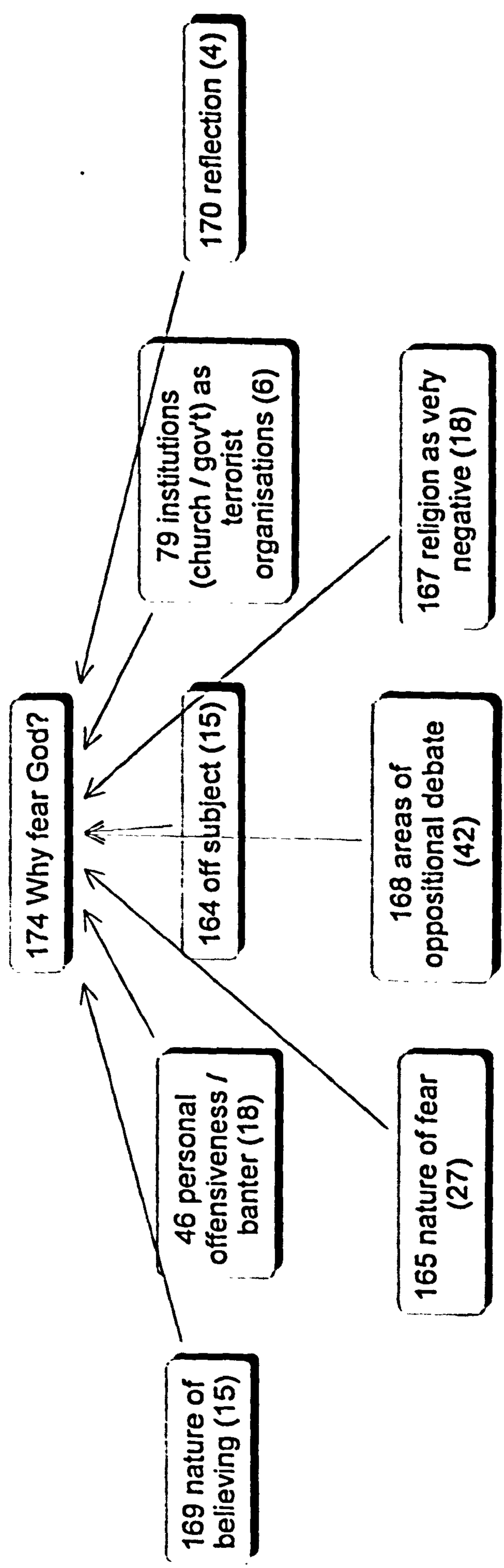




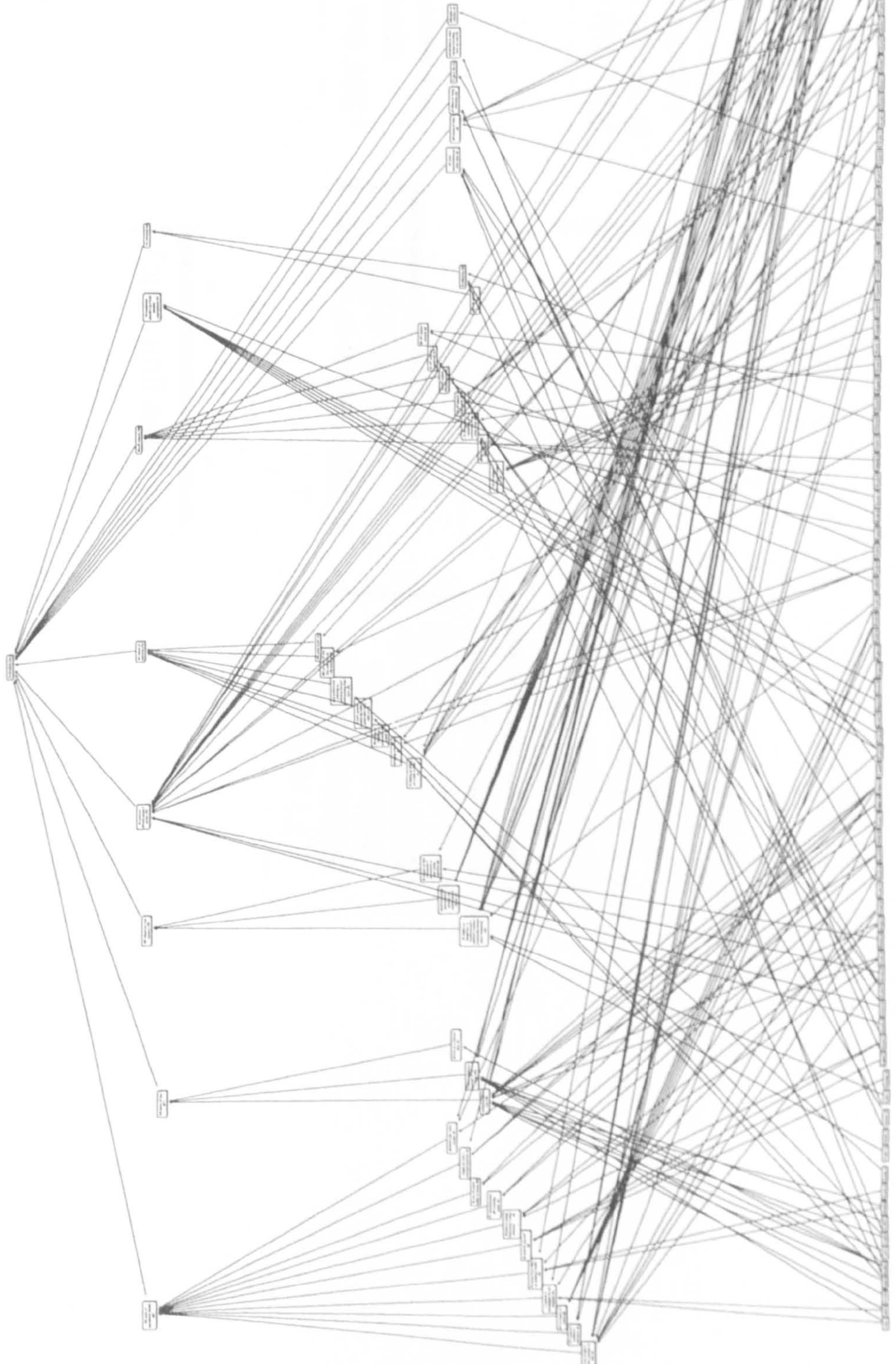
MARS



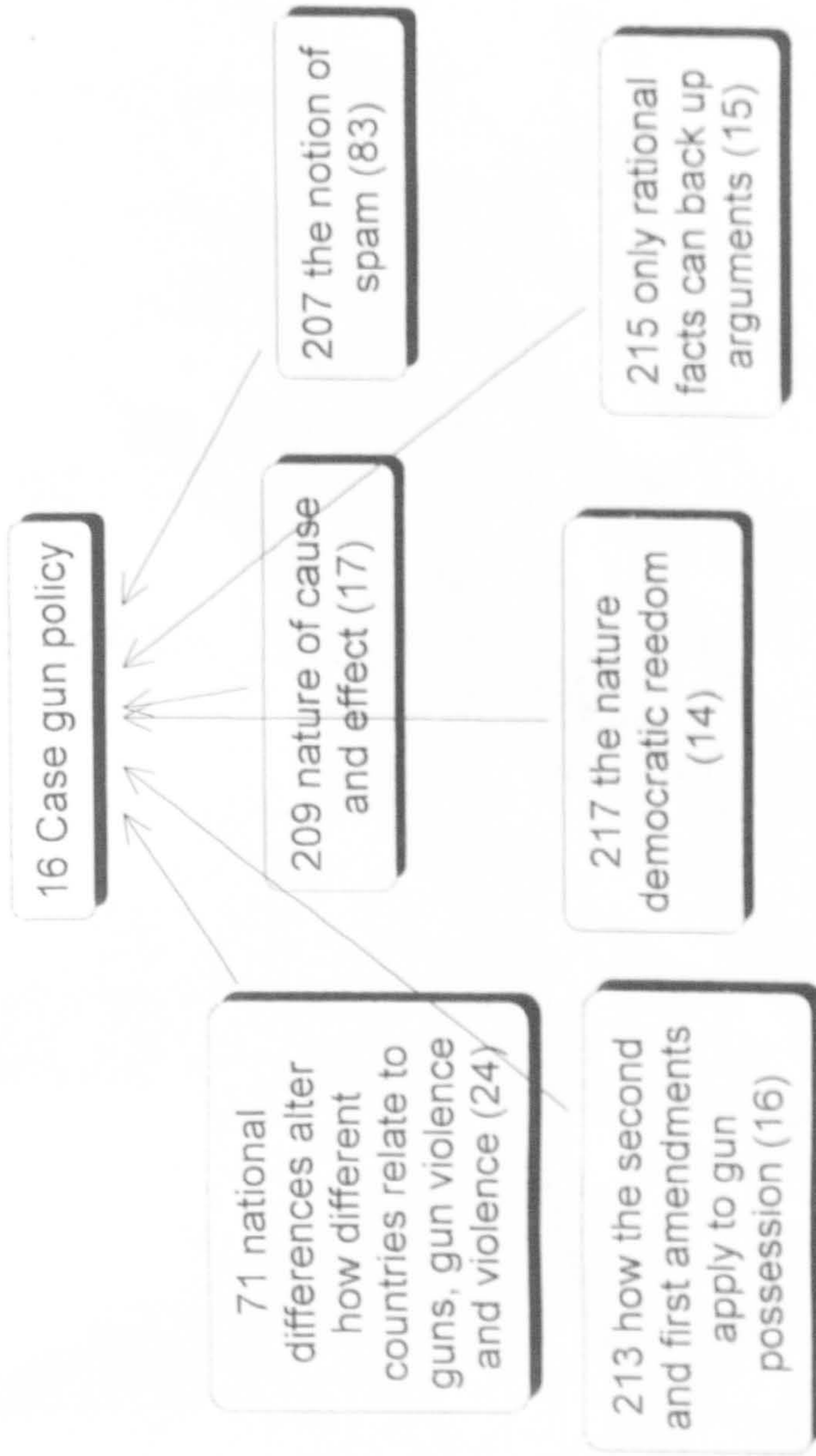
197a



RELIGION

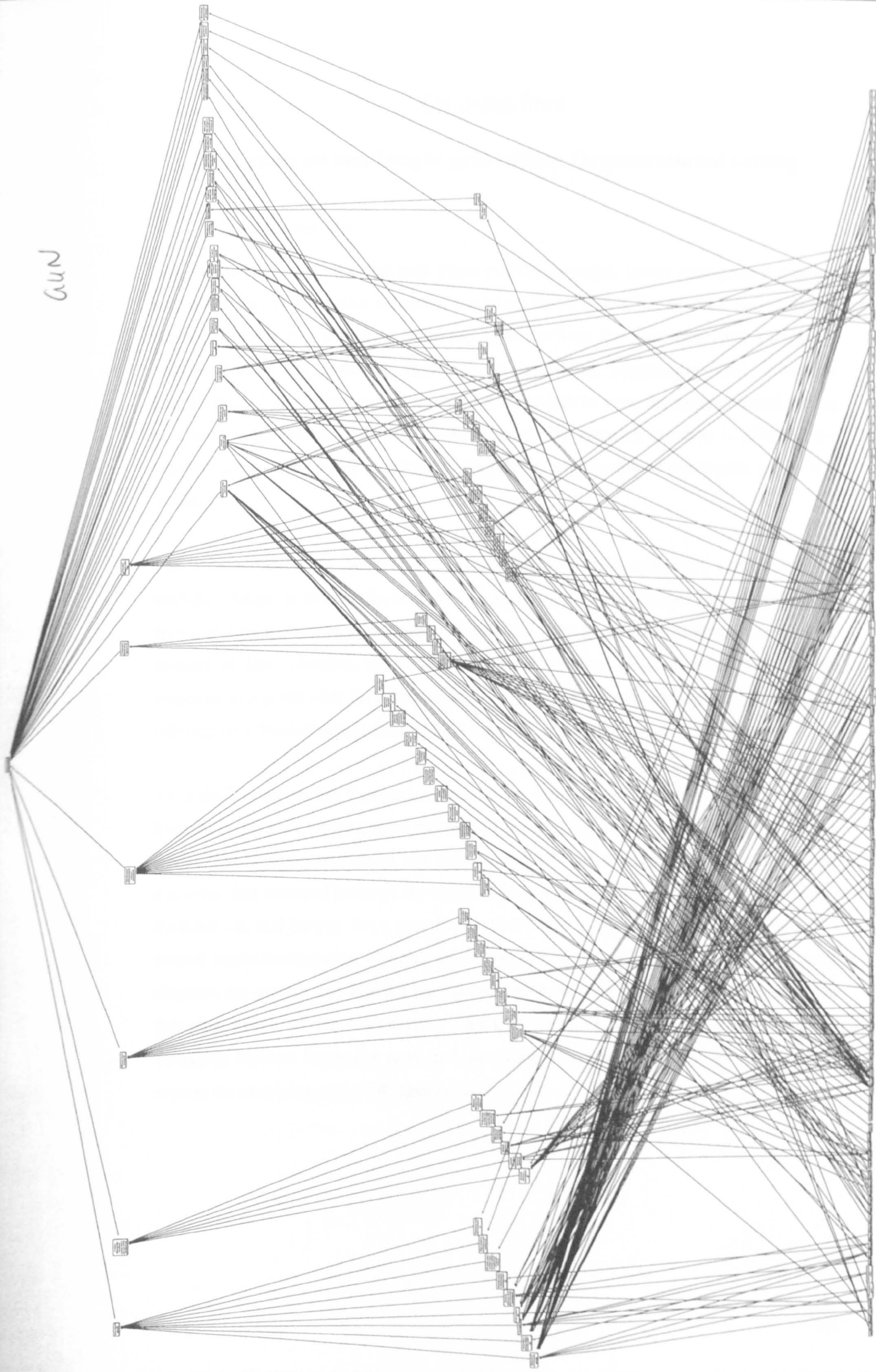


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## CHAPTER FIVE

### Data analysis and insight generation: Organizational setting

#### 5.0 Chapter overview

This chapter uses discourse that took place within a strategic, senior management meeting within a dynamic, innovative company, combined with a broad, but detailed, knowledge of the organization as a whole, to determine how and why does organizational knowledge emerge. During the discourse, opinions are exchanged, judgements made, situations interpreted and new ideas suggested, making it possible to view the organizational setting as a knowledge system. The process of answering the research question is aided by the organizational setting being a contrast to the Internet setting studied previously, in that it is 'managed'.

The organization is an Intellectual Property company that underwent a great deal of strategic change in the months prior to data collection. Having started the transformation period as a division of an ex-nationalised company with an uncertain strategic intent, at the moment of data collection, the division became a separate company, fully owned by the corporate group but with the intention of becoming independent through an Initial Public Offering on a Stock Exchange within 12-24 months, dependent on market conditions.

As in the Internet setting, three cases make up the organizational data set. They all emanate from the same senior management meeting, of the type that is held approximately every six weeks. The meeting was audio and video taped. One of the organizational cases is the discourse that occurred between the senior directors and two project managers, requesting feedback on, and finance for, a new Intellectual Property based idea ('Project case'). The second organizational case involves the period during the meeting when only the senior directors are present and internal management processes are discussed in the light of the changing nature of the organization ('Internal case'). Lastly, a period in which the Managing Director leaves the room and the nature of the discussion moves off agenda is used as the remaining case ('Off agenda case').

As before, the cases are analysed from a memetic perspective in order to answer the research question, 'how and why does knowledge emerge?' The data in each case is divided into memes and memeplexes to create a functionally annotated menome. The content of the memes is analysed to create qualitative and quantitative dendrograms that are converted into simpler, purely quantitative histograms of numbers of first-order memeplexes and numbers of memes in each. The process by which that content emerges is also analysed to create replicationgrams.

This functionally annotated menome, analysed in terms of knowledge-based content and process, is then used to determine whether forces of community interactivity, differential retention dynamics, knowledge rules and reflexivity, identified as explaining why knowledge emerged in the 'unmanaged Internet', explain emergence in this 'managed' setting. As before, the differences between the cases as shown by the dendrograms, replicationgrams and histograms act to verify whether the system attributes are common to all cases and whether, at the same time, the exact nature of the system attributes differs between the cases and explains the difference between the cases. Furthermore, within this analysis, comparisons are made of the different organizational cases and different social settings (Internet case rooms and organizational strategy making).

As regards answering the 'how' part of the question, it is revealed that this can be done in the same way as for the Internet setting. The manipulation and analysis of the data reveals that it is possible in the organizational setting, as in the Internet setting, to create a functionally annotated menome and to analyse this menome from the perspectives of knowledge content and process. The exercise reveals the nature of knowledge creation within the organizational cases, in terms of quantitative differences in the breadth of variety, frequency of that variety and hence distribution of knowledge content within each case. As before the nature of the process whereby that variety is created is quantitatively characterised to reveal differences in the ways in which the knowledge is created in each case. These differences are explored further using the qualitative data behind the quantitative approach. In the organizational setting a new category of combination (combining pieces of knowledge to create a 'helicopter' view) is found (albeit that this was also found through second coding to exist once in the Internet setting see appendix II) whilst the category of mis-interpretation does not appear at all in the organizational setting.

Having characterised how knowledge emerges in these organizational cases, as regards the question 'why does knowledge emerge?' whether the concepts of community interactivity, differential retention dynamics, rules of knowledge emergence and reflexivity can explain the 'why' of knowledge emergence is explored. With regards to community interactivity (who interacts with whom and what emerges) as in the Internet setting, the nature of the discourse cannot be traced or explained at an individual level other than to say 'who interacts with whom and what emerges as a result' as done within the 'how' analysis. At a collective / community level it is found that, in contrast to the Internet setting, the systems are closed in that the discourse occurs in a closed meeting. It appears to take into consideration very little about what happens in terms of community interactivity in the broader system, despite it being very much part of that broader system.

Differential retention dynamics are, as in the Internet setting revealed and, in contrast to the Internet setting, found to be identical across all of the organizational cases. Evidence is found for the existence of rules of emergence. These rules limit the amount of variety that is produced and discussing their nature forms part of a case (internal case), albeit the discussion is far less explicitly about knowledge than in the Internet setting. There is evidence of reflexivity about rules and about community interactivity but not about preferential retention and non-retention of memes. Reflexivity is limited in prevalence terms and in the range of types of reflexivity for which evidence is found. Indeed reflexive memes (knowledge about the past production of knowledge) tends not to be retained despite the situation being managed.

Lastly, the two settings of the 'unmanaged' Internet cases and the 'managed' organizational cases are compared and contrasted to determine the nature of the 'management' of the emergence of knowledge. As regards content and process and therefore the 'how' of knowledge emergence, the Internet cases exhibit more variety of content and feature more categories of emergence that rapidly add knowledge content to the populations of memes than is the case in the organizational setting. The Internet setting includes the category mis-interpretation whereas the organizational setting does not and, more interestingly, contains a number of examples of a category combination, which as explained above is akin to what is often referred to as a helicopter view.

As regards system attributes and the 'why' of knowledge emergence the following applies. Community interactivity is far less complicated in the Internet cases, given the open systems nature of that setting, whereas the organizational setting is more closed. The Internet setting has many more interacting communities on the whole. The organizational cases resemble much more the Mars case than the more dynamic Religion or even more dynamic Gun policy case. There is evidence in both settings of preferential retention and non-retention of certain memes. Whereas these vary greatly between the Internet cases, in the organizational setting they are very similar across the cases. Whereas the rules in the Internet setting cause an increase in the variety of knowledge content, rules in the organizational setting cause a decrease in variety. Reflexivity is present in both settings but to a far lesser degree in the organizational setting and also in less forms than in the Internet setting. Furthermore, unlike the Internet setting, reflexivity in the organizational setting does not ever direct knowledge emergence because reflexive memes are a type of meme that is not retained across all cases. In neither setting is evidence found for anywhere near all theoretically possible forms of reflexivity.

In conclusion, the empirical analyses of the two data sets showed that unique, if more or less similar, fingerprints of organizational knowledge emergence exist within each case and between each setting. Applying the theory of memetics and the exploratory methodology developed within the thesis creates these fingerprints. These fingerprints quantitatively and qualitatively characterise the nature of knowledge emergence in both content and process terms. The characteristics of all the fingerprints can be explained in terms of the concepts that act as systemic forces on evolution, namely community interactivity, differential retention dynamics, rules of knowledge emergence and reflexivity. The nature of these concepts differed between cases within the same setting and between settings. The most striking finding is the lack of reflexivity in the 'unmanaged' organizational setting when compared to the 'unmanaged' Internet setting.

## **5.1 The company**

The organizational setting is described below. The company remains anonymous with names changed to maintain this anonymity but which still reflect the nature of the organization. Organizational data was collected in a European company, which has a long history and a rapidly changing recent past. The company formed over 40 years ago, was a national institution with a governmental remit to help national companies adopt new

technology and science as well as the obligation to develop science that was in the national interest such as defence capability. In the 1970s the company was nationalised, forcing its managers to enter a period of rapid adaptation to the different demands of shareholder ownership, from which it is arguably still emerging.

When the researcher first made contact with the firm it was with the Products division, headed by a MD. The aim of the division was somewhat varied in that in some cases it provided new products and systems that were developed by the remaining divisions into profitable businesses, whereas in other cases the innovative outputs were co-developed with outside partners, some of whom were old-style government backed organizations, whereas others again were developed in association with customers operating in the commercial world. Finance was obtained in some cases from traditional government and national institutions in the form of grants, in other cases internally, in other cases again from customers. This mix of business policy, although well intended and successful in incrementally moving the organisation from a national to a private concern, ended up creating a difficult-to-manage division that was felt to possess unrealised potential in what was fast becoming a knowledge economy. In a period of rapid change, the organization acquired a new MD and the division was renamed 'Innovative Technologies' to communicate that it needed to focus on what it was good at, namely providing innovation to others rather than creating stand-alone products and systems. Through a mixture of a growing entrepreneurial spirit within the firm, an increased awareness of knowledge-based competition within and outside of the firm and a lessened but still present lack of clarity around what the organization stood for, a proposition was made to the Corporate Board for the division to become an Intellectual Property Company (often referred to internally as 'IPCo' before the official name was created), to be made independent of the corporate in time through an Initial Public Offering (IPO). The mission of the new company is to create 'commercial knowledge through inspired innovation'.

Background data was collected during the whole of this period from just before the name of the division changed from Products to Innovative Technologies in February 2000, to the forming of the independent company to the build up to the IPO of the new company in early 2002. The data specifically analysed in detail in search of an answer to the research question, 'how and why does knowledge emerge', was collected in the period between the

Board accepting the proposition to become an Intellectual Property Company and the as yet unfulfilled IPO.

During this period, following a review of the organization's Intellectual Property, conducted in association with a Big Five consulting firm as part of the transformation to a newly named company, the company was organised around Intellectual Property-based 'exploitation plans'. These plans and accompanying actions and implications were managed at a senior level through an investment process built on the back of the old Product Division's product portfolio process, itself brought in to Corporate as part of another change exercise aided by another consulting firm and which had at the time of Innovative Technologies become the growth process. At periodic intervals, exploitation prospects were either required to be presented to senior managers meetings, as a matter of organizational routine (as they were at stages or gates that required a new level of resource be afforded to them) or were presented because middle management requested that they should be in order to benefit from the experience of the senior managers. The presentations took place at periodic 'investment meetings' at which the whole company status was reviewed.

The investment process that these meetings revolved around, and which formed the backbone of the company, was relatively routinized in terms of standard forms being available, such as the 'idea pro-forma', and relatively guided in terms of approved organizational practices such as milestone planning and working to job codes. In this period of rapid change, it was however generally accepted that nothing was 'set in stone' or probably ever would be and that there were areas of the approach that needed to be developed and areas which were on a learning curve. There was however an evident, if limited, and arguably very healthy amount of tension between creating a old-style rulebook and getting through every day as best as time allowed in order to fuel the transformation into a leading-edge Intellectual Property company. The format of the presentations at the investment meetings was not proforma-ed in anyway, but the Group Secretary prior to the meeting often saw the presentations.

## **5.2 Data collection**

As detailed in Chapter Three on research strategy, the data were collected within this organizational setting in two ways and for two reasons. Firstly, in order to obtain a through understanding of the organization as a whole, background data were collected in the form of interviews and cases with directors and project managers, internal company documents from IP exploitation plans to agendas of meetings to business process documentation, as well as externally available information such as company reports, share price fluctuations and Internet site content on an ongoing basis. This data were not analysed *per se* but served to put the data that were analysed in its broadest context.

The data that formed the case material existed in the form of three organizational cases. These took place during one of the regular investment meetings in which the directors met amongst themselves and with project managers responsible for the development of the company's IP. The meeting was audiotaped and transcribed. Meeting notes and a videotape of the meeting served as further detail.

The collection of the background data was useful for another reason, namely that by the time of the investment meeting, in which the case material was collected, staff present at the meeting knew of the research and knew of the nature of the confidentiality agreement.

As a whole data set; the amorphous background data that made the researcher familiar with the organisation; the substantial, relaxed and professional presence of the researcher within the organisation over a period of time that made managers at the meeting happy to be part of the research and the transcribed organisational cases that were actually analysed, made for a robust and comprehensive data set.

## **5.3 The case studies**

Investment meetings were generally held at six-eight week intervals, lasted from lunchtime until early evening, included the senior management team and followed a set agenda. The senior management team at this point in time in the transformation of the company was made up of the Managing Director (MD), The Scientific Director (SD), the Growth Secretary (GS), a Corporate Director, Growth Director (GD) and a Marketing Director



(MarD). The investment meeting as ever involved a review of the actions of the last meeting, a review of the financial situation, a number of presentations by project managers to senior directors of IP projects at various stages of development, meeting specific agenda items, which in this meeting took the form of discussing the managing of IP, other discussions under Any Other Business (AOB) that in this meeting were also about internal management issues. At this meeting there was also a period when the meeting went 'off agenda' when the MD left the room to take a phone call and the remaining directors chose to suspend the meeting until his return.

The three sections of the meeting chosen as cases (for justification of this choice see Chapter Three) are detailed below.

#### **The project case**

The first case study was an 'idea' meaning that it existed as Intellectual Property that, to date, had been developed in spare time and was in the earliest stages of development. The presentation to the Board represented a request for finance to develop the idea further and hence to become part of the Intellectual Property Development Portfolio and enter the Investment Process. Pre-meeting preparation had included filling in the idea pro-forma and preparing the presentation. The presentation included explaining the origins of the idea, handing around a physical example of the product, discussing the patent situation, justifying requests for funding in terms of the technical challenges ahead regarding the development of IP, alternative exploitation routes and the nature of the competition. In this case two project team members were present, one of which was the inventor (PM1), who was nervous of making the presentation, and a colleague (PM2) who had completed most of the paper work-up of the idea and interjected on occasions during the presentation and discussion.

#### **The internal case**

After other presentations of projects at various stages of development, the meeting turned to address internal management issues. The agenda mentioned cluster management, a company specific approach to managing Intellectual Property, and indeed this was discussed. The process of introducing this approach to all staff was mentioned, areas worthy of cluster management as the organisation moved towards an all IP-based company were discussed as was the competence of staff to manage this internal process. Under AOB the conversation also included three other internal issues; firstly, the need to comply with a corporate demand for a certain report, secondly a potential new cross division business

opportunity, and thirdly, a request by the Scientific Director that meeting material associated with the presentation of projects be given to the directors some time prior to the meeting so that some preparatory work could be done. This conversation proceeded to cover many other options of how to change the nature of the meeting and the investment process of which the meeting was part, some of which were somewhat distant from the initial idea and included:

- Needing perhaps to treat projects at different stages differently as regards accompanying material in order to avoid stifling creativity in the early stages
- The need for more good product champions.
- The absence of good late stage project business plans.
- The presentation of a particular project and how disappointing it had been
- Inviting people with ideas to lunch.

The only action that was agreed upon was to have an open half an hour at the beginning of each meeting for very informal chats about new ideas. The remaining thoughts about how to change the process were neither noted nor actioned.

#### **The off agenda case**

This shorter discourse occurred when the Managing Director left to take a phone call from the Head of Corporate, AEA. The discussion started as an extension of the previous discourse on clusters but quickly moved on to the heavy workload being experienced by all as a result of the rapid changes within the company. There was also a spontaneous discussion about a project that was not on the agenda but was part of paper work, and hence work overload which a director happened to have with him as it had arrived recently on his desk.

#### **5.4 Data analysis**

The analysis took place as planned and as detailed in Chapter Three and as described in Chapter Four. In the first stage of answering the research question, the issue of how does knowledge emerge is addressed in three steps. Firstly, per case, the data are divided into memes to create a functionally annotated menome. Secondly, using content analysis and clustering into first-order memeplexes, dendograms are created of each of the three cases, which are converted into easier-on-the-eye histograms showing the number of first-order

memeplexes and the number of memes in each. Thirdly, and using a mixture of grounded analysis and the work already completed with the Internet cases, replicationgrams are created of each case study to show the distribution of categories of emergence within each case.

In addressing the second part of the research question, the issue of 'why does knowledge emerge' is addressed in two steps. Firstly, the cases are viewed to see whether the direction of knowledge emergence is subject, as had been the case in the Internet cases, to the forces of community interactivity, system boundedness and reflexivity and to what extent the nature of these are different between the cases. Lastly, and in an additional step compared to Chapter Five, the findings in the two settings are compared and contrasted to create insights about the management of the emergence of knowledge.

## **5.5 How does knowledge emerge?**

The three steps used to answer this question are detailed below, followed by a commentary on this process of elucidating how knowledge emerges in each of the three organizational cases.

### **5.5.1 Generating the knowledge-based perspective: identifying the population of 'memes'**

#### **The Process**

As before, content analysis is used to divide the data within each case room into particles of knowledge that contained sufficient knowledge for the particle to exist independent of a single person and therefore be potentially transferable from person to person within that context. The generation of a memetic perspective from the organizational data proves to be both different from and similar to the generation of a memetic perspective from the Internet data.

In terms of similarities between the two processes firstly, it is not possible to determine exactly in words where one meme began or ended. Secondly, it is shown how important context is in determining what was and was not to be considered as a meme as had been the case in the Internet cases. Albeit as the context is very different, the difference element of this observation is dealt with below. Thirdly, it is discovered, once again, that even the most sophisticated of artificial intelligence could not have coded the data with the same subtlety.

The coding process is subjective. It was not however biased in that when coding it is impossible to think what could be the implications of the coding process of the results and insights as the research is far too complex. The process is subjective in that it was difficult to determine how many memes and of what type existed in each 'talk' (or intervention by a single person). For this reason a second coder was used to code the same data. This person is used to having to record the content of senior manager meetings, was very familiar with the process of investing in developing science and was willing to complete the task! The second coding revealed that it is very necessary firstly to have many rules about coding and information about context if the coder if differences are to be minimised. Secondly, it revealed that however much effort is put into training and informing the second coder differences will still remain but that these can be resolved especially where they relate to context, less so when they related to number and type of memes. More details are provided in Chapter Three and Appendix II. An overall error rate of 5% in the initial coding after second coding was found after the resolution of differences, but the need for training and the subjective nature of the coding does mean that the reader will not necessarily agree with the coding.

In terms of differences between the two processes, firstly, creating a memetic perspective from the organizational data was a less arduous exercise and secondly, what could be considered as a meme when viewed in terms of words was different in the organizational setting from the Internet setting. The task of dividing the organizational data into memes was easier than the Internet data, in part because the researcher had already become very familiar with the task, but also because the data originated from verbal discourse rather than written discourse as was the case of the Internet cases. This meant that rather than having on average a relatively high number of words 'spoken' per person before another person interacted and 'spoke' their words, as was the case in the Internet cases, the organizational data was much more staccato with people speaking only a few words before someone else took over the discourse. So rather than having to divide lengthy posts into memes, in the case of the organizational data, rarely did any one intervention by a person contain more than one meme, although this did happen on a few occasions. This difference emphasised the importance of context in memetics. Not only do memes create context but also what is a meme in physical terms differs according to context. By this it is meant that in different

contexts a varying amount of words are needed to create meaning. Generally in face-to-face contact this will be less than through less rich media such as e-mail.

The data

The data are presented in the following format which contains three sections as explained below:

**EXAMPLE OF HOW TO INTERPRET THE FORMAT OF THE PRESENTED DATA**

*Project Talk 46 PM1*

- Again Company K seem to change the price as it suits them but typically if you were buying them in some number it would be between £100 – 150. And as we say we believe in fact we know Company K's turnover from the dye sublimation market is about £100,000 units.

Meme number	First-order Memeplex	Emergence category
53/1	Product price	Emphasis
54/2	Market size	Extension
55/3	Nature of current supplier / competitor/competition	New

Firstly, '*Project Talk 46 PM1*' reveals that this section of transcript emanates from the Project case, that it is the 46<sup>th</sup> intervention made by a person from the start of the discourse about the project and that the intervention is made by the first Project Manager.

Secondly, the main text, repeated below, is an exact transcript of what the Project Manager said at this point in the meeting.

- Again Company K seem to change the price as it suits them but typically if you were buying them in some number it would be between £100 – 150. And as we say we believe in fact we know Company K's turnover from the dye sublimation market is about £100,000 units.

Thirdly, the table underneath reveals in the first column the memes numbered from the beginning of the case and secondly from the beginning of that talk. Hence these memes are the 53<sup>rd</sup>, 54<sup>th</sup> and 55<sup>th</sup> identified in this project case whereas there are three memes within this talk. In the second column are the first-order memeplexes to which the memes belong. Lastly, there is the emergence category (explained in the next section) to which the meme belongs.

What follows are examples of this analytical process chosen to illustrate the nature of the process involved in coding the data into memes. Source data are provided here exactly as they are presented in the appendix the format of which is explained above.

## EXAMPLE 1

It is shown how in comparison with the Internet cases, the face to face 'talks' that were the organizational data were much shorter than the equivalent posts in the virtual Internet data.

This discourse occurs at the start of the presentation (and hence case) and is considered to exist in memetic terms as follows:

### *Project Talk 1 MD*

- That takes us to LPH. Welcome R.

Meme number	First-order Memeplex
1/1	Welcome statement from the Chair

### *Project Talk 2 PM1*

- I'll need to get over the technological challenge.

Meme number	First-order Memeplex
2/1	Presentation issues (PC and slides up for view)

### *Project Talk 3 MD*

- Are you happy about being on video, totally confidential, nobody gets to see it other than Jill – have you met Jill.....

Meme number	First-order Memeplex
3/1	Introduction and presence of researcher

## EXAMPLE 2

Talks do exist that were coded as containing more than one meme as follows.

### *Internal Talk 155 MarD*

I like the idea that this is something we get out - saying we are trying new ways to introduce you know new ideas and we do not know what is going to happen.

Meme number	First-order Memeplex
249/1	Investment Process
250/2	People, their workload and competencies
251/3	Knowledge transfer between directors and project managers
252/4	Organizational renewal, reflexivity and experimentation

Reading the transcript one would not know that the words 'I like the idea that is something we get out' refer to a change in the approach to the Investment Process. Thus the transcript could be coded as containing an Investment Process meme, this is because the idea being referred to is one about a suggested way of changing how the Investment Process operates. Two points, each reflecting one of the two aspects of context, one ontological the other methodological, can be illustrated with this example. The first is that in this context of face-

to-face communication few words are needed for others to know that the idea being referred to is an idea about changing the Investment Process. This is because the idea about how to change the process is referred to in the seconds before this talk by the Marketing Director. The second point is that the coder needs to be aware of the broader discourse and nature of the organization in order to code the data as was highlighted in the second coding exercise (see Chapter Three and Appendix II).

### EXAMPLE 3

As in the Internet cases care had to be taken (in a way artificial intelligence or word counts would be unable to) to understand the intended meaning and to take into consideration how subtleties such as tone of voice changed meaning.

#### *Project Talk 149 GD*

- Hmmmmmm

Meme number	First-order Memeplex
183/1	Technical explanation / development of product

Was, when listened to on tape, very much a note of agreement with the previous statement.

Whereas:

#### *Project Talk 151 GD*

- Yes ??!!!

Meme number	First-order Memeplex
185/1	Nature of current supplier / competitor/competition

Was very much a sarcastic yes, with a tone of voice that said, please explain the statement you have just made.

### EXAMPLE 4

This example also shows how important it is to understand the context in which discourse occurred by knowing in detail what the organization is about and ideally having been in the room when the discourse took place. This is because it would have been impossible, for example, for someone not involved as much as the researcher, to code this discourse (see below) as including a meme that could be clustered as part of the first-order memeplex 'Relationship between staff motivation, timing of rewards, transition towards ICo.'

### *Off Agenda Talk 25 IP*

- I mean what is encouraging is the degree to which people are putting effort into these despite the huge amount of work they have to get through in the normal course of the day anyway. Some of these things are still being done at some cost I should think. You know, people are putting themselves out to do these and the question is what the payback will be....

<b>Meme number</b>	<b>First-order Memeplex</b>
25/1	People and the high workload
26/2	Relationship between staff motivation, timing of rewards, transition to IPCo

Having divided all talks in each of the three cases into memes to create a population of memes or 'menome', it was revealed that the relationship between the talks and memes within each menome was as follows.

**TABLE 5.0 Memes per post per case**

<b>The Menomes (population of memes per case)</b>	<b>Project</b>	<b>Internal Management</b>	<b>Off agenda</b>
Number of memes	373	255	98
Number of talks	260	158	83
Average number of memes per talk	1.4	1.6	1.1

This overview makes intuitive sense, in that the internal case does have a number of quite long talks which contained a number of memes. The overview also highlights that the off agenda case has less memes than is desirable given that ideally each talk, whether organizational or internet, needed to have the same number of memes – i.e. between 200 and 300. It was decided that, despite this problem and because the nature of the case was at face value so different from the others, it was still worth analysing.

In summary, despite being a different setting, the researcher was able to divide the data in the chosen cases into memes, to produce a population of memes per case. In order to do so the researcher had to keep to Dennett's definition of a meme being the functional relationship it creates with the world rather than the physical manifestation. So as in the Internet case and in genetics, the population took the form of source data in the form of physical words, ontologically annotated with the functional relationship the meme created with the world.



Once again as in the Internet cases, having divided the data into 'memes', the next step in data analysis involves characterising the content of the identified memetic population. Given the research question, this involves determining the type, amount and hence distribution of content within the population. The two steps are, as before, creating a dendogram and replicationgram for each case. The next two sections of the chapter detail these steps.

### 5.5.2 Knowledge content: memetic population characterisation

The creation of the dendograms follows the same logic as in the cases. Memes are compared and similar ones placed together in the same first-order memeplex. If, during the process a meme does not fit into the already created memeplexes, a new memeplex is created. In some cases this leaves memes on their own, clustered with no other memes as no similar memes exist. These are termed memes with no first-order. First-order memeplexes are then, if possible, clustered further into second-order memeplexes as was the case for the Internet cases. None of the organizational cases had sufficient variety to create a second layer of clustering of second-order memeplexes.

So, for example, in the project case, some twelve memes became part of the memeplex 'financial costs of development', four of which are randomly reported below:

#### EXAMPLE 1

##### *Project Talk 141 GD*

- Unless the development costs for the prototype are 25 million that we are about to come on to

Meme number	First-order Memeplex
173/1	Financial costs of development

##### *Project Talk 142 PM2*

- Well yes

Meme number	First-order Memeplex
174/1	Financial costs of development

##### *Project Talk 143 GD*

- So we need to see that actually fairly quickly I think

Meme number	First-order Memeplex
175/1	Financial costs of development

### *Project Talk 159 PM1*

- What we want to do is produce a widget that someone can actually add the rest, possibly Company I, add the chip registers and the software to demonstrate that you can control the elements that they do heat and cool at the rate we want them to and emit dye sublimate. I am assuming that the demo is not something we have to spend any money on.

Meme number	First-order Memeplex
193/1	Financial costs of development
194/2	Exploitation route
195/3	Technical explanation / development of product

### *Project Talk 207 GS*

- So there is an action on PM1 to go ahead with we call it product champion activities which will accrue 5 K which will mean I will have to get a job number for him and then there is an action upon SD to sort out as quickly as possible the - whatever that means - Intellectual Property issues associated with Imaging.

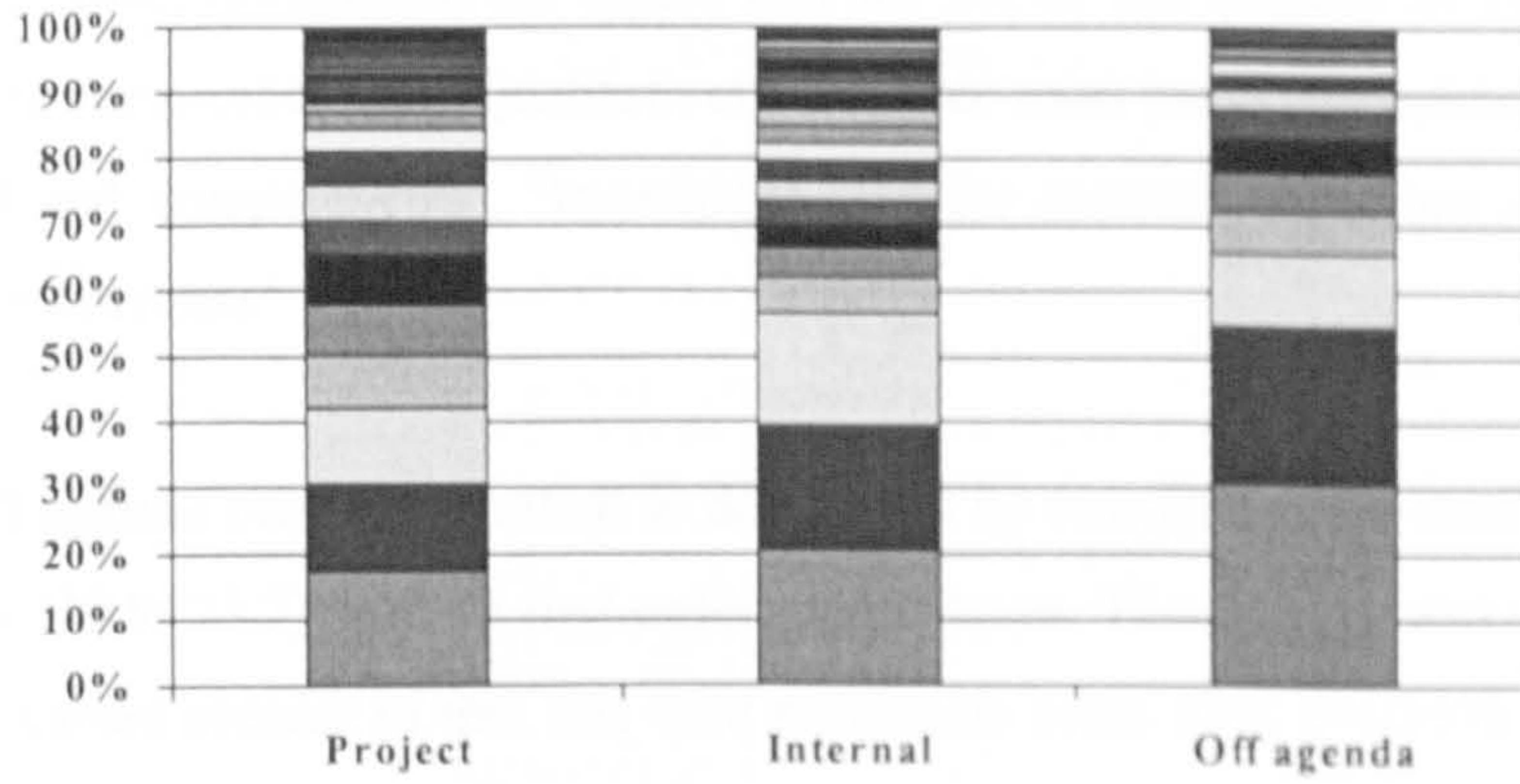
Meme number	Functional Meme
276/1	Internal development of project (resources and timings)
277/2	Financial costs of development
278/3	Patent situation

The creation of dendograms (Charts 5.1, 5.2 and 5.3 provided at the end of the chapter) proved to be far easier to perform for these organizational cases than in the Internet cases, despite the former, except in the case of the off agenda case, having a similar sized memome. This was because the cases had no second-order memeplexes; there was just not the breadth of variety of content within the data to justify adding another layer of clustering. This is of course a subjective judgement. It was however difficult to see how the first-order memeplexes fitted into any type of further clustering as had been the situation in the Internet cases (see also Chapter Three section 3.7 on reliability for comments on maintaining the same level of abstraction throughout the analysis process).

As regards the distribution of memes in the population, using the first-order memeplexes and the dendograms produced in Decision Explorer, histograms were then produced of each case showing how much of the population of memes was within each memeplex and how many memeplexes there were. These appear below Chart 5.4 is a stacked histogram whereas Chart 5.5 is an unstacked histogram, both illustrate the number of memes in each first-order memeplex.

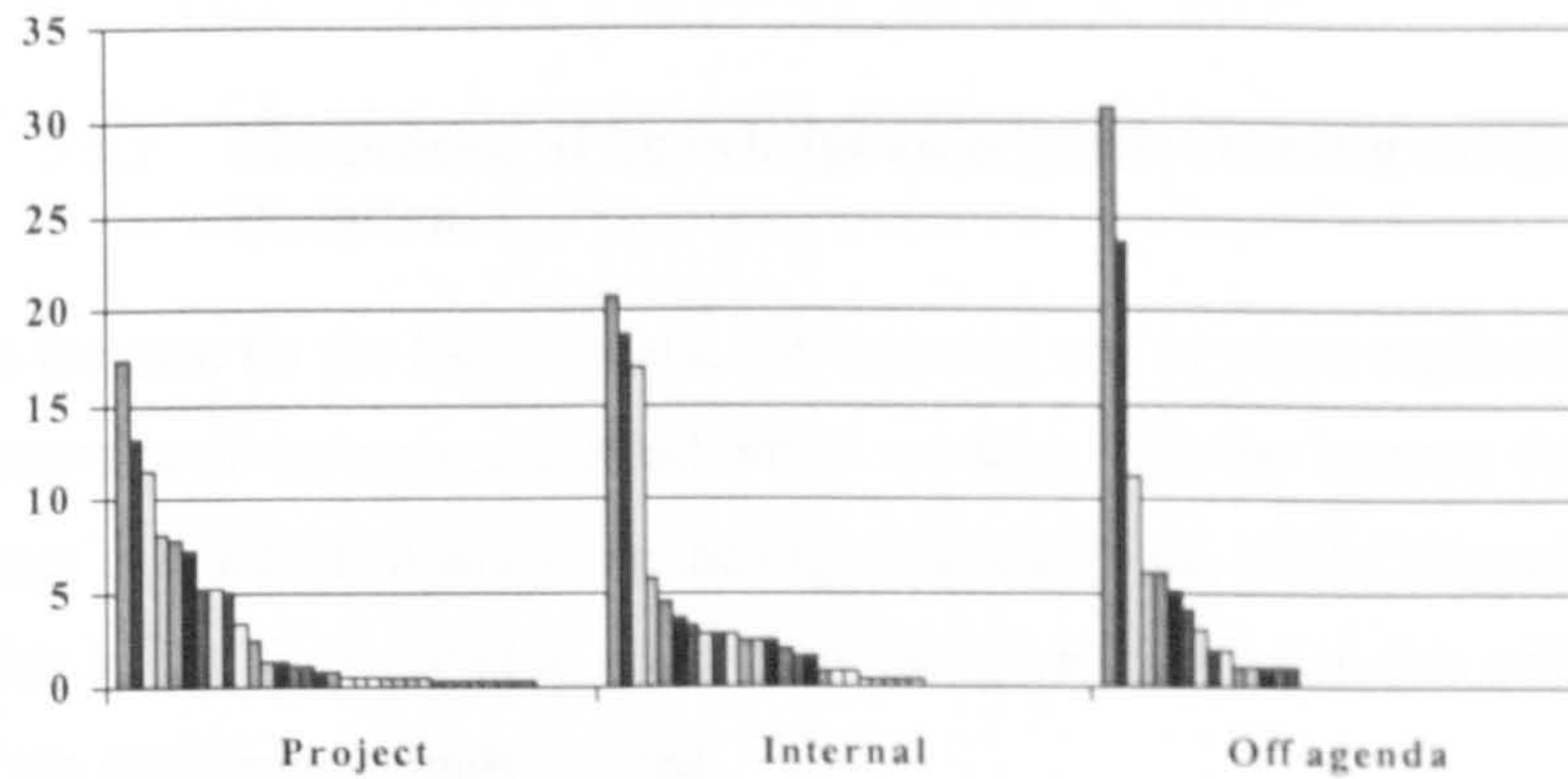
**Chart 5.4**

Distribution of memes – organizational setting  
*(number of memes in first order memeplexes)*



**Chart 5.5**

Distribution of memes - organizational setting  
*(number of memes in first order memeplex)*



In terms of content it can be seen from the content histograms, that the project case has an even distribution from a highly frequent first-order memeplex to lesser frequent and to even less frequent memeplexes. This case has the highest number of first-order memeplexes (32). The first three first-order memeplexes make up 42% (17.4+13.2+11.5) of the total content. Qualitatively they are 'technical explanation/development of product', 'relationships needed to take to market' and 'internal development of project (resources and timings)'.

The internal case has a more skewed distribution with a therefore higher percentage of memes within the three most frequent first-order memplexes. These consume 56% (20.7+18.6+17.0) of the total content. In total there are fewer first-order memplexes than in the project case (24) but as this case is 71% (255/357) of the total number of memes of the project case, normalised the figure reaches 34, so the number of first-order memes is identical to the project case. Qualitatively the three most prevalent memes are 'people, their workload and competencies', 'knowledge transfer between directors and managers' and 'investment process'.

In the off agenda case, the content is dominated by two first-order memplexes that make up 54.6% (30.9+23.7) with 15 first-order memplexes. This is high, and arguably represents the most varied content in that this case represents some 31% (94/357) of the project case room in volume of memes, meaning the normalised figure is 48 (15/31) first-order memes. Lastly, the off agenda case has somewhat of a dual profile, reflecting the content, with some 66% (30.9+23.7+11.3) residing in only three first-order memplexes in which there is a lot of content that refers to workload. The remaining content is very varied. Qualitatively the first three memplexes are 'people and their high workload', 'project information focussed on commercial side' and 'meeting management'.

### **5.5.3 The process of knowledge emergence: creating categories of memetic evolution**

As was the case for the Internet data, the next step was to create replicationgrams. Knowing the categories of emergence created whilst working with the Internet data, these categories were kept in mind when analysing the organizational data, whilst respecting that a grounded approach might be required to create new categories if data in this setting did not fit into any of the categories already created.

It was found that in working with the organizational data there was a need to create a new categories of emergence called 'combination'. Once again, these categories reduced the data, and provided insights into them, whilst maintaining as much of their integrity as possible.

The forms of replication discovered in the data and their corresponding mechanisms of transmission are provided below in the table and explained in more detail subsequently.

Note: no categories other than those found in the Internet setting were needed. The mis-interpretation category found in the Internet data was not found in the organizational data.

TABLE 5.1 Organizational categories of emergence

Category	Sub-category	Nature of fidelity	Amount of variation added into the population
Repeat	From previous population	Near or absolute perfect copy-fidelity	None
Emphasis	Added detail	Medium, imperfect copy-fidelity	Moderate
Extension	Additional lateral knowledge	Medium, imperfect copy-fidelity	Moderate
Combination	Two pieces of knowledge so strongly associated with each other that they form a new meme	Both imperfect and perfect at the same time	Moderate
New dimension	A new theme to the case but one if taken out of the context would not obviously be part of it	Low, imperfect copy-fidelity	High
No retention	Within whole population	Zero copy-fidelity	Variation reduced

A typical example of each category of copy-fidelity is found below exactly as found in the source data. *All* of the source data, divided into memes clustered into first-order memplexes and given a category of emergence are in Appendix IV.

Category Repeat

Some memes were either exact, or very near repeats, of previous memes. This was often the case as consensus was reached between managers. As shown, for example, in the following data:

EXAMPLE 1

*Project Talk 134 MD*

- Total market was £3million, 30% would be a million and therefore £1.80 per unit.

Meme number	First-order Memplex	Emergence category
166/1	Assumptions underlying revenue stream?	Emphasis

*Project Talk 135 PMI*

- Yeah

Meme number	First-order Memeplex	Emergence category
167/1	Assumptions underlying revenue stream?	Repeat

*Project Talk 136 MD*

- OK

Meme number	First-order Memeplex	Emergence category
168/1	Assumptions underlying revenue stream?	Repeat

EXAMPLE 2

Or in the off agenda case:

*Off Agenda Talk 19 GD*

- How many exploitation plans?

Meme number	First-order Memeplex	Emergence category
19/1	People and their workload	Emphasis

*Off Agenda Talk 20 MarD*

- 16

Meme number	First-order Memeplex	Emergence category
20/1	People and their workload	Repeat

*Off Agenda Talk 21 GD*

- Just the 16

Meme number	First-order Memeplex	Emergence category
21/1	People and their workload	Repeat

*Off Agenda Talk 22 MarD*

- Just the 16

Meme number	First-order Memeplex	Emergence category
22/1	People and the high workload	Repeat

Category Emphasis

In some cases, memes were different from the previous posts, in that they related to the world in the same way, but added more in-depth detail about an aspect of the previous meme.

EXAMPLE 1

*Talk 152 PMI*

- Working on the Company K concept of customer care I can see why you might come to that conclusion

Meme number	First-order Memeplex	Emergence category
186/1	Nature of current supplier /	Emphasis

	competitor/competition	
--	------------------------	--

This example is close to a repeat as it is agreeing with the previous meme, but because of the slightly sarcastic tone (evident on tape) and the addition of coming to the same conclusion as a function of Company K's concept of customer care, it was classified as an emphasis.

#### EXAMPLE 2

##### *Internal Talk 60 GS*

- The nature of all three reviews in my humble opinion where they were about right in what we got i.e. we got it on the day. I mean the fuel cells was one that we wanted because we could see the potential for it. This committee as a body practically demanded that they report back in a month. And it really was a progress report that was required it was not the beginnings of a gate 2.

Meme number	First-order Memeplex	Emergence category
98/1	Investment Process	Emphasis
99/2	Knowledge transfer between director, project managers and line managers	Emphasis

In this example, talks about the nature of the presentations are provided in more detail than previously in terms of how the presentations fulfil their role in transferring knowledge between Project Managers and Senior Directors as well as the extent to which they comply with the organizational routines, practices and values associated with the Investment Process. It is not an exact repeat of what has gone before but neither does it extend the area laterally to the extent of being classified as an extension.

#### EXAMPLE 3

##### *Off Agenda Talk 25 IP*

- I mean what is encouraging is the degree to which people are putting effort into these despite the huge amount of work they have to get through in the normal course of the day anyway. Some of these things are still being done at some cost I should think. You know, people are putting themselves out to do these and the question is what the payback will be....

Meme number	First-order Memeplex	Emergence category
25/1	People and the high workload	Emphasis
26/2	Relationship between staff motivation, timing of rewards, transition to IPCo	New

Here the issue of workload, already discussed as regards the managers, is added to in terms of people in general in the organization taking on a high workload. Arguably this meme is on the borderline between emphasis and extension, but as the other meme present focuses on the new element of the relationship between staff motivation, timing of rewards and

transition towards IPCo, on balance an emphasis category was allocated to the other meme within this talk.

### Category Extension

In some cases memes found in the data were extensions of the previous posts in that the content of the previous post was added to and therefore extended outwards into new terrain, for example:

#### EXAMPLE 1

##### *Project Talk 40 PM1*

- As far as we can make out they supply to .. all the people who are involved in make printers based on dye sublimation and our estimate is that's about 100,000 of print-heads a year.

Meme number	First-order Memplex	Emergence category
44/1	Nature of customers	New
45/2	Who supplies who?	Emphasis
46/3	Market size	Extension

Here market size became part of the discussion as an extension of the discussion about whom the company K supply. As such it is more than an emphasis of the discussion on the company K but is not sufficiently different to be classified as a new dimension.

#### EXAMPLE 2

##### *Internal Talk 69 GS*

- Well I still feel – my own good feeling – if you do it that way to a certain extent when they have reached a certain maturity in what they are doing – well (if we took that stance) I can tell you now there would be nothing on the agenda next month.

Meme number	First-order Memplex	Emergence category
111/1	People, workload and their competencies	Extension

This meme is an extension to the previous knowledge because, although it talks about people, their workload and their competencies, it adds the view that this person feels if only mature Project Managers were asked to attend the meeting no one would be able to attend. So in being a personal and extreme view the meme was classified as an extension and not an emphasis.

#### EXAMPLE 3



### *Off Agenda Talk 45 IP*

- Well I think we have been quite driven by the mechanics of budget processes for 2-3 years and that I think budget process has become so central and so important, so up in headlights that people have forgotten that you need a plan to drive a budget.

Meme number	First-order Memplex	Emergence category
50/1	Transition towards IPCo	Extension
51/2	Skills of staff	New

In this example, the meme clustered as part of the first-order memplex 'transition towards IPCo' is classified as an extension because in being part of a discussion about the need to change the organization, it makes explicit that in the past the management has perhaps been too associated with financial issues. So although the financial side is new, it is related to the discussion quite strongly and so is more of an extension than a new dimension.

### Category Combination

In this category two memes in the population were seen as being combined to form something new. So in one sense, anything falling into this category was a perfect repeat, but in another, a new dimension. This category only occurred once in the Internet cases (and only upon second coding) but was far more frequent in the organizational cases, where it served to create a bigger picture of what was being discussed.

### EXAMPLE 1

#### *Project Talk 109 SD*

- I don't see a problem with a deal providing the thing we have to watch out for is protecting our long term ongoing relationship. D. is very talented individual creative person who R. works very well with. There are other activities that are going on there and we have to make sure that we can cut a deal here that does not alienate Company A or Company I. It's a matter of pulling things together rather than putting up dividing walls. And what we may have to do is almost mediate between what potentially is a conflict position between Company A and Company I just to protect our own position.

Meme number	First-order Memplex	Emergence category
137/1	Relationships needed to take to market	Combination
138/2	Patent situation	Combination
139/3	Dual development of idea	Combination

All of these memes have already been referred, what is different about their expression at this point in the discussion is that they are associated together to form a new relationship with the world in which they are all combined.

### EXAMPLE 2

#### *Internal Talk 145 MD*

- But that's OK we can ring the changes can't we. At the moment we are doing directors surgeries. I only think they will have a limited shelf life. Then executive lunches will be

another way of doing it. So before the Board ..... after the Board you can meet with people for lunch. Rail used to do that regularly. There are a lot of things we could do. We don't have to try them all at the moment. And I know we are moving towards IPCo and we do not quite know what the values are. Once we have the exploitation plans done, then it will be absolutely clear which bits are in and which out you can then start being very much more selective about which of the people, in term of which of the people we want to nurture and which of the people we want to bring into these things

Meme number	First-order Memeplex	Emergence category
229/1	Organizational renewal, reflexivity and experimentation	Combination
230/2	Idea of inviting people for lunch	Combination
231/3	IP and moving towards IPCo	Combination
232/4	People, their workload and competencies	Combination

This represents exactly the same situation as in the previous example, memes mentioned before are combined together to form a bigger picture, which is in effect a form of new knowledge.

### EXAMPLE 3

#### *Off Agenda Talk 66 SD*

- I am a firm believer in orthopaedics I really am. I think you need a good growth person, you need a technology person, someone that understand the technology, you need someone who understands the market, you need some aggressive entrepreneurial character to people that can do deals and think creatively and you have got it. There is a small team there, if we can get the right people. The only thing lacking is there – we didn't own any IP ourselves. If we can close this deal and its as good a we think it is those guys will drive that business.

Meme number	First-order Memeplex	Emergence category
73/1	Project information focussed on commercial side	Combination
74/2	Building cross-functional teams	Combination

Here the project of orthopaedics is associated with success, and success with having a cross functional team in a way that combined knowledge.

#### Category New Dimension

In some cases memes found in the data had substantial added dimensions to them that differentiated them from extensions. The same test, as was used in the Internet cases to differentiate between extensions and new dimension, was used here; if one took the meme as a stand-alone would one have easily guessed it was part of the same case.

### EXAMPLE 1

#### *Project Talk 111 PMI*

- Do the exploitation route I have thought about simply going to Company K or and end-user now and saying give us a lot of money and we will do this for you. I actually don't

think that this is at the moment the best way to get the value out of this. I think its to open to Company K saying come on silicon is too fragile a material it will not survive in the sort of environment you are going to put this in to. It's not proven technology. I just feel happy about that what I would like to do is take the concept forward and not necessarily develop a prototype product but a demonstrator that demonstrates that they technological steps will work.

Uhhh so that's the first step and then we need to think then again what is the best way forward for us.

Meme number	First-order Memeplex	Emergence category
142/1	Exploitation route	New

In this case, the new dimension of the exploitation route options are discussed, which have not been mentioned before.

## EXAMPLE 2

### *Internal Talk 144 GS*

- It's very difficult to keep these things fresh I mean we had the example of the James Tweed seminars, which went on for quite a while. When they first started he used to organise a hour and a half at lunchtime. Someone used to give a talk for half an hour, there would be food there and everyone would have a good natter about it. And sometimes things came out of it associated with the topic of the presentation but after about a year it got stale.

Meme number	First-order Memeplex	Emergence category
227/1	Organizational, renewal, reflexivity and experimentation	New
228/2	Idea of inviting people for lunch	Extension

This is the first time that time is taken out to reflect on what is being discussed, which in this case, is what can be learnt from past experiences as regards managing the organization.

## EXAMPLE 3

### *Off Agenda Talk 81 GD*

- I think that is actually thing we need to be consistent about is how we are using discount factors and writing down the NPV numbers because I do not think there is anything that – a consistent methodology at all with these NPV numbers that are being banded about at the moment.

Meme number	First-order Memeplex	Emergence category
91/1	Project information focussed on commercial side	Emphasis
92/2	Consistency in commercial evaluations	New*

In this example, in commenting on the commercial side of a project, the need to be consistent with NPV calculations is made. This was considered as a new dimension because although it follows on from the project discussion, it is very much a new comment that,

irrespective of the project, NPV calculations are perhaps not as yet done consistently as they could and should be.

Category Mis-interpretation

There were no cases of this category in the organizational data where there were some in the Internet cases. This is probably in part because the face to face communication meant that mis-interpretation was less likely, and because the nature of these organizational cases did not involve the production of very innovative knowledge or people unknown to each other, as happens for example in brainstorming.

Category No Retention

Lastly, there was the category of no retention of the meme, it never being replicated in the whole population or in the next post. Examples from each case are provided below: within Appendix W, an asterix (\*) represents the no retention category.

**EXAMPLE 1**

*Project Talk 67 PM1*

- There may be some other ways of doing things point-to-point sales where you don't need five-colour printing. There might be very cheap ways of doing that. I think what is attractive about this, even just thinking about the plastic ID card it's quite an attractive market – as people as more and more using plastic ID's and you can also start to think about building some functionality in there magnetic strips and things like that on them. I don't know if anyone has been to Hong Kong recently but to use the Hong Kong Transit system money never needs to change hands, you just vaguely wave your hand in the direction of a bit of equipment and it scans your card.

Meme number	First-order Memeplex	Emergence category
81/1	Plastic ID card - novel use	New*

*Project Talk 68 MD*

- OK

Meme number	First-order Memeplex	Emergence category
82/1	Plastic ID card – novel use	Repeat

In this example the idea of a future market being in plastic ID cards is mentioned. The following talk involves an 'OK' that is classified as a repeat as it is difficult to do otherwise. That said, no future reference is made to the ID card so it is difficult to imagine it is really retained. In essence, the group appear happy to accept the existence of the

current market and its size rather than to explore expanding, for example into photo ID cards, on the basis of their new technology.

## EXAMPLE 2

### *Internal Talk 157 GD*

- Yes a good one and just I am interested in that. From random samplings an unsolicited feedback I have had it is recognised that significant progress has been made this year in what we have done – that's good.

<b>Meme number</b>	<b>First-order Memeplex</b>	<b>Emergence category</b>
254/ 1	Organizational renewal, reflexivity and renewal	New*

This talk and meme come at the end of the case as this part of the meeting is being drawn to an end. Interestingly, although most of the case has been about new organizational practices that could be introduced to the investment process, only one is actually actioned and the remainder are not minuted. There is no further discussion about what an appropriate speed of renewal might be.

## EXAMPLE 3

### *Off Agenda Talk 81 GD*

- I think that is actually thing we need to be consistent about is how we are using discount factors and writing down the NPV numbers because I do not think there is anything that – a consistent methodology at all with these NPV numbers that are being banded about at the moment.

<b>Meme number</b>	<b>First-order Memeplex</b>	<b>Emergence category</b>
91/1	Project information focussed on commercial side	Emphasis
92/2	Consistency in commercial evaluations	New*

Here, the meme involving the judgement that in the new era of exploitation plans and the related move towards an Intellectual Property company the process of using NPV calculations to estimate commercial worth of any IP needs to be tightened to make it consistent, is never referred to again.

## Summarising the data

Having categorised each memetic evolution within each case room, the amount of each type of copy-fidelity was calculated making it possible to compare the amounts of each category within each case, as follows:

TABLE 5.2 Categories of emergence per case

Case room	Sources of increase in variety*										Decreases*	
	Repeat		emphasis		combination		extension		New dimension		no retention	
	#	%	#	%	#	%	#	%	#	%	#	%
Project	60	17	221	62	12	3	32	9	31	9	7	23
Internal	64	25	85	33	16	6	42	17	48	19	11	23
Off Agenda	25	26	44	47	2	2	10	11	13	14	3	23

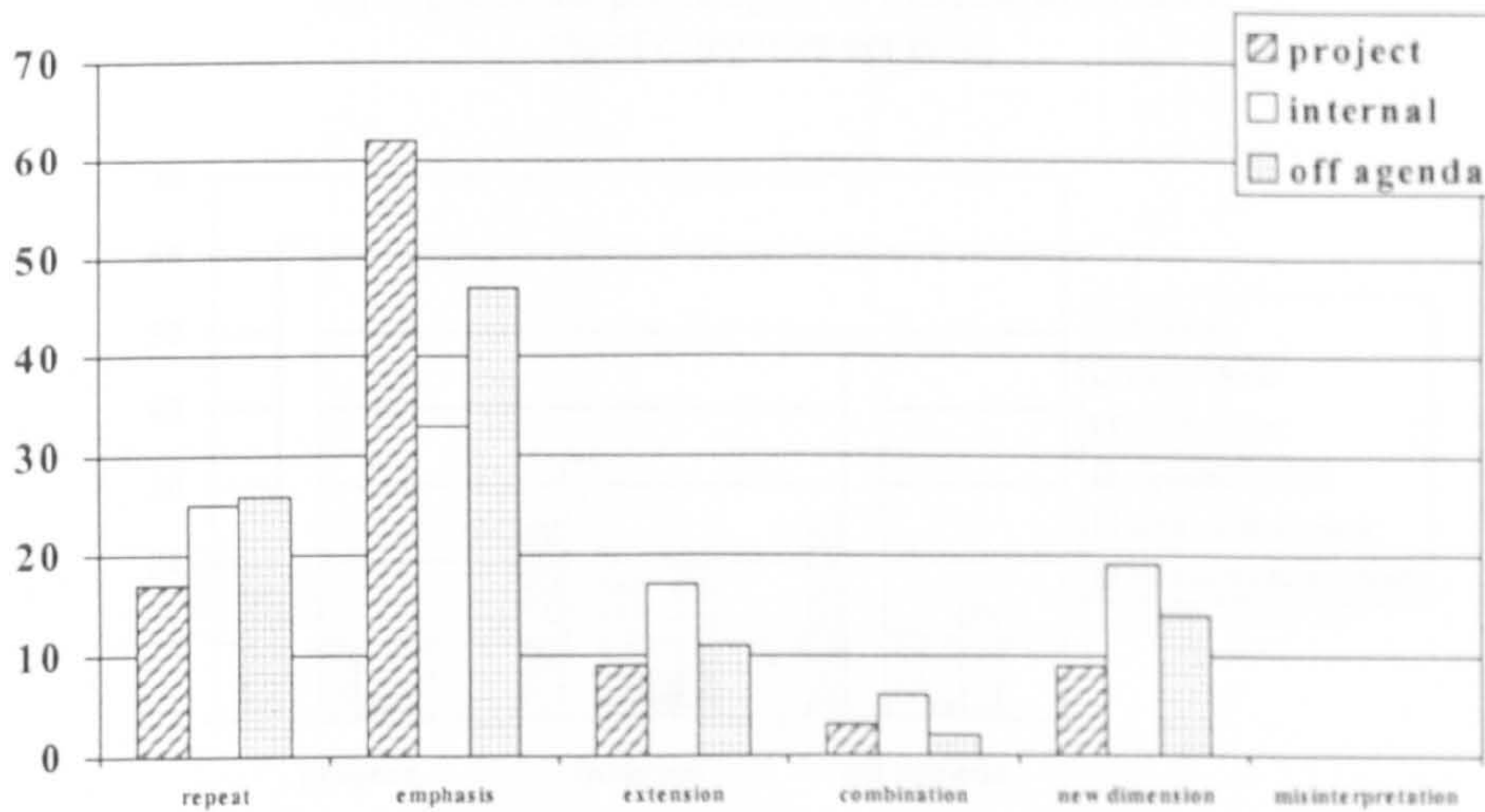
\*For increases in variety 100% equals all categories of copy fidelity

\*For decreases in variety 100% equals all new memes (new + mis-interpretation which in these cases is zero)

This process by which this content is produced can be understood best by looking at the replicationgrams that are histograms of the categories of emergence per case and per category.

Chart 5.6

Replicationgram per category of increase in variation  
(% in each case of each category)

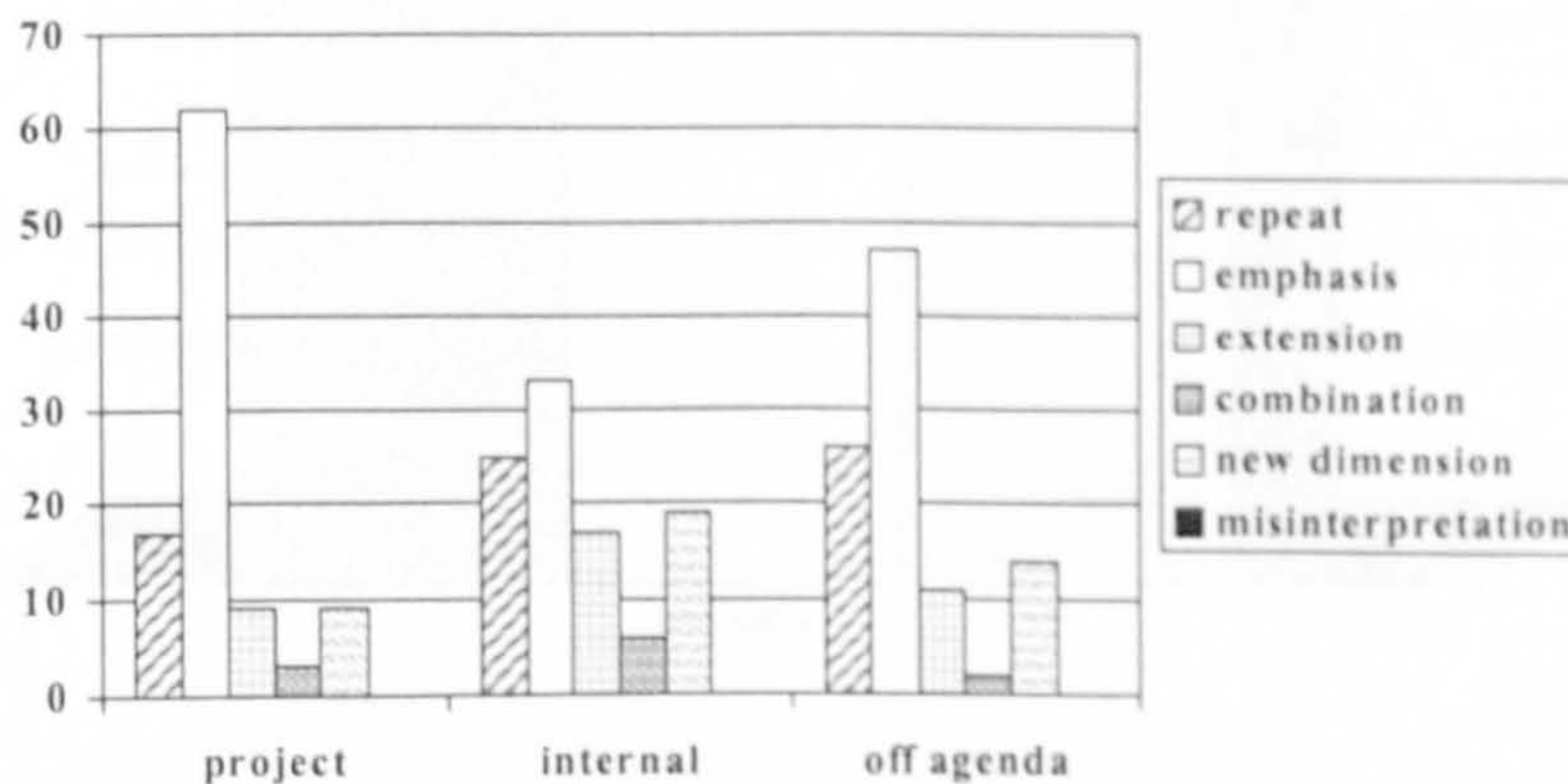


The repeat category features mostly highly in the off agenda case where there are repeat discussions of workload, nearly as frequently in the internal case where repeats appear

mainly in the form of agreement with previous talkers about various matters and much less so in the Project case. In contrast emphasis appears very often in the project case where details, mainly technical, are gradually added to the discourse and the directors seek to understand the project rather than agreeing with it, which would produce repeats. Repeats also appear quite frequently in the off agenda case where they appear frequently in the banter about workload. In the internal case they relatively appear less often but still represent the most frequent category as people add details to previous talks. Extensions appear infrequently in all cases, least so again in the project case characterised by small additions of variety. Combinations appear infrequently across all cases but most frequently in the internal case, and all always introduced by the Scientific Director (SD) who appears to have a skill at creating a 'helicopter' view. New dimensions feature most highly in the internal case where the directors are indeed thinking of new ways of working, less frequently in the off agenda case but with the freedom of being off agenda and despite the dominance of the meme workload in this case, a number of new dimensions appear. Lesser new dimensions appear in the project case suggesting that infrequently do the directors challenge the project managers. The overall impression is of a profile dominated by the emphasis category suggesting variety is added in incremental steps.

**Chart 5.7**

Replicationgram per category of increase in variation  
(% of categories per case)



The project case, although high in variety of content, arrives at that content primarily through slow steps, whereby detail (i.e. emergence category emphasis which 62% of the

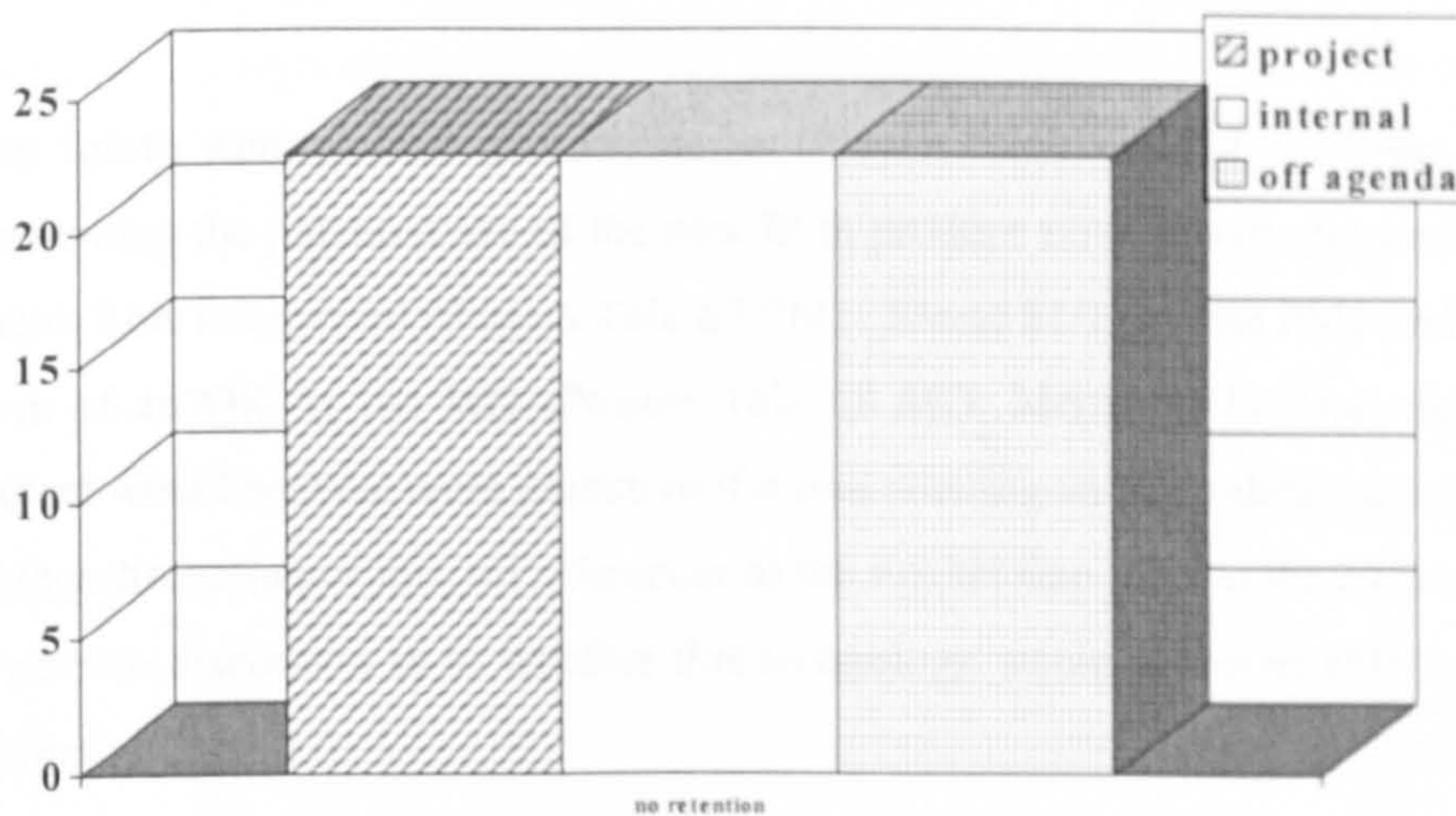
total) is added to the previous knowledge, presumably as the project managers and directors interact to transfer knowledge about this new idea between them.

The variety of content in the internal case is arrived at through a lesser number of the category emphasis (33%) but through a greater number of jumps in knowledge through new dimensions (19% versus 9% in the project case), extensions (17% versus 9% in the project case) and to a lesser extent combinations (6% versus 3% in the project case). The internal case has the greatest number of combinations of all three cases. This is probably because this case involved coming up with new ideas on the internal management processes led by the Scientific Director who as stated above often contributes to discourse in the form of combinations.

As regards the off agenda case, there are a large number of repeats, even higher number of emphasis meaning some 74% (47+27) of categories of emergence reside in categories of emergence lie in new dimensions. That said the case still has a number of new dimensions

**Chart 5.8**

Replicationgram per category of decreased variation  
(% in each case of the category)



The nature of the non-retained memes reveals a series of insights. Firstly, the project case, internal case and the off agenda case contain the same percentage of non-retained memes



(23% respectively) meaning that the managers consistently ignore the same percentage of new dimensions whatever the case or number of new dimensions in that case.

In the project case seven memes (23%) are not retained starting firstly with an account of the history of the project. This is a precise and easy to understand account and is probably retained by the minds of the directors present to the extent they did not need to remember the details and, as the story was precise, making the demand for more detailed memes unattractive. The second non-retained meme is the notion (Project Talk 31PM1:Meme 33/3) that, although the idea might appear to be one of many from the 'MS' group and hence the group may appear to be taking a scatter-gun approach, in fact all the recent ideas from the group emanate from the same base technology. The meme could have evolved into a discussion or at least some type of acknowledgement of that base expertise and knowledge existing, let alone needing to be continually renewed or even developed through contact with other key knowledge bases.

The third project meme that is not retained (Project Talk 32 MD: Meme 36/1) involves a sarcastic comment about a previous failed project that went wrong from within this group. No attempt however is made to counter this negative stance by the project managers with a lessons learnt statement or to elucidate from the MD or the project managers what this involved.

The fourth non-retained project meme (Project Talk 44 PM1: Meme 51/1) involves mentioning the potential use of the new IP to produce novel plastic ID cards that include a photo. This is repeated (Project Talk 67 PM1: Meme 81/1) by the PM1 and repeated in the form of an OK by the MD (Project Talk 68 MD: Meme 83/1). One could imagine the project would become more attractive if it was entering an expanding market but there is no further discussion of this, all references to the market size refer to the current market. There is also no discussion as to whether this technology would be better able to serve this new market.

The fifth non-retained meme (Project Talk 51 SD: Meme 61/1) is a comment on market size, but not in terms of financial size, but in terms of types of market. So once again market development information is not retained.

The sixth non-retained meme (Project Talk 69 PM1: 83/1) comments on the lack of a whole picture. This is equivalent to the category of emergence called combination whereby, as is said to be required in strategy, a 'helicopter' view is produced.

The last and seventh non-retained meme (Project Talk 110 MD: Memel41/2) involves stating that the directors are interrupting the flow of the presentation. It is not retained but then this is hardly significant. The only comment that could be made is that in the following case, 'internal', there is a discussion about the flow of knowledge between directors and managers in terms of the extent to which directors can add value if they are not prepared or the presentation is inadequate. In this case the presentation was fine so neither of these issues appear to apply, so perhaps it is not surprising this meme is not retained.

Moving on to the internal case, there are 11 (23%) non-retained memes. One is similar to that in the project case. A comment is made (Internal Talk 128 SD: Meme 198/2) about the lack of ability to combine knowledge. Once again this is not taken further. There are 3 cases of reflexivity that are not retained. One (Internal Talk 128 SD: 198/191) involves commenting on the fact that the debate about different ways to improve the investment process is becoming lengthy. One is about reflecting on the fact that in the past a new idea became stale and so there is a need to keep on coming up with new ideas. The last is at the end of that case (Internal Talk 157 GD: Meme 254/1) when it is commented on unsolicited feedback on progress has been good. A similar non-retained meme, in that it is reflexive but at a project level, is also not retained. This meme (Internal Talk 62 GS: Meme 101/1) comments on the fact that one of the presentations was a disaster, but is not discussed further in terms of developing the skills of the project managers to ensure this does not happen and why they still came as they were asked to do, rather than taking the initiative to say it was not an appropriate moment to present. This is despite the recognition amongst the directors that there is a need for the hierarchical gap between the directors and managers to grow smaller (background data). Following on there are three further non-retained memes (Internal Talk 18 GD: Meme 27/2), (Internal Talk 54 SD: 85/3) and (Internal Talk 58 SD 94/2) that all mention in some form inadequate skills and knowledge levels in staff but these observations are not taken further in terms of what could be done to remedy the situation. Lastly, there is the meme about there being no good stage 2 business plan as yet (Internal Talk 51 GS: Meme 59/2).

As regards the off-agenda case there were 3 (23%) non-retained memes. The first (Off agenda Talk 8 GS: 8/1) was reflexive about the fact that the previous project presentation was so engaging that he had forgotten to take notes. The meme could have evolved to comment on what made this presentation good, tied into the previous comments on project manager's competencies, but was not. The second non-retained meme (Off Agenda Talk 45 IP: Meme 51/2) was also about staff skills in the form of people in the past being driven by budgets such that people have forgotten that there needs to be a strategic plan behind the budget. Ironically the second most frequent first-order memeplex in this case was about a new project and was primarily a financial discourse rather than anything strategic! The last non-retained meme (Off Agenda Talk 81 GD: Meme 92/2) was about the financial commercial side of IP evaluation and the need to be consistent with how NPVs were calculated across different IP projects.

There is a high level of consistency in not only the percentage of memes not retained but also in the qualitative nature of the same memes. The knowledge content of these memes covered areas of the management of the organization that are generally considered as strategic. These included building a high level cross-functional picture of a project (or 'helicopter' view as is often referred to in strategy), needing more strategic thinking capability at middle management level, reflecting upon the past emergence of knowledge in some way and hence conducting strategic learning.

#### **5.6 Commentary on analysis performed to answer 'how does knowledge emerge'?**

The fingerprints of the organizational cases as regards knowledge content and process reveal that the variety in content is most unevenly distributed in the off agenda case, where the discussion is dominated by workload and takes place in the absence of the MD, relatively unevenly distributed in the internal case where a lot of content falls into the first three memeplexes, and is more evenly distributed in the project case. In all cases however the distribution is skewed towards content being concentrated in a few memes. The off agenda chat contains the most memeplexes and therefore the most variety, which being an off agenda discourse is not surprising. As regards process, the overall picture is one of variety being added between newly evolved memes and past memes primarily in small steps rather than big jumps. Non-retained memes are identical across the cases, both in terms of number and type, suggesting that retention dynamics are similar across the cases, which is

not surprising as the people involved in the discussion always contain the directors and a variety of project managers all of which are steeped in the same organizational culture.

## **5.7 Why does knowledge emerge?**

As in the Internet analysis, the research at this point moves to ask the more difficult question of why does knowledge emerge. The same concepts of community interactivity, the emergence of knowledge rules, differential retention dynamics and reflexivity are explored.

### **5.7.1 Community interactivity**

As stated in Chapter Four which analyses the Internet setting, it is impossible to find evidence for the individual part of the concept community interactivity by which is meant the very basic notion of who meets whom and what emerges as a result. There is however obvious management of social interaction through the closed meeting, which compared with the Internet setting limited the knowledge that could emerge. So rather than have a self-organizing, open community that altered its membership as knowledge emerges as in the Internet cases, here the community for the duration of the discourse is organized by the rules of investment process that dictates that such meetings be closed.

There is evidence of who meets whom being managed throughout the investment process. Specifically, the required need to develop and report upon 'special relationships,' guides external contact with co-developers, suppliers and customers and internal contact with senior managers and patent staff. With one exception, rules about social interaction are not discussed or referred to in terms of their effect on knowledge emergence. Instead, people are referred to in terms of their character, motivation and competencies, of skills and experience. The exception involved the danger of continued discussion outside of the company altering the patent position. However, even here the emphasis was on the tendency for middle managers to be incompetent in this area.

Once again as in the Internet cases, it is impossible to imagine how managers could perfectly control who meets whom and what emerges as a result and thus knowledge emergence has to contain an uncontrollable element. This is appreciated by the management in terms of their brainstorming sessions (background data) that are held within the

organization where the idea is very much to put together people who normally do not have any chance of meeting but which are experts in their fields and who upon exchanging knowledge might come up with something very innovative (indeed the researcher was provided with excellent examples).

It is not surprising that who met who was managed in the organizational setting. It is however surprising that, whereas the uncontrollable element of this force is taken into consideration as regards brainstorming, it is not taken into consideration in any great detail for the rest of the investment process. For example, in the project case, the impact of co-development with one company, rather than any other, was not discussed in terms of knowledge emergence other than in patent ownership terms.

As regards the lack of control humans have over knowledge emergence, the Off agenda case provides a good example of the unpredictability of knowledge emergence. Here a discussion about high workload that started upon the MD leaving the room leads to a discussion about Project K. The link being a pile of paper in front of a Director that is commented on in terms of being representative of workloads and, which leads to a discussion of its content, as the data below shows. This knowledge emergence is still not however as off subject and therefore varied as was found in the Internet setting where the process led to content that had nothing to do with the initial subject.

*Off Agenda Talk 59 SD*

- There is a bit of bedtime reading for me as well here

Meme number	First-order Memeplex	Emergence category
65/1	People and the high workload	Emphasis

*Off Agenda Talk 60 Group*

- Group laughter

Meme number	First-order Memeplex	Emergence category
66/1	People and the high workload	Repeat

*Off Agenda Talk 61 IP*

- That's the trial valuations on the orthopaedics numbers that I have brought back for you to interpret

Meme number	First-order Memeplex	Emergence category
671	Project information focussed on commercial side	New

### *Off Agenda Talk 62 SD*

- Oh right I would like to read that

<b>Meme number</b>	<b>First-order Memeplex</b>	<b>Emergence category</b>
68/1	Project information focussed on commercial side	Emphasis
69/2	People and the high workload	Emphasis

### *Off Agenda Talk 63 Group*

Group laughter - as he flicks through huge volume

<b>Meme number</b>	<b>First-order Memeplex</b>	<b>Emergence category</b>
70/1	People and the high workload	Emphasis

### *Off Agenda Talk 64 GD*

- Just tell him every document is that and you are away

<b>Meme number</b>	<b>First-order Memeplex</b>	<b>Emergence category</b>
71/1	People and the high workload	Extension

In summary, community interactivity is fundamental to knowledge emergence, yet its exact effect is both unpredictable and imperfectly controllable, as shown in the off agenda case where an unpredictable conversation about Project K emerges. At an individual level of who meets who and what emerges can and is described in the 'how' analysis. What is examined here are the patterns of community level dynamics that make knowledge emergence more or less likely. In this setting there is evidence of community interactivity being managed extensively within the firm but much less so as regards what happens outside of the firm. For example it is surprising however that not more time is not spent on discussing the likely impact of social interaction on knowledge emergence (e.g. in the Project Case as regards the special relationships needed to develop the project) or on discussing the effect of management style on the effect of social interaction on knowledge emergence (e.g. when the concepts of self-organising groups might be relevant to the organization).

## **5.7.2 Rules of knowledge emergence**

As was the case in the Internet cases, rules about the emergence of knowledge exist within the organizational setting and, as in the case of the gun policy case, form part of the knowledge content of a case (the Internal case). So, not only do rules exist that guide the emergence of knowledge but the discourse within the Internal case involves a discussion

about these rules. In contrast to the Internet setting, the rules in the organizational setting encourage the restriction of the emergence of knowledge within a certain field rather than, as in the Internet setting, the emergence of knowledge of any kind. The other difference between the two settings is that, whereas in the Internet setting there are rules to prevent a meme becoming more frequent through heavy promotion or repeated posting, there are no such rules to prevent this happening in the organizational setting. Lastly, the discussion about knowledge rules involves a debate as to whether or not they are being violated by some entering into discussion in the case, whereas in the organizational setting the discussion involves how these rules might be altered in terms of how ideas are to be encouraged to enter the investment process.

Evidence for three main sources of rules exist. The first source of rules is the strategic intent of the organization that guides knowledge content production within approved areas of innovation. The second source of rules is the investment process that guides the way in which that knowledge content is developed. These rules follow New Product Development best practice. The third source of rules guide the management of Intellectual Property through the development of clusters of IP and the patenting of knowledge. This area is discussed in the 'internal' case. The details of how these rules operate are however not detailed here for confidentiality reasons, but suffice to say such rules exist, guide the development of IP and ensure ownership where appropriate.

As regards strategic intent, this exists in the form of the changing intent to become an Intellectual Property company meaning that knowledge, rather than needing to be embedded into products and systems as had been in the case in the past, is directed into patents, the knowledge content of which provides solutions to customers. Strategic intent also exists in the form of a list of approved areas within which staff could innovate. In summary, the strategic intent rule of knowledge emergence involves producing patentable, commercially viable knowledge within these areas of known organizational expertise.

As regards the investment process this, as mentioned before, had arisen from a previous traditional new product portfolio process, that changed into a growth process and finally into its current form. It was still essentially a typical Staged/Gated portfolio development process. At the preset Stages or Gates projects, according to these rules, have to be presented to the senior management team. The content of the presentation needs to reflect

whether or not, and in either case, why the project needs or not to continue to receive support. There is however a degree of flexibility in this process, project managers can request to present their project to managers for specific reasons outside of these gates.

Behind this process are a number of standard ways and formats for producing and presenting knowledge. These include for example and most relevant here, the idea proforma that accompanies the Project case and which specifies what knowledge needs to be included in a stage or gate. An emphasis is placed throughout on the relationships that were needed to develop the IP commercially but that said this emphasis was not seen in the live Project case. Beyond the idea stage, projects are supported by an exploitation plan, the content of which is guided.

In both cases there is an awareness of the need for the rules to find a balance between restricting variety too much and letting the organization become too disparate. Evidence lies in the case of strategic intent and came from background data whereas in the case of the investment process it came from the analysed data within the internal case. Both are detailed below.

In the case of strategic intent after collecting the data the researcher was asked for advice regarding the approved areas in which staff were allowed to innovate. Was it too restrictive given creativity was so vital to the value of the organization? The answer the researcher gave (in consultant mode) was that it should be made clear that it was recognised there were certain areas of competence within the firm that were regarded as special to the firm and from which it was expected that most ideas would fit into and were areas of competence that needed to be cherished. However it needed to also be made clear that if managers and scientists had ideas that fell out of this strategic intent and could justify the need to invest in these either on strictly commercial terms or on the basis of needing to renew the competencies of the company then they would be considered. This was felt by the managers to be more than a compromise and an approach that would encourage innovation within known areas of expertise whilst at the same time would avoid new areas of expertise being created and being stifled before their value could be assessed, for example, by the coming together of elements of two areas of expertise to create a new one.



Evidence for the management of the knowledge content that makes up the strategic intent exists within the Internal Case. In this example the managers are discussing which of the projects should be taken into the new Intellectual Property Company. By discussing this, the directors are managing what knowledge content will make up that new knowledge system. This, by way of contrast, is not part of the dynamic of the Internet setting indeed to manage knowledge in this way in an Internet case room is to create spam which is a violation of the knowledge rules operating within that setting.

#### EXAMPLE 1

##### *Internal Talk 13 MD*

- Or why do we not simplify things and why don't we – I mean – this is evolving because IPCo is evolving so when we put this list together I think we had a less clear idea of what IPCo would be today. Space you could take off so that would solve one problem. Project D will not be in IPCo I think we can be 99% certain of that. So M (name), splendid chap and I am sure he would gain from the coaching and the rest of it we could take him off. Frankly project F could come off, the arguments for building a cluster around project F are pretty weak are they not?

Meme number	First-order Memeplex	Emergence category
18/1	IP and moving towards IPCo	New
19/2	What areas are worthy of cluster management	Extension
20/3	Project K	New

##### *Internal Talk 14 SD*

- Ah yeah I would be inclined to support Project T than Project F right now.

Meme number	First-order Memeplex	Emergence category
21/1	What areas are worthy of cluster management	Emphasis
22/2	Project K	Emphasis

##### *Internal Talk 15 MD*

- So would I, I don't, I don't - cluster is an exaggeration

Meme number	First-order Memeplex	Emergence category
23/1	What areas are worthy of cluster management	Repeat

In this example, managers are making a decision as to what knowledge development should be transferred into the new IPCo, excluding some knowledge from that transition.

As regards the Investment Process, there was, as in the case of the gun policy Internet case, evidence of discussing these rules of knowledge emergence within the internal management

case. The discussion centred on cluster management and moved towards the needs perhaps, for development project presentations to be given to directors prior to the meeting and moved rapidly on to how the presentation of new ideas to the senior management could be encouraged.

A variety of examples are given below that show the types of discussion that took place:

**EXAMPLE 1**

*Internal Talk 9 SD*

- I would be inclined to say they are probably not cluster managers by their inherent character traits

Meme number	First-order Memeplex	Emergence category
13/1	People aspect of IP competence	Emphasis

Here the managers are discussing the selection of cluster managers who manage Intellectual Property in the proprietary way the organization has developed. Not only is there the rule of managing the emergence of knowledge through clusters but also the suggestion that there is a certain type of manager better able to do this type of knowledge management.

**EXAMPLE 2**

*Internal Talk 45 SD*

- I have one and I don't know whether any others feel this way but in order to properly do justice to the presentations I would like if possible we implemented a cut-off that anything that the presenters had not got to us in final form by say 5 working days – maybe that's too long but a few working days before was just deferred until the next meeting just to set some – In theory people should be able to plan for these but when a bunch of e-mails have come through a day before or whatever and your diary is already booked up and you are working all night to do other things. I just could not do this justice. I missed a key meeting with Ruth – I cancelled at short notice just to read a bit of background here and it just does not help really. And in theory once we get into that habit once we have done it once – we might have a lightish meeting next meeting but then anything that had been deferred we will have the same agenda.

Meme number	First-order Memeplex	Emergence category
64/1	Knowledge transfer between director, project managers and line managers	New
65/2	People, their workload and competencies	New

In this somewhat reflexive statement, the observation is made the current version of the investment process does not aid knowledge transfer between project managers and directors, and how possibly it could be improved.

Lastly, there was evidence of an acute awareness of the need to own knowledge in the form of managing intellectual property and that sometimes knowledge emerged outside of the organization to the detriment of the organization's commercial position as shown below:

**EXAMPLE 3**

*Internal Talk 45 SD*

- I have one and I don't know whether any others feel this way but in order to properly do justice to the presentations I would like if possible we implemented a cut-off that anything that the presenters had not got to us in final form by say 5 working days – maybe that's too long but a few working days before was just deferred until the next meeting just to set some – In theory people should be able to plan for these but when a bunch of e-mails have come through a day before or whatever and your diary is already booked up and you are working all night to do other things. I just could not do this justice. I missed a key meeting with Ruth – I cancelled at short notice just to read a bit of background here and it just does not help really. And in theory once we get into that habit one we have done it once – we might have a lightish meeting next meeting but then anything that had been deferred we will have the same agenda.

Meme number	First-order Memeplex	Emergence category
64/1	Knowledge transfer between director, project managers and line managers	New
65/2	People, their workload and competencies	New

In the off agenda case there was evidence of the knowledge content becoming more varied and 'off subject' in this 10 minute interlude when people relaxed. The evidence is as follows:

**EXAMPLE**

People looking at material in front of them

*Off Agenda Talk 49 MD*

- If I read all the bedtime reading I got I would not sleep. Added to the pile is this a new one.

Meme number	First-order Memeplex	Emergence category
55/1	People and the high workload	Extension

*Off Agenda Talk 50 GD*

- You should spend more time in bed

Meme number	First-order Memeplex	Emergence category
56/1	People and the high workload	Emphasis

*Off Agenda Talk 51 Group*

- Group laughter

Meme number	First-order Memeplex	Emergence category
57/1	People and the high workload	Repeat

*Off Agenda Talk 52 GS*

- If you went to bed a two o'clock in the afternoon and got up at 10.00

Meme number	First-order Memeplex	Emergence category
58/1	People and the high workload	Emphasis

*Off Agenda Talk 53 Group*

- Group laughter

Meme number	First-order Memeplex	Emergence category
59/1	People and the high workload	Repeat

*Off Agenda Talk 54 MarD*

- I don't think David would quite appreciate that

Meme number	First-order Memeplex	Emergence category
60/1	People and the high workload	Extension

*Off Agenda Talk 55 Group*

- Group laughter

Meme number	First-order Memeplex	Emergence category
61/1	People and the high workload	Repeat

*Off Agenda Talk 56 MarD*

- Well I am in bed .....

Meme number	First-order Memeplex	Emergence category
62/1	People and the high workload	Emphasis

*Off Agenda Talk 57 IP*

- You do not even go to bed when you have a cold and then come in and infect everyone

Meme number	First-order Memeplex	Emergence category
63/1	People and the high workload	Extension

### *Off Agenda Talk 58 MarD*

- Well I did try and take the day off but .....I did try to do that but it did not quite work out. I hoped I would not get a cold before I get on a plane again to get another cold.

Meme number	First-order Memeplex	Emergence category
64/1	People and the high workload	Emphasis

It is not surprising that rules exist in the organizational context that are directed to limiting the variety of knowledge about to be produced and that in the off agenda case when these rules are no longer operative the discourse does become more 'off subject' with added variety. Furthermore, the rules that are present follow the normative best practice portfolio development literature by building gates at which development projects have to have reduce the knowledge uncertainty that surrounds them in order to gain more funding. What is perhaps surprising is that, other than in terms of patents, a necessary area of focus given the Intellectual Property nature of the company, there is no discussion that directly talks about how knowledge emergence rules affect knowledge emergence or what type of knowledge emergence is required, and therefore what rules are required. This is in contrast to the Internet setting where it is established that the type of knowledge emergence that is desired is as varied as possible, and hence rules are established to achieve this and contraventions of these rules noticed and acted upon. So in the organizational setting the concept that the organization has rules that impact upon knowledge emergence and that these rules might benefit from being discussed in knowledge terms and altered according to the needs to different areas of the business or different points in its life-cycle were is underdeveloped when compared to the Internet setting.

#### **5.7.2 Differential retention dynamics**

As detailed above there is evidence of certain areas of organizational knowledge which rarely, if ever, are retained within the discourse as a function of past knowledge emergence dynamics. These areas have a common theme of being highly strategic. They include building commercial strategic competence irrelevant to the latter stages of the investment process, being strategically commercial by exploring new markets, seeking to understand markets in terms of customers and market dynamics rather than strictly financial needs, being aware of the need for middle managers who possessed the ability to be cross-functional and strategic and the reflexive comment that the organisation was not perhaps able, as well as it might be, at producing a big picture.

As regards what tends to be preferentially retained. In the project case, there are technical memes about the project, namely 'technical explanation of product' (17%) that are described in great detail relative to the strategic commercial side of the project, which was the subject of only three memes in the form of the plastic ID. The financial-commercial side of the project gaining voice in the form of financial costs of development (3%), licensing revenue from project (0.5%), timings of revenue (0.5%), market size (1%), types of markets (0.5%), nature of competitor / supplier (5.3%), but these were never talked about in terms of strategic market dynamics and inventing a future (e.g. ways in which market could be expanded or market dynamics altered to their advantage). This pattern is repeated in the internal case where Project K makes up 24% of the content but once again is never discussed in terms of strategic marketing or market development or dynamics but in financial-commercial terms.

Furthermore, as regards the internal case content, where new ways of working are being discussed, the majority of the content is in the creative, more scientific early part of the investment process whereas being commercial is not retained or retained for only a short time (e.g. the lack of any decent Stage 2 exploitation plan).

As for the off agenda case, what is preferentially retained here are the memes within the most frequent first-order memeplex 'People and their workload'. The explanation in this case might be that in the absence of the MD such a memeplex could survive because the power associated with the MD's presence made memes that were not attractive in his presence free to be copied in his absence. This dynamic led to the discussion of the second most frequent first-order memeplex, Project K, given its association with workload.

So in summary, strategic memes are consistently not retained. In contrast, memes relating to technical information and financial information and memes about the more scientific and less commercial end of the investment process were preferentially retained. In the specific context of the off-agenda case, the differential retention dynamics were seen to change, in the absence of the MD, to a subject one can imagine would not have been discussed often in his presence and led to the emergence of an impromptu and relatively detailed discussion of a seemingly un-related topic of Project K, the knowledge content of which was all commercial-financial and related in fact to workload. This showed that the dynamics of

what is and what is not preferentially is retained in different contexts.

### 5.7.3 Reflexivity

Reflexivity (the action of looking back and analysing and reflecting upon knowledge emergence as this thesis does) is a type of meme that is rarely retained. Furthermore these memes tend to be about the other memes that were rarely retained. The major example of where the reflexive memes are not about non-retained memes is in the project case where they are about stating how good the project is but even amongst this data reflexive memes about strategic issues that are not retained.

#### EXAMPLE 1

##### *Project Talk 245 MD*

- Thank you very much very exciting

Meme number	First-order Memeplex	Emergence category
342/1	Reflection on project	New

##### *Project Talk 246 GD*

- Very exciting indeed

Meme number	First-order Memeplex	Emergence category
343/1	Reflection on project	Repeat

##### *Project Talk 247 MD*

- I like the near termness of it

Meme number	First-order Memeplex	Emergence category
344/1	Reflection on project	Emphasis

##### *Project Talk 248 PM1*

- Well hopefully

Meme number	First-order Memeplex	Emergence category
345/1	Reflection on project	Emphasis

##### *Project Talk 249GS*

- It seems to be it all depends on her getting to BB (new location)

Meme number	First-order Memeplex	Emergence category
346/1	Internal development of project (resources and timings)	Emphasis

##### *Project Talk 250 MD*

- Yes (amongst laughter)

Meme number	First-order Memeplex	Emergence category
347/1	Internal development of project (resources	Emphasis

	and timings)	
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Specifically, the critically reflexive memes to be found amongst the positive reflexivity, (namely those about timings of project often falling behind schedule and the physical move of the project team to new premises) are not copied further and hence do not evolve.

Examples of non-retained reflexive memes about non-retained memes include the following:

**EXAMPLE 2**

*Internal Talk 58 SD*

- I still think there is time to shape the deal early. If we have not got our heads around the general shape of the deal early which is a creative thinking activity that can go wrong – it can cut off certain things without realising it. Bone bonding was a classic one. After that first presentation, I got in there with those guys and I spent ages with them trying to figure out how we do that. Now sometimes, you have got time sometimes you have not got time. Now given a bit of advanced warning about the market sectors, the market your going in to, the shape of the pot, the shape of the relationships involved can get your mind thinking down a route and you can give genuine positive feedback at this meeting.

Meme number	First-order Memeplex	Emergence category
93/1	Investment Process	Emphasis
94/2	Commercial IP deals	Emphasis
95/3	Knowledge transfer between director, project managers and line managers	Repeat

Here, the meme about the competence at the level of middle managers is not retained. This said the company had set up training sessions for this purpose but it is interesting that there is still no feedback on this or evolution of the memes in terms of the degree of the problem and other ideas about how to tackle the problem, is interesting.

Note: the meme about IP management is not classified non-retained as a previous meme of the same nature (85/3) made by the same person is also not-retained.

**EXAMPLE 3**

*Project Talk 32 MD*

- That's where we went wrong with HVO.

Meme number	First-order Memeplex	Emergence category
36/1	Sarcastic comment on previous project in MS – reflection	New*

*Internal Talk 62 GS*

- I think with Project H in a funny way was a way of demonstrating that if everything went wrong it went wrong.



Meme number	First-order Memeplex	Emergence category
101/1	Progress of presented projects	New*

Once again reflexivity this time in the form of openly discussing past lessons is not retained in either case.

#### EXAMPLE 4

##### *Internal Talk 125 GD*

- The work that I would like to see put in is scooping the market opportunity as I don't think we do that ever so well

Meme number	First-order Memeplex	Emergence category
193/1	Lack of emphasis on commercial side	New*

##### *Internal Talk 51 GS*

- I mean I am hoping when we move – one observation I would make over the last few months is that I don't think we have really had a proper gate 2 business plan.

Meme number	First-order Memeplex	Emergence category
78/1	IP and moving towards IPCo	Emphasis
79/2	Investment Process	Extension*

This shows another non-retained meme, namely reflexivity about the need to improve the latter end of the investment process.

#### EXAMPLE 5

The ultimate irony was perhaps the reflection that middle managers tended still to be dominated by the financial side as a function of how the company had been run in the past yet (see below) were, as senior managers, dominated by the financial side of any commercial discussion (Off Agenda First-order Memeplex 'Commercial Side of Project K' - 23%).

##### *Off Agenda Talk 45 IP*

- Well I think we have been quite driven by the mechanics of budget processes for 2-3 years and that I think budget process has become so central and so important, so up in headlights that people have forgotten that you need a plan to drive a budget.

Meme number	First-order Memeplex	Emergence category
50/1	Transition towards IPCo	Extension
51/2	Skills of staff	New*

The managerial implications of this type of differential retention dynamics are potentially large as the majority of the critical reflexivity is about strategic issues and is not retained. This suggests that, although the organization appears to be following best practice in that it is aiming to develop the right (and hence commercial projects) and develop projects right

(ensure they reach their full potential), these very micro knowledge emergence dynamics suggest that in reality this might not always be the case.

#### **5.8 Commentary on analysis performed to answer 'why does knowledge emerge'?**

The 'why' of knowledge emergence within the organizational setting is explained in terms of the concepts used in the Internet setting. Community interactivity contributes less to the creation of variety than in the Internet setting where the cases operate within a closed system, rather than the self-organising, open system of the Internet. As regards the dynamics of retention, there is evidence of a consistent bias throughout the cases to the retention of commercial, financial project data to the detriment of big picture strategic, strategic marketing, competence development and reflexive memes. Rules for knowledge emergence are found as in the Internet setting, except that the rules within the organizational setting are restrictive of variety production and are not discussed as being rules that affect knowledge emergence. Memes about how often to change these rules and how tightly they needed to be adhered to, do not evolve in the internal case, the ideas about how to change the rules are not recorded and only one is possibly actioned. The ability to address the potentially detrimental differential retention dynamics is lost because reflexive memes, which to a great extent point out this imbalance, also are not retained.

In the previous section, the 'why' of knowledge emergence was viewed from the perspective of each of the proposed forces operating on each case. In this section, the alternative perspective is considered of how these forces operate together within each single case. In particular, what is looked for is the extent to which any force predominates by acting antagonistically or whether the forces act agonistically, in order to obtain a view of the system operating as a whole.

As projects are part of the investment process the project case is where the rules of knowledge emergence apply. Indeed, the case follows this process in that it is guided by the knowledge requirements of an idea entering the process as laid out in the 'idea proforma'. As regards community interactivity, the meeting is closed to those invited, but is more open if one takes into consideration the discussion of the relationships needed to make the solution commercial. This involves the patent situation that is complicated and potentially unfavourable and the fact that the supplier does not strive to expand the market or treat the market with any respect, as shown below.

**EVIDENCE**

*Project Talk 63 MD*

- And Company K's position is protected by patent? As it certainly is not protected by service!

Meme number	First-order Memeplex	Emergence category
76/1	Patent situation	Emphasis
77/1	Nature of current supplier / competitor/competition	Repeat

*Project Talk 64 PM1*

- Ahuh! No it's not. I was not actually able to identify many Company K's patents. I think they might have licensed the technology from someone else like another Korean company like Company Z where I did find quite a lot.

Meme number	First-order Memeplex	Emergence category
78/1	Patent situation	Extension

*Project Talk 65 SD*

- According to Company I there is no alternative and their Technical Director, there is not alternative, if there was everyone would go to it as they are so hacked off with the supply.

Meme number	First-order Memeplex	Emergence category
79/1	Nature of current supplier / competitor/competition	Emphasis

Despite the influences of the forces of knowledge rules and community interactivity, these forces seem to antagonistically affected by the force of preferential retention and non-retention. So, although the rules of knowledge emergence embedded in the investment process involve ensuring any development project at any stage takes into consideration commercial aspects, in this case the knowledge content is still dominated by what is preferentially retained, namely scientific and financial memes. Equally, although the discussion about the supplier shows a market opportunity and is a stipulated discussion point in the idea pro-forma under the title of special relationships, non-retention seems a stronger force in that the potential to break this bad customer supplier relationship is not even created as a meme, let alone allowed to evolve. Furthermore, reflexive memes around this area of being more strategic are not retained, reinforcing the dynamics of not being strategic.

Taking the 'internal' case, the rules of knowledge emergence that surround the investment process are not relevant but no other rules exist. Although there is a reflexive statement about the need to keep renewing it does not evolve. There is no discussion about how

frequently such rules around the investment process should be altered. Community interactivity, in terms of asking non-directors for their ideas, is not considered (see the next paragraph). In content terms, the Group Secretary does not record the many ideas that do emerge. What are recorded are actions, as is traditional in this nationalised rooted organization, and perhaps this is another source of non-retention and preferential retention that the analysis has not picked up. So here we have a different situation in which rules about knowledge emergence do not exist and seemingly do not emerge because reflexive memes are not retained. This means that the meme that could result, if retained, involving rules about the speed of change in the investment process, did not evolve. The reflexive meme that is not retained is shown below.

## EVIDENCE

### *Internal Talk 144 GS*

- It's very difficult to keep these things fresh I mean we had the example of the James Tweed seminars, which went on for quite a while. When they first started he used to organise a hour and a half at lunchtime. Someone used to give a talk for half an hour, there would be food there and everyone would have a good natter about it. And sometimes things came out of it associated with the topic of the presentation had but after about a year it got stale.

Meme number	First-order Memplex	Emergence category
227/1	Organizational, renewal, reflexivity and experimentation	New*
228/2	Idea of inviting people for lunch	Extension

This is the only meme that could possibly lead to the emergence of rules about how often the investment process should be altered, but it is not retained. As in the project case, it appears that the force of retention works against the emergence of knowledge about rules on emergent knowledge and hence new rules.

Lastly, knowledge emergence in the off agenda case, was primarily a function of the most frequent first-order memplex associated with high workload (30.9%). Once again this content lay outside of the rules surrounding knowledge emergence in the investment process. The emergence of this content seemed to be a function of the absence of the MD making such talk easier. This falls into the category of community interactivity and is not very insightful in that power is often thought of as an influencer of knowledge emergence. What is more interesting is that the memes surrounding the positive angle on the preparedness of staff to work hard (see Meme 25/1) is stifled rather than taken up as shown below.

## EVIDENCE

### *Off Agenda Talk 25 MarD*

- I mean what is encouraging is the degree to which people are putting effort into these despite the huge amount of work they have to get through in the normal course of the day anyway. Some of these things are still being done at some cost I should think. You know, people are putting themselves out to do these and the question is what the payback will be....

Meme number	First-order Memeplex	Emergence category
25/1	People and the high workload	Emphasis
26/2	Relationship between staff motivation, timing of rewards, transition to IPCo	New

### *Off Agenda Talk 26 GD*

- Well you make a lot of progress against a sense of urgency

Meme number	First-order Memeplex	Emergence category
27/1	Relationship between staff motivation, timing of rewards, transition to IPCo	Emphasis

### *Off Agenda Talk 27 MarD*

- Yep, yep yep

Meme number	First-order Memeplex	Emergence category
28/1	Relationship between staff motivation, timing of rewards, transition to IPCo	Repeat

This is perhaps another source of non-retention related to the previously identified one of not allowing memes about middle management competence to evolve. Here one has evidence that given the chance middle managers would be prepared to work hard to improve their competencies and might willingly contribute to discussions about speed of renewal of the investment process. This does not ever evolve into something concrete and actionable.

As regards the rest of the content, the second most frequent first-order memeplex is that of Project K which is discussed in very financial terms. So once again knowledge emergence, in terms of the balanced investment process, seems hijacked by the force of preferential retention of financial memes. This is despite the following reflexive comment, as already mentioned and reported below.

## EVIDENCE

### *Off Agenda Talk 46 GD*

- Well there's almost a conflict in – cos – the budget is an exercise to some degree in my experience sort of again being played around to minimise expectations whereas sort of some of the planning we are trying to do here is to open up and sort of say kind of say what's the big game now and I think we should see some – I mean planning our aspirations for a business area is different from agreeing next year's budget. Now they definitely have to connect but you tend to confine it if you do it as a budget.

<b>Meme number</b>	<b>First-order Memeplex</b>	<b>Emergence category</b>
52/1	Transition towards IPCo	Emphasis

Taking these cases as one data set, the conclusion is reached that the force of preferential retention and non-retention consistently overwhelms the forces of knowledge emergence rules and community interactivity as well as reflexivity about these. This means that the knowledge that emerges is not as strategic as it could be. This situation is compounded by reflexive memes not being retained that could otherwise rescue the situation by causing the emergence of knowledge around big picture creation, strategic marketing, market development and strategic thinking competence of middle managers. The evidence is that above all knowledge emergence is altered by what is preferentially retained and what is not retained, the nature of which is consistent across the cases. This force is stronger than rules of knowledge emergence, community interactivity and reflexivity. So working at this very micro level, it can be seen that the reason the knowledge content that is produced is what it is, is a function of the forces of knowledge emergence rules and community interactivity operating but being dominated by the far strongest force of the dynamics of differential retention which in turn squashed reflection on the same as reflexive memes were not retained.

#### **5.9 Comparing the emergence of knowledge between the two settings**

As regards the 'how' of knowledge emergence and hence variety of content, the Internet cases exhibit a far greater level of knowledge content than the Internet setting. The process which produces that variety in content involves more categories of emergence that add variety in the Internet setting, whereas the organizational setting is dominated by the category of emergence emphasis that adds little variety.

The Internet setting is open to anybody with access to the Internet, whereas the organizational setting is closed around the few people who attend the meeting creating high levels of community interactivity in the Internet setting and low levels in the organizational setting. This means variety is higher in the Internet setting than in the organizational setting.

Whereas rules of emergence that promote openness and variety in the Internet setting (ISP rules that prohibit promoting a cause and repeat posting) they restrict variety and openness (strategic intent, investment process rules and patents) in the organizational setting. As regards differential retention dynamics, these differ across all the Internet settings that involve different people, whereas they are the same across the organizational setting that involves people deeply rooted in an organizational culture (many staff have been employed for many years in the same company) and are managerially important and significant. Reflexivity is higher and more varied in the Internet setting than the organizational setting. In the Internet setting reflexivity alters the direction of knowledge emergence in one case (Gun policy case), whereas it does not alter emergence in any case in the organizational setting. In neither setting does reflexivity appear in all its theoretically possible forms.

### **5.9.1 Conclusions and next steps**

The emergence of knowledge within organizations can be characterised in the same way as general social discourse both in terms of the 'how' and 'why' of knowledge emergence. As regards the 'how', organizational discourse can be divided into 'memes' that are self-contained but are more or less alike. Both qualitative and quantitative dendrograms can be created that illustrate the amount (variety) and depth (frequency) of knowledge content present in any organizational context. These can be converted into simpler purely quantitative histograms revealing the number of memeplexes and the frequency of the memes within them. The process of social interaction can be analysed by comparing successive 'memes' showing that knowledge emerges as it is replicated from one person to another as the content is either replicated perfectly or less than perfectly with consequential implications on variety (the more imperfect the replication the more variety added) and prevalence (if content is replicated in some way then the prevalence of that content increases). Whether the neurological mechanism is copying as stated in memetic theory is not known. Equally what the knowledge stock of each mind is before and after the discourse is not determined. Instead the analysis emphasises elucidating the dynamics of the discourse.

As regards the 'why' of knowledge emergence the direction of knowledge emergence in this 'managed' organizational setting could be explained by the same concepts as the 'unmanaged' Internet setting, namely community interactivity, differential retention dynamics, rules of knowledge emergence and reflexivity. Community interactivity can be

explained in terms of this setting being far more closed in the organizational setting involving only one community rather than many as in two of the Internet cases. Differential retention dynamics could be elucidated. Interestingly differential dynamics were the same across all organizational cases. Evidence could be found for rules of knowledge emergence and reflexivity and explained.

A comparison of the two settings regarding content and process reveals that the Internet setting contains far more variety of content as reflected in a relatively even distribution of categories of emergence. The organizational cases contained by comparison much less variety of content and the category of emphasis dominated the distribution of categories of emergence in all three cases. Community interactivity was more open and more complex in the Internet setting than the organizational setting. Retention dynamics in the Internet setting varied across the cases, which involved different sets of people, whereas in the organizational setting they were the same across all cases, which involved people from the same organization. What was not retained in the organization setting involved memes that had implications on management style and organizational performance in that they were all strategic memes, including all reflexive memes. Reflexivity was more present in the Internet setting than in the organizational setting and evidence was found for more types of reflexivity. In neither case was evidence found anywhere for all theoretically possible forms of reflexivity.

In terms of managerial agency certain concepts (community interactivity and differential retention dynamics) appear beyond high levels of *a priori* control. That said certain communities might be encouraged to meet and interact. Differential retention dynamics can be understood, their impact on performance assessed and actions taken to reposition the dynamics to another level (from project to strategic intent for example) or with greater difficulty, given their embeddedness, they might be eliminated or changed. The concept of rules of knowledge emergence seems to be much more capable of being controlled *a priori* to create a certain type of knowledge as happened in the chat rooms in the form of prohibiting spam to encourage variety or in the organization in the form of strategic intent to reduce variety. The concept of reflexivity, or rather the act of being reflexive, is seen as being very much in the control of man.

Irrespective of agency in both settings there is evidence of the knowledge systems evolving over time to become less directed towards the 'desired' form of knowledge. In the gun

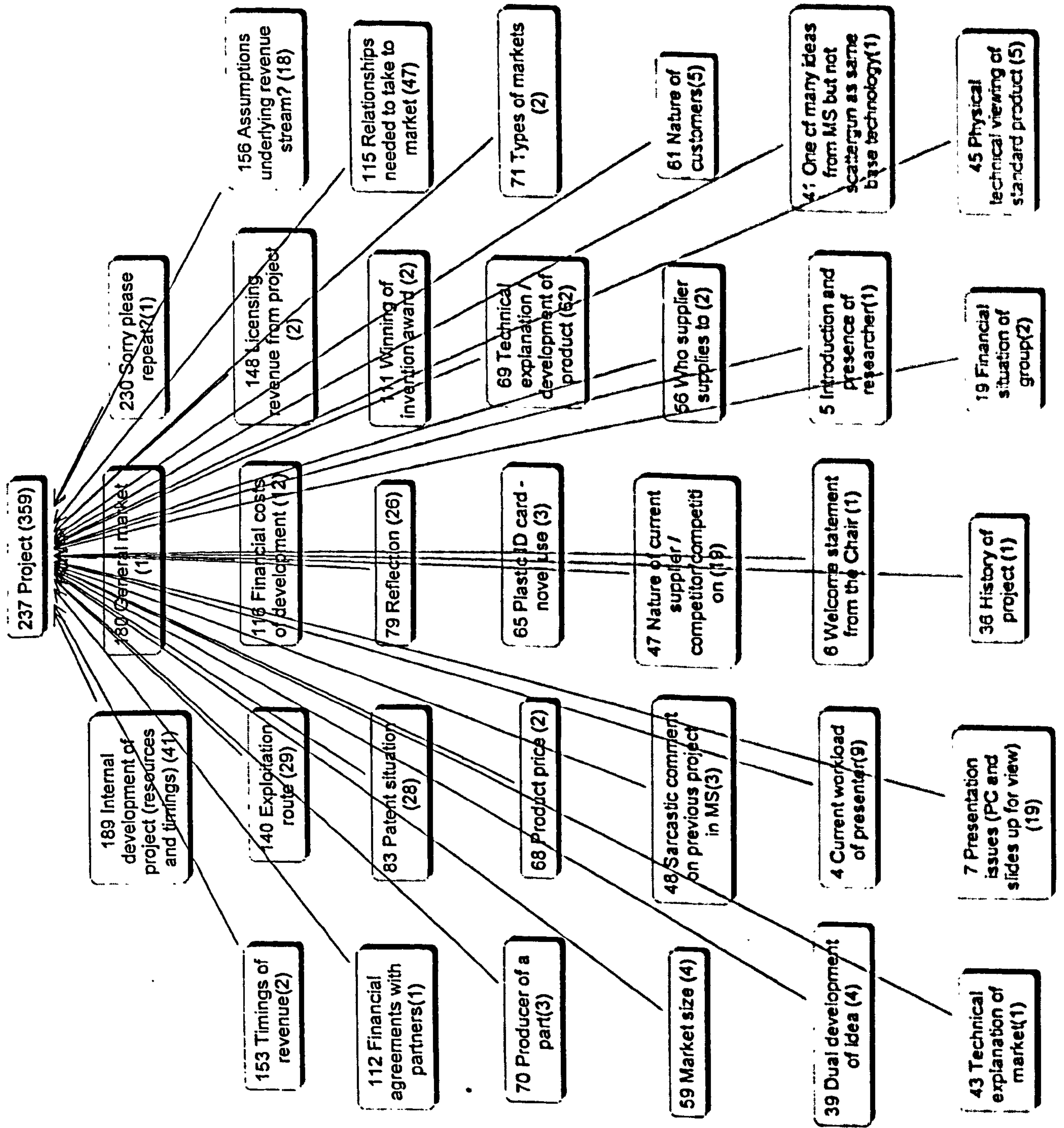


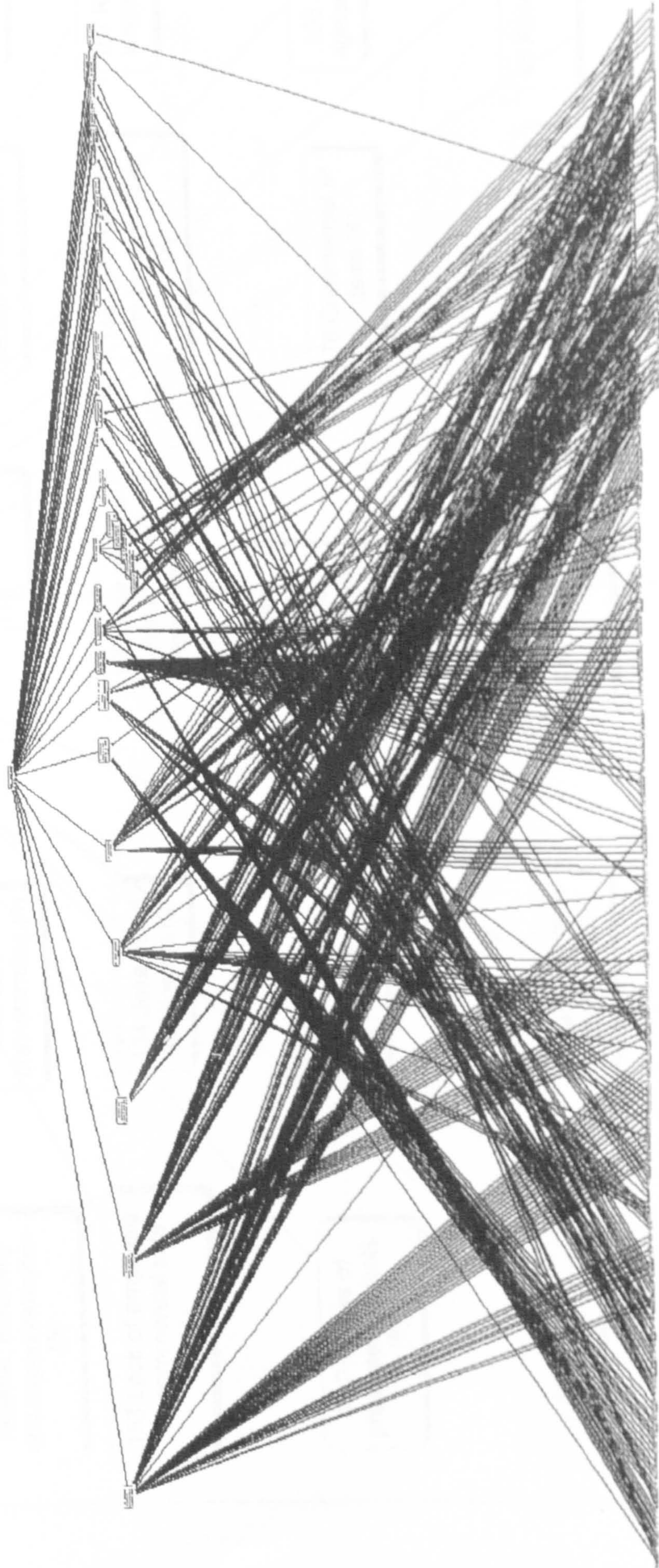
policy chat room there is spam and in the organizational setting in the absence of the MD the conversation moves to over work and strategic memes are not retained. In both settings the potential for reflexivity to bring the system back to a point where it does produce the desired knowledge is under-realised. The one attempt the data contains to bring a system back into 'fitness' (in this Internet setting it is to create variety) shows that this task is not easy in that spam continues to rule the discussion. This suggests that the management of knowledge creation should be about designing a system to create a desired (Internet) or appropriate (organization) type of knowledge. However, inevitably because of the complexity involved, the system will at some point evolve into a system that is unintended. If it is desirable that the system be brought back into its intended state, why it is out of state needs to be elucidated by discovering what the content specific system attributes are and how they are interacting and all potential sources of reflexivity need to be employed to bring the system back again to fitness. This unpacking of managerial and memetic agency is discussed further in Chapter Six in the section 6.5 entitled 'Managerial Implications'.

In conclusion, it is possible to map the content and process of knowledge emergence taking place in different social settings and reveal the system dynamics that create the knowledge in cases of social evolution including organisational knowledge emergence. Each discourse creates a unique fingerprint but this fingerprint is more or less similar to others, allowing for the comparative analysis of knowledge emergence dynamics in different discourses. From this analysis conclusions can be drawn about what type of knowledge is intended, whether the knowledge that is emerging is as intended and why, as well as what might be done to readdress the balance if there is a difference.

The contribution the research lies in the insights generated in Chapters Four and Five most specifically in the comparison between the 'unmanaged' Internet and 'managed' organizational setting. The contribution is limited in a number of ways, not least because the research is exploratory. The research has theoretical implications in terms of strategy literature and organizational evolutionary literature. As intimated in the last paragraph the research also has managerial implications. Lastly, the limitations can be reduced and the insights made more robust and broader in further research. These theoretical, research and managerial implications of the research are discussed in Chapter Six.

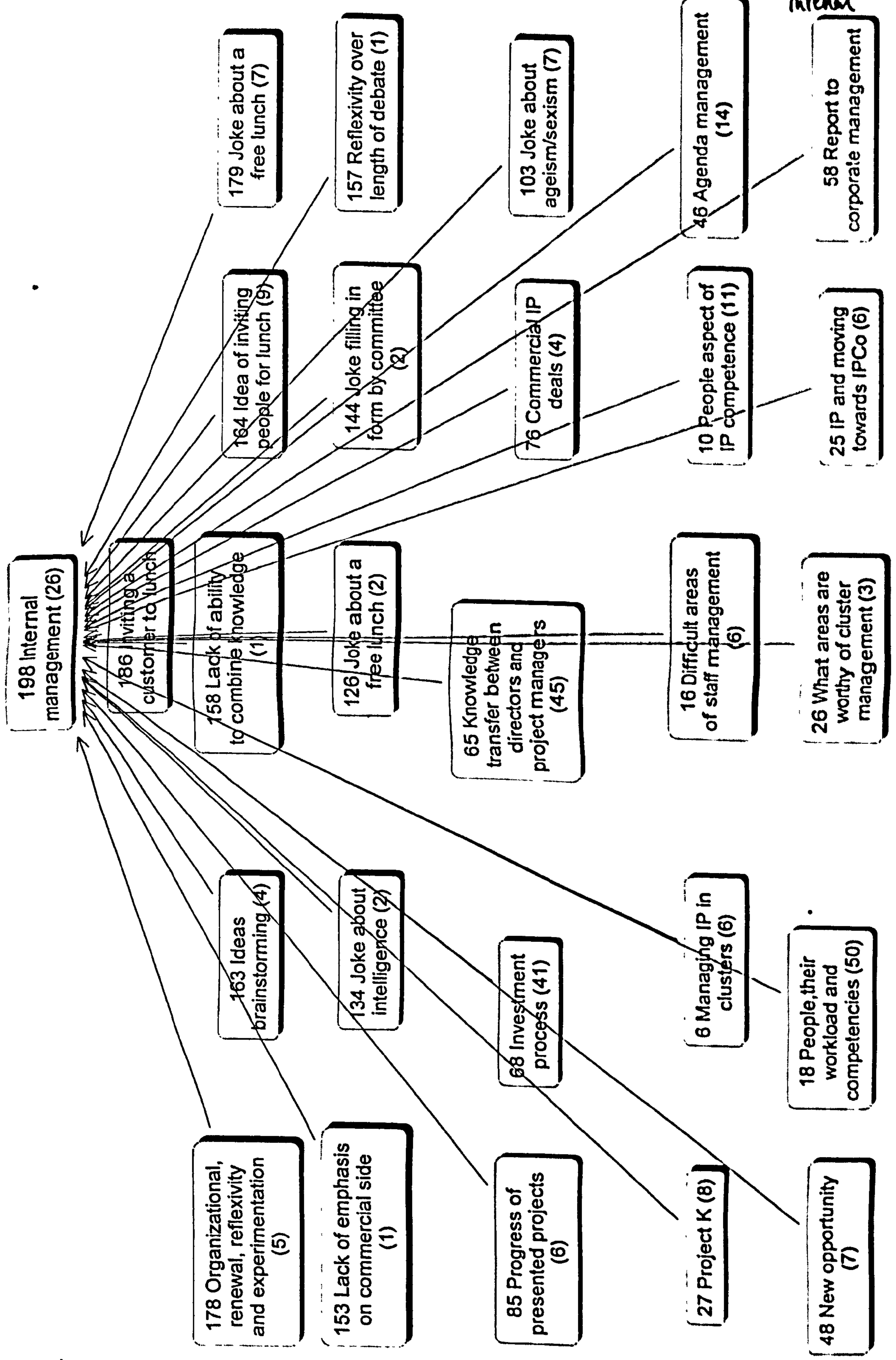
Chat 3.a  
 High order memeplexes  
 Project case

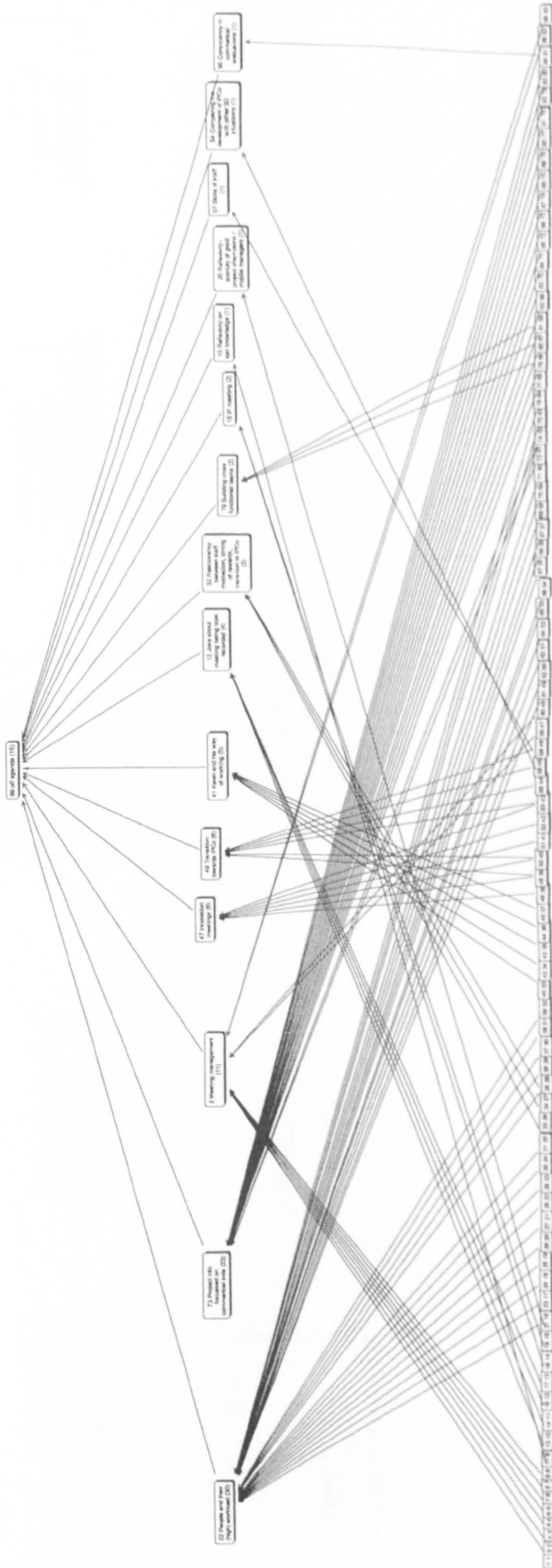


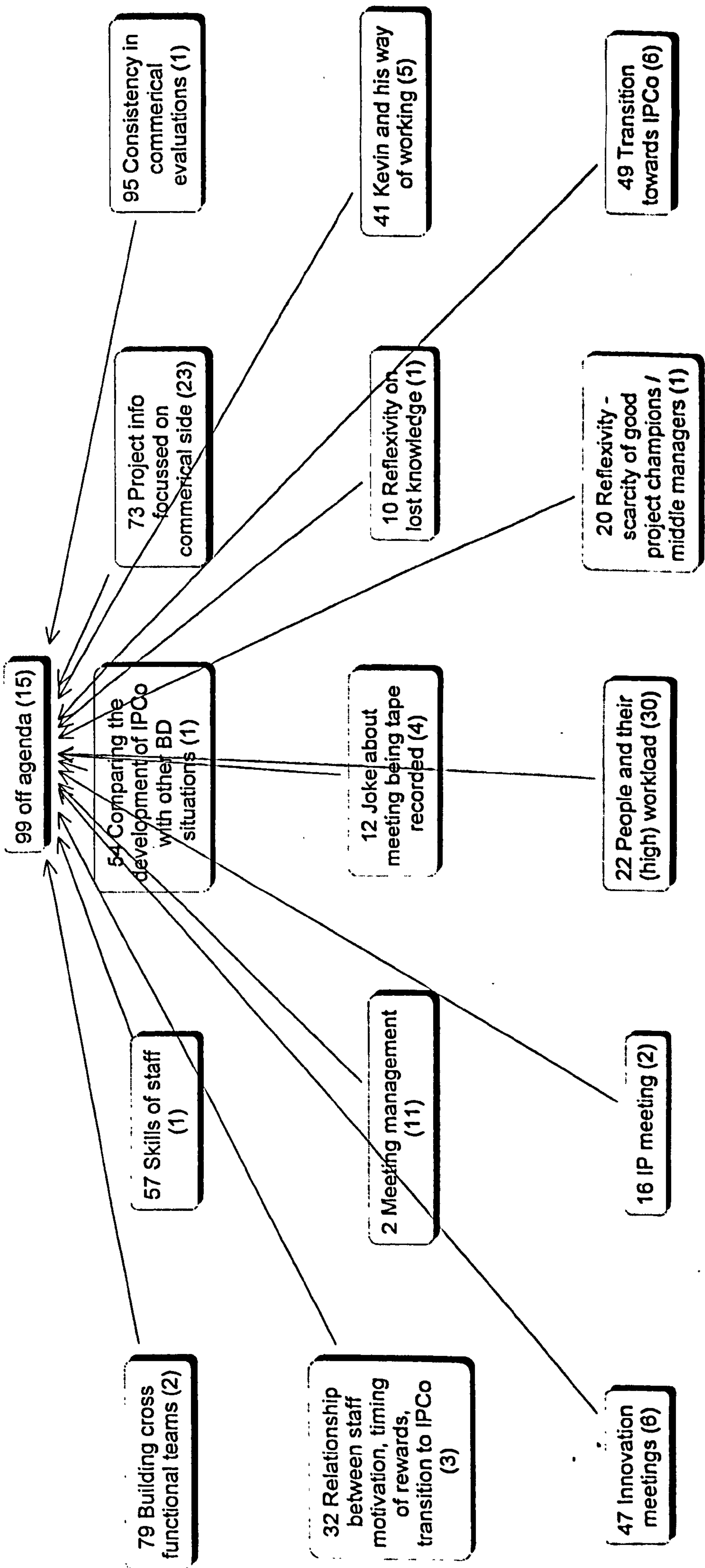


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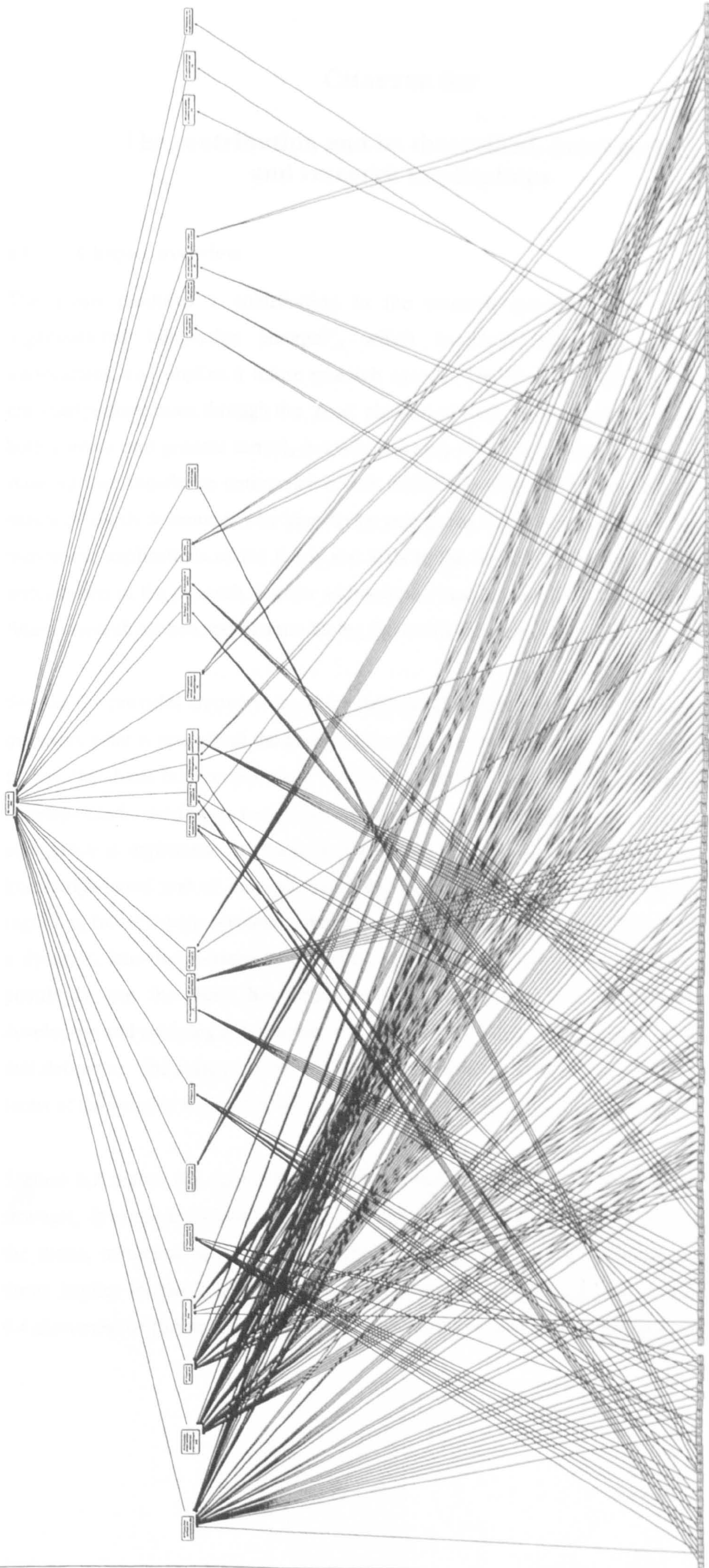
chat 59.1 high order workshop  
Internal







Chat 5.9.2  
 high code  
 memplex  
 Off Agenda



## **CHAPTER SIX**

### **The contribution and its theoretical, managerial and research implications**

#### **6.0 Chapter overview**

The thesis produces a contribution to the research question 'how and why does organizational knowledge emerge?', which has both theoretical and managerial implications, and implies a future research agenda. The thesis not only seeks to describe knowledge emergence through the 'how' element of the research question (and succeeds in both content and process terms), but also answers the 'why' element of the question by showing that knowledge emergence occurs within a system that has certain attributes, the nature of which determines why knowledge emerges as it does. This chapter summarises the theoretical implications of the thesis and adds to the thesis by introducing the managerial implications of the research. Further additions are made in terms of discussing the potential future research agenda and by introducing the learning points.

Section 6.1 provides an overview of the theoretical contribution which the thesis makes. It discusses what is new about the knowledge which the thesis creates whilst highlighting the factors that limit that contribution. Secondly, how the unit of analysis which the thesis develops can be used to create descriptions and explanations of different cases of knowledge emergence is explained. Emphasis is placed on the empirical justification of a dynamic knowledge-based unit of analysis which arguably fulfils the criteria set by Porter (1991) regarding future theory development within strategy and by Spender (1996) in his outline of a dynamic, knowledge-based theory of the firm. Limitations are discussed including the possibility that the thesis has either made a contribution to evolutionary theory, by developing and applying a definition of evolution that is knowledge-based, or is limited by that definition. The systemic view of organizational life that the unit creates is discussed in terms of the insights it provides into what it means to manage knowledge emergence.

Section 6.2 places the contribution the thesis makes within the context of developing a strategic, dynamic knowledge-based theory of the firm. Given that the theory used within the thesis, memetics, is a branch of evolutionary theory, section 6.3 discusses what the thesis implies for the future development of evolutionary organizational research. Section 6.4 discusses the future research agenda for memetics within organizational life in terms of



making the contribution more robust, both methodologically and theoretically, and in terms of extending the contribution. The managerial implications and usefulness of the memetic perspective are discussed within section 6.5. Section 6.6 discusses the lessons learnt and section 6.7 concludes the thesis by providing a summary of it.

## **6.1 The contribution**

The thesis is exploratory in a two ways. Firstly, it employs an under-developed and new branch (memetics) of a historically difficult-to-accept theory (evolutionary theory). Secondly, it applies that theory to an empirical setting that is very testing of the theory as it assumes managerial control whereas memetics denies human agency.

The contribution is three fold. Firstly, in answering the 'how' part of the research question the thesis develops a knowledge-based unit of analysis and shows how this unit of analysis can describe knowledge emergence in terms of both content and process. Working with this unit of analysis, the meme, allows longitudinal process research to be conducted. Different cases of knowledge emergence can be compared and contrasted in terms of how much breadth of variety is within the conversation and how much depth in terms of how often that content is repeated. Secondly, the thesis answers the 'why' part of the research question by showing how meme dynamics form knowledge systems which are subject to directional forces. The thesis identifies these forces and characterises them, creating in turn an approach to explaining why knowledge emerges as it does. At this point judgement on the roles of human and memetic determinism are suspended. Thirdly, having identified what makes the system go in one direction or another, the thesis shows that these forces are more or less controllable and therefore more or less manageable. The contribution is limited as it is a new perspective that remains to be tested in other settings and cases, because it does not include other relevant branches of evolutionary theory, in particular genetics, and because it is a perspective on knowledge creation that has yet to be compared with others.

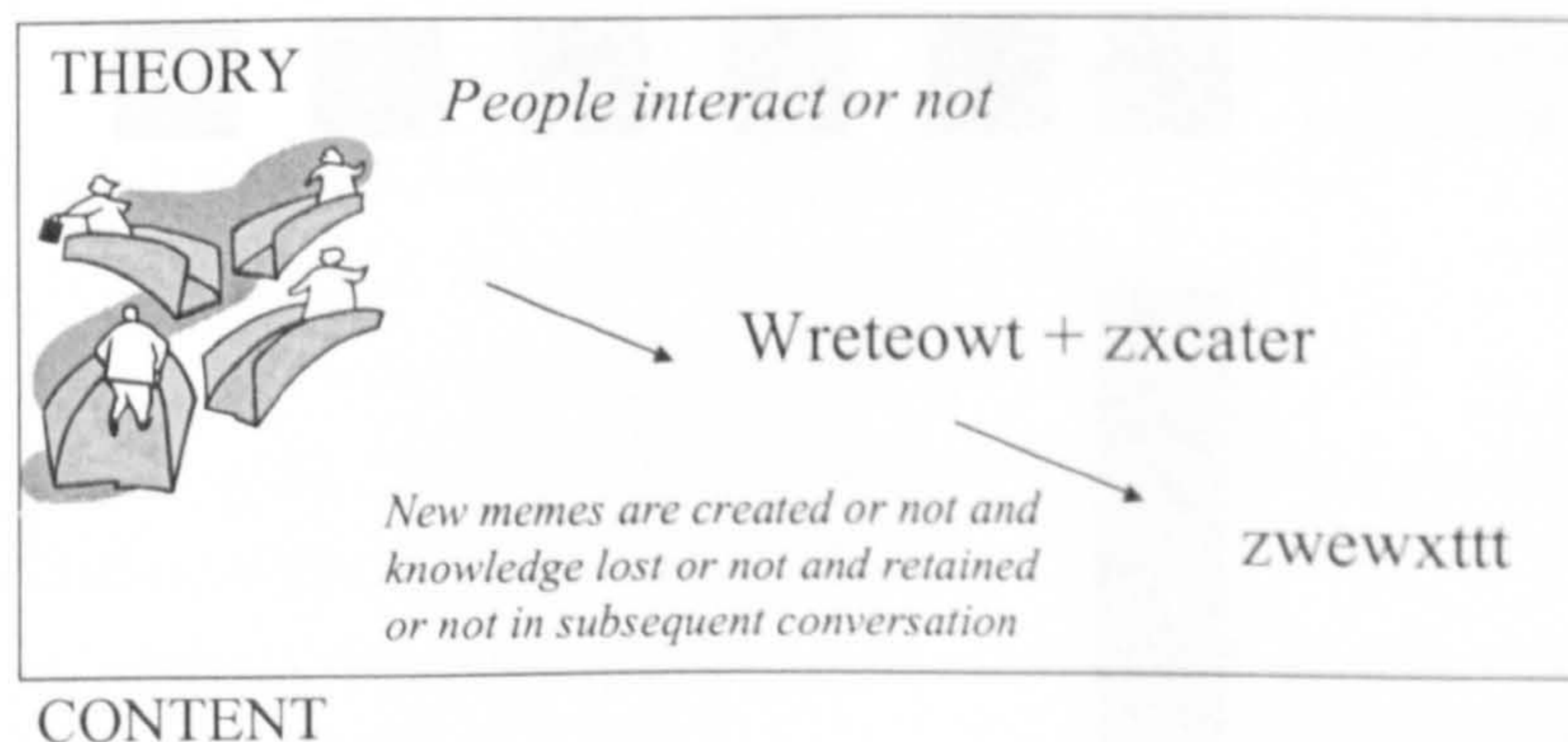
Firstly, as regards the 'how' of knowledge emergence, the content of this knowledge-based unit can be seen to change over time as the knowledge within it changes. Those people that voice the same content can be said to form communities of practice or interest. At a high level the dynamic of these communities can be traced as changes in knowledge content alter the membership of the communities, create new ones and cause others to cease to exist. The dynamics of the process, by which content emerges, are characterised in terms of categories

of knowledge emergence. These categories describe the process underlying the emergence of knowledge in terms of how much new variety is added at each and every social interaction. They reflect the rate of change at each step of knowledge emergence.

Diagram 6.1 graphically shows how, using the theoretical concept of imperfect copy-fidelity during social interaction, the amount of variation in content (produced over time during a knowledge exchange) is determined. The 'fingerprints' can, *in extremis*, contain a lot of variety but little depth in terms of numbers of times the meme is exchanged **or** little variety but much depth in that a smaller amount of that knowledge is frequently exchanged.

In the this diagram it is shown how in meeting or not people may or may not exchange memes (wreteowt or zxcater) which contain meaning to product new variation in the form of another meme, in this case a combination (zwewxtt). Over time if much newness is created a greater or lesser amount of variety is created. Equally this variety may be repeated over and over in the conversation and dominate it or be mentioned only once. These two scenarios create the two possible extremes in distribution shown in the latter part of the diagram.

DIAGRAM 6.0 – The 'how' of knowledge emergence- content element



*Over time this creates a certain amount and depth of variety within a discourse*

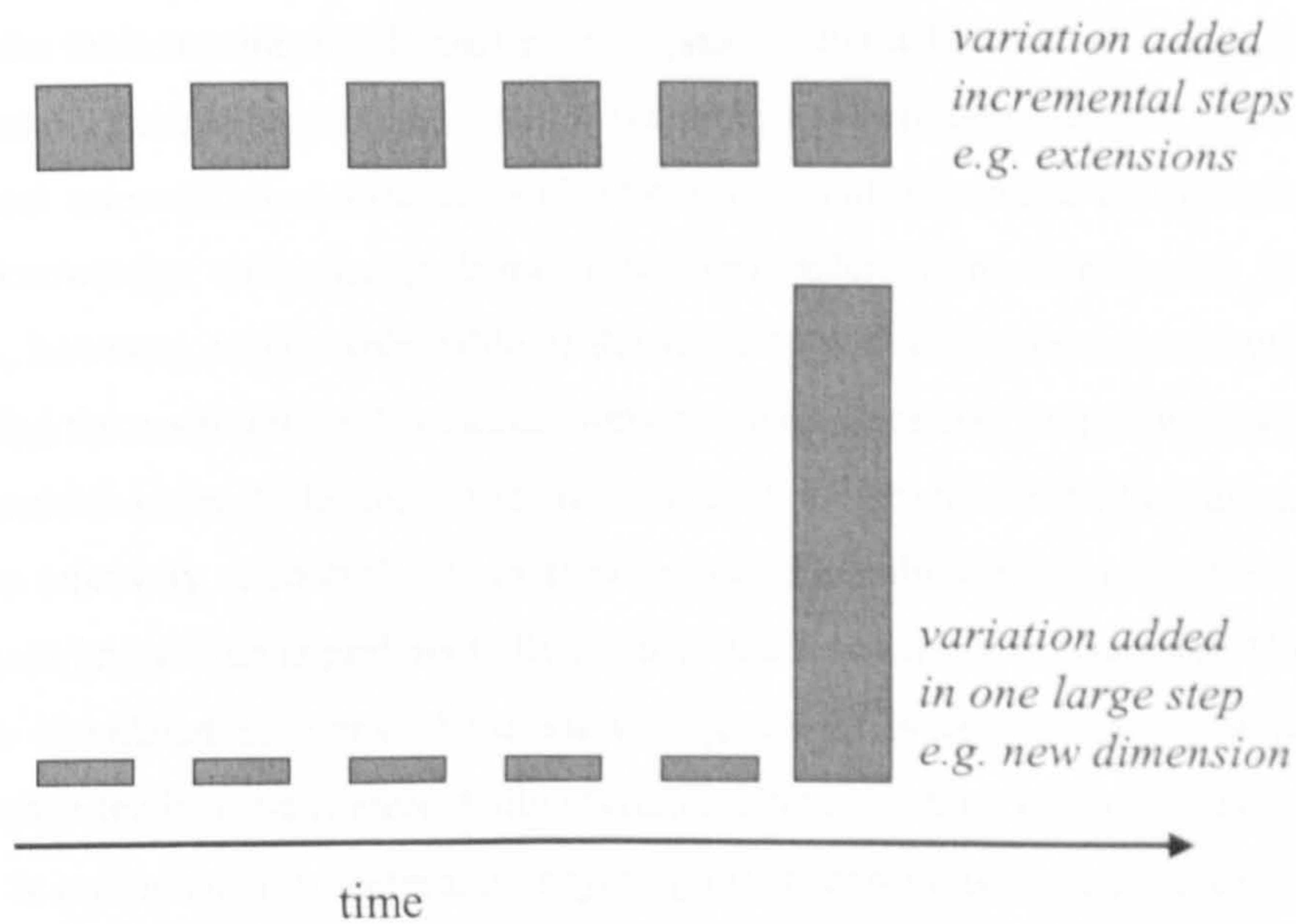


Diagram 6.2 shows how the replicationgrams which represent the process element of variation production are created by analysing for each interaction in a series of interactions, whether the variation is added incrementally or in large amounts interspersed with near perfect or perfect copying. This analysis uses the concept that evolution does not occur at the same rate of change but is typified by differences in the speed at which variety is produced. Indeed evolutionary theory explains those differences in speeds according to the differences in selection pressures that cause or not variety to be retained. Just however as variety production in genetics cannot be predicted or explained as it is blind, it is impossible to say why at that stage (social interaction) more variety or less variety was produced or that a mis-interpretation happened rather than an emphasis, for example.

As before, the diagram shows the two possible extremes of the same amount of variation in content being produced in on many jumps each of which add a small amount of variation or one large jump in one social interaction.

DIAGRAM 6.1 – The ‘how’ of knowledge emergence- process element

PROCESS



The thesis takes a number of these interactions played out in different settings and characterises them for depth (how often they are exchanged) and breadth of variety (how much new knowledge is added), together describing content and the process by which

content is produced (numbers of each type of copy-fidelity). This produces a method and way in which knowledge emergence in different settings can be compared.

Secondly, the thesis then uses the different cases and the differences and similarities between them to generate system attributes that are common to all cases but their exact nature of which and their interactivity of which varies per case, explaining the differences and similarities. This constitutes the 'why' part of the analysis. Four 'system' attributes are discovered. The four attributes of the system, namely community interactivity, retention dynamics, rules of knowledge emergence and reflexivity moderate the nature of the social interaction.

In essence, the 'fingerprints' of knowledge emergence created for each case are unique, as the name, also used in genetics, suggests. Comparing organizational fingerprints allows the dynamics of knowledge emergence in each case to be elucidated. Knowing the dynamics of knowledge emergence explains why that knowledge is being produced in the present and recent past, and what would have to change for knowledge of a different type (more varied or less varied) to be produced in the future (see managerial implications section for details).

Community interactivity (who interacts with whom and what emerges as a result) is seen as being the most uncontrollable part of the system. This is because it is impossible to know every social interaction that results in a knowledge system being what it is, as theoretically all social interactions contribute to all knowledge and because it is impossible to predict what knowledge will emerge from each social interaction. Community interactivity is shown, however, to be explainable at the level of collectives in that knowledge systems, including the cases within this thesis, contain one or more evolving communities. The more communities interact, the more variety is created. Differential retention dynamics are also seen as relatively uncontrollable as they are deeply embedded in past social interactions. The more knowledge is preferentially retained the less variety is produced. These dynamics can be elucidated in terms of the knowledge which is not retained and which type of knowledge tends to be preferentially retained. However, they cannot be fully explained in that it is not practical to determine anything other than these extreme cases of differential retention. In contrast, it is easy to find evidence of rules of knowledge emergence and they appear to be intentionally created and more controllable. According to their nature these rules can either increase emergent variety production (Internet cases) or decrease emergent variety production (organizational cases). Reflexivity, thinking about past dynamics and

taking action to use that information to alter future dynamics, appears to be an action which managers can choose to take, although it is obviously impractical to reflect on every social interaction and its dynamics. All analysed cases of knowledge emergence bar one, exhibit insufficiently high levels of reflexivity to influence knowledge emergence to any significant extent and none contain evidence of all of the theoretically possible types of reflexivity.

The empirical data allows this framework of how to analyse and characterise diverse knowledge systems. The analysis provides insights into the dynamics of knowledge emergence within and between two settings and three cases within each of these settings. Summaries of the cases are given below to illustrate how the framework of 'how' (content and process) and 'why' (system attributes, their nature and interaction) knowledge emerges can be applied.

In the Internet setting, the nature of knowledge emergence is similar across the cases, in that a great deal of knowledge variety is created in all cases as shown by the histograms and replicationgrams. The nature and interaction of the system attributes explain this situation. The chat rooms remain largely open systems (relative to the organizational setting) as the Internet enables extensive social interaction and because the system possesses rules of knowledge emergence that promote variety. These differences in knowledge emergence between the cases are explained by each case exhibiting different retention dynamics altering whether or not the knowledge system becomes less open over time, whether the system exists as one community of interest or several, whether these communities overlap and/or whether new communities are created. Reflexivity is present in this Internet setting. Indeed, it is very prevalent within one case, gun policy, in the form of reflexivity regarding the preservation of the rules of knowledge emergence. In another case (religious case) it is present in the form of individuals allowing knowledge to enter their minds without thinking too much but then, upon reflection, considering the knowledge as undesirable. In the former case, reflexivity serves to maintain the openness of the system, in the latter the reflexivity is directed at reducing the chances of certain memes being retained and is insufficiently prevalent to make a substantial difference.

Contrastingly, in the organizational setting, the nature of knowledge emergence is such that much less variety of content is produced in the organizational setting, as shown in the dendrograms and histograms. The categories of emergence in the organizational setting are above all 'emphasis' whereas the categories of emergence in the Internet setting include

more categories of emergence that add variation. The differences and similarities in breadth and depth of variety are explained by the nature of the same system attributes as developed in the Internet case and how they interact in each case. In all organizational cases the systems are very closed, not only because they involve bounded meetings at which a limited and fixed number of people can contribute to knowledge emergence, but also because there is little consideration of the views of others outside the closed system. This situation reduces variety. Unlike the Internet setting, retention dynamics are very similar across all cases. In particular, consistently the same memes are not retained. These are strategic memes and include, for example, memes about projects close to commercialisation and memes about middle managers lacking strategic skills. This means that the type of knowledge is more similar between the organizational cases in comparison with the Internet cases where the retention dynamics are different between the cases making the differences between the Internet cases greater. In contrast to the Internet setting, rules of emergence reduce variety in contrast to the Internet setting where they promote the addition of variety to the knowledge pool. There is less reflexivity in the organizational setting than in the Internet setting. When reflexivity does occur it is about the same strategic memes which are not retained. Reflexive memes are also not retained and so reflexivity has little effect on knowledge emergence. Reflexivity does affect knowledge emergence in the Internet setting.

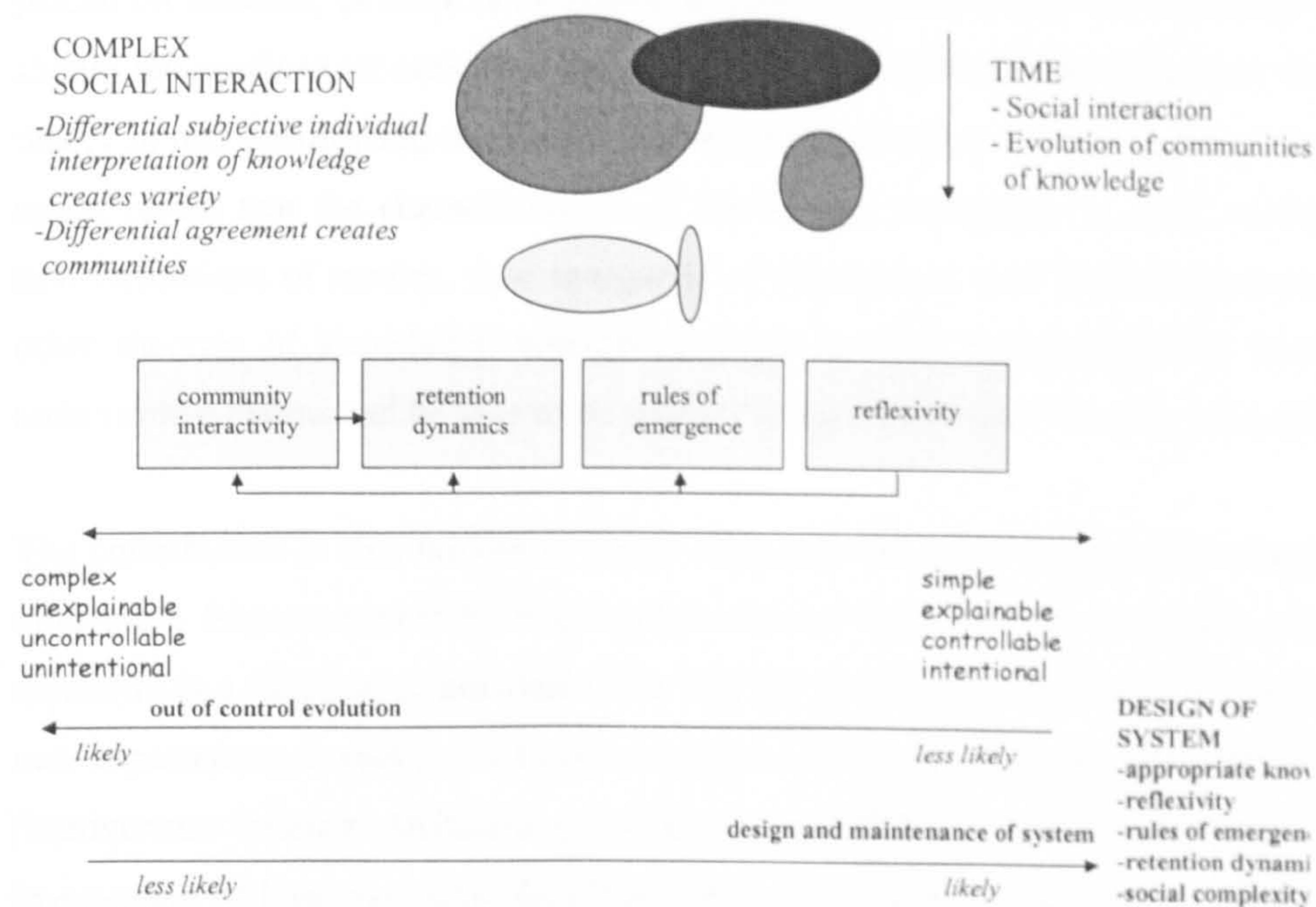
Thirdly, as regards memetic and human agency, the empirical evidence suggests that systems can be designed *a priori* to create a certain type of knowledge as deemed appropriate by an organization. (Note that this process can be negatively and positively affected by existing system attributes.) Knowledge systems can be most easily designed by defining rules of knowledge emergence and by institutionalising reflexivity within the organization and, to a lesser extent, designed in terms of influencing differential retention dynamics and community interactivity. As the system is not perfectly controllable in time it will not reflect the intention to produce knowledge of a certain type and/or not reflect what is appropriate. Managers then need to analyse how the system dynamics are producing a type of less desirable knowledge through reflexivity, and take appropriate action.

Neither memetic determinism nor human determinism is shown to be in control. Humans can be intentional by setting up rules for future knowledge emergence towards a certain goal and can be reflexive allowing for adjustments to be made about future knowledge emergence on the basis of past dynamics. However in time those rules might not be adhered to and might need to change as the broader system around those rules change. Equally being

reflexive at each stage of knowledge emergence and hence each social interaction is not possible. Humans may exhibit freewill and interact with certain people but will often interact in an unplanned fashion, when they interact what emerges is unplanned and the stock of memes inside their head which they have had only partial control over will alter what they let into their heads in the future.

Diagram 6.3 summarises the how and why in that it looks at the dynamics of knowledge emergence. As social interaction occurs over time periods during which multiple social exchanges take place the knowledge base changes. As the knowledge base changes the people associated with harbouring and expressing that knowledge change altering the communities of practice present in the system. Some grow larger and more and more people express the same knowledge, others are created as new variety is expressed and shared, others die as the discourse moves on. Communities therefore dissolve and are born through social interaction as a function of the differential and subjective interpretation of knowledge and shared differential agreement that creates the knowledge-based communities.

DIAGRAM 6.2 The dynamics (how and why) of the emergence of knowledge



Specifically, the diagram shows that social interaction and exchange of memes creates communities that share the same knowledge (circles). These communities (and circles) may overlap to some degree in the knowledge they share as they begin to exchange memes. They may be distinct and not exchange memes and therefore not overlap. As time goes on the

membership of the communities that share knowledge may become distinct again, others may disappear, as they lose all members because the meme is no longer exchanged. What happens and when is thought to be modified by the four system attributes. Community interactivity and retention dynamics are linked by an arrow, as they are both connected to each other in terms of how open or closed the systems are. Reflexivity is linked to the other attributes using a backwards arrow as this attribute involves reflecting on the effect of the other attributes on the direction of knowledge emergence. The control arrows indicate how human agency is a decreasing or increasing component of the system attributes as one moves from right to left and left to right.

Having summarised the contribution the remainder of the section details the limitations of the thesis both in terms of what it does not include and the assumptions it makes.

The audacious claim this thesis makes, namely that an approach to describing and explaining knowledge emergence and how to manage knowledge has been developed, needs to be put in the context of the limitations of the thesis. The contribution is not limited in terms of the traditional conditions of who, where and when (Whetten, 1989), normally placed on theories, as there is no reason to think that this theory of knowledge emergence should not apply to all contexts. That said, empirical evidence has only been found for the theory in two settings and the theory has only been developed in two settings. Further work might reveal that the characterisation of knowledge emergence in other settings requires new definitions of memes, new categories of emergence, new system attributes. Equally, other theories of knowledge emergence might provide more insightful findings, more authoritative claims and be able to be applied using a more user-friendly methodology!

The contribution is also limited in that it does not take into consideration other sources of innovation. Simonton's (1999) book on Darwinian Perspectives on Creativity points out that creativity is a function of personal traits that are probably genetic and include openness to new experiences, breadth of interests, cognitive flexibility, independence and extroversion/introversion balance. Different personalities probably do affect knowledge emergence, irrespective of how over time they have been moderated by exposure to different memes, which is why presumably psychology tests are successfully used in selection processes.

There is one last limitation, which is potentially by far the biggest limitation, but can be seen (and is seen by the researcher) as a contribution. This is the definition of evolution



created by reviewing evolutionary theory from cosmology to geology to genetics to immunology to memetics and defining the common denominator of these branches of the theory as knowledge. The contribution lies in integrating and consolidating the various common aspects of evolutionary theory and to some extent that of similar theories. In particular, the thesis states that evolution in whatever branch of theory and form must be defined as the differential prevalence over time of knowledge, whether that knowledge is genetic or consists of cosmological laws. Furthermore, the contribution lies in stating that knowledge is never absolute but is only true for as long as it holds the system in balance. This leads to the notion that the creation of uncontrollable variety is a process in every sustainable sub-system. The point being that evolutionary systems, as in complexity theory, are more complex than man's ability to understand or control them, but not too complex to understand in terms of fundamental principles allowing the direction of evolution to be somewhat directed (see MacIntosh and MacClean, 2001 for an example of such logic within complexity theory). The broad definition of evolution used in the thesis is therefore a combination of a number of alternative theories, namely evolutionary theory in the sense of variety and selection being knowledge based within all areas of the universe and beyond, complexity theory in the sense of emergence and patterns and autopoiesis and the Gaia hypothesis in the sense of self-perpetuation and dynamic balance. This 'contribution' is potentially controversial in two ways. Firstly it suggests that evolutionary theory might be a theory of everything. Secondly the theory suggests it might lead to the letting go of some well established tenets. For example,

*Most physicists would be happier if the whole problem went away.  
It will not be easy for them to surrender the beloved constants of nature.*

(The Economist, April 6<sup>th</sup> 2002:84)

Another tenet might be the difficulty with which we can accept that so much of social, as well as, physical existence is beyond our perfect control, as has been proven in genetics and which memetics also suggests is the case for social evolution. The limitation therefore lies in the degree of agreement with, and acceptance of, the broad definition of evolutionary theory used in the thesis and its implications for social evolution.

Last, but not least, there is the major assumption that the thesis makes regarding the relationship between variety of knowledge content and organizational performance over

time and in times when the speed of change can alter. To make the connection between knowledge emergence dynamics and organizational performance the comparison needs to incorporate a number of assumptions. The first is the more the organization relies on innovation, the more variety in knowledge content it needs to produce. Secondly, the assumption that this variety is created through the overlapping of communities that results in novel recombinations of knowledge needs to be made. Furthermore, the assumption needs to be made that the commercialisation of the knowledge relies on knowledge becoming more and more popular with a sufficient number of each of the crucial stakeholders to become economically viable. Lastly, the assumption needs to be made that effective management requires being acutely aware of how systemic dynamics affect the two sides of knowledge emergence, namely content and prevalence.

Despite these limitations of authority, scope and as yet unproven relationship between variety and performance, the contribution has implications on strategic management and evolutionary organizational research. In terms of strategy, the contribution starts to develop a knowledge-based dynamic theory of the firm, by being able to compare knowledge emergence in different organizations. In terms of evolutionary research, as a new approach to conducting evolutionary organizational research the contribution needs to be situated within that field. The following section places the contribution within the context of strategy literature whereas the section thereafter places the contribution within the context of evolutionary research.

## **6.2 The contribution placed in the context of the strategy literature**

Chapter Two reveals that eminent strategy thinkers are moving the field towards dynamic theories. This section reviews the contribution the thesis makes to this trend. In summary the thesis develops a knowledge-based unit of analysis which is dynamic in that it can be traced longitudinally, has an exact nature that varies according to the systemic forces that act upon it and which is an entity that is not entirely within the control of the manager.

The empirical work shows how the creation of a memetic systems perspective from knowledge exchange (in this case discourse) combined with the analysis of the dynamics of that system, provides a way of relating micro-level organizational dynamics with macro-level performance. As such memetics, as developed in this thesis, meets Porter's (1991) requirements for a dynamic theory of the firm, as reported in Chapter Two, and repeated

below along with a commentary on how the memetics perspective addresses each requirement:

- An ability to address both exogenous and endogenous variables.

*Memetics is systemic and therefore makes little distinction between exogenous and endogenous variables allowing the organization to be seen as part of a broader system that it affects and is affected by, rather than as an entity that is separate from its external environment. The systemicity arises from the unit of analysis being a piece of knowledge that can be exchanged during social interaction by any stakeholder (organizational and non-organizational) and as such by communities that can, but might not include, any number of types of stakeholder and by the nature of knowledge emergence is shown to be determined by the attributes of the system.*

- A flexibility that allows for changes in those variables according to context.

*Memetics is based on deciphering the dynamics of the creation of context and thus is about determining what are the variables of specific contexts. Context in memetics is defined as the amount and nature of knowledge produced over a certain time period, the dynamics of the process by which that added variety is created and the attributes of the system that create that knowledge rather than any other.*

- The openness to accommodate not only well-defined options but also creative strategies

*Memetics follows the emergence of all knowledge whether intended or creative (read emergent); for memetics intentionality lies in the survival of knowledge according to the system dynamics irrespective of the nature of the creation of that knowledge (intentional or emergent)*

- Consideration of how firms upgrade their competitive advantage over time through increased complexity, sophistication and innovation.

*In looking at the systemic dynamics of knowledge turnover, memetics looks at what directly adds organizational value. It can decipher how the organization affects what knowledge is produced and how popular it becomes and how over time the knowledge that is produced may become less appropriate or desirable*

In developing a knowledge-based unit of selection, the thesis moves away from single level perspectives. The meme can be looked at as an entity, as something harboured alongside others in a single mind and as harboured in communities that share and discuss the same knowledge. It defines knowledge in terms of processes that make more or less knowledge (breadth of variety) meaningful to more or less people (depth of knowledge). To quote Spender:

*'To know is to take part in a process that makes knowledge meaningful'.*

(Spender, 1996:59)

It looks as the forces that affect whether the knowledge-based entity changes in content over time and changes in terms of whether it remains part of organizational discourse. Once again to quote Spender (1996):

*'The result is a very different mode of theorising, less of an objective statement about the nature of firms 'out there' than a tool to help managers discover their place in the firm as a dynamic knowledge-based activity system.'*

(Spender, 1996:45)

It can be argued that the thesis generates such a tool by identifying the forces that operate on knowledge emergence and by showing how the exact nature of these forces differs in different circumstances and how these differences contribute to differences in knowledge emergence as well as suggesting how knowledge emergence might be related to organizational performance.

### **6.3 The contribution placed in the context of evolutionary research**

The thesis empirically explores and develops memetics as a branch of evolutionary theory and brings a knowledge perspective to organizational evolutionary research. It justifies the knowledge-based perspective in terms of there needing to be a common denominator to evolution if the phenomena is said, not only to explain physical organic evolution, but also to be able to explain other sub-systems of the world in which we live. The only common substrate on which evolution can work is knowledge. As regards memetics it makes a contribution in the areas of identifying memes, identifying variation, selection and, to a lesser extent, retention mechanisms. The nature of agency is the most important insight the application of evolutionary theory can bring. The thesis empirically explores the notion of human agency in a way that recognises man has the ability to reflect and understand the world around him but that equally appears not to be able to control that world. Specifically the thesis identifies system attributes that are more and less controllable by man. It does not deny intentionality in the sense of thinking one is being goal directed or in behaving in a reflexive manner. It challenges whether these modes of thought are not as intentional as they are thought to be in that they are a function of memes that have entered the mind in the past, at least on some occasions without thinking, and because what you intend to happen is not dependent on you but on larger system dynamics which you cannot control. Lastly, the thesis makes the case for a greater level of integration between evolutionary theory development and organizational evolutionary theory development. These are new insights within organizational evolutionary research.

Unlike in organizational evolutionary research, the knowledge-based meme allows mechanisms of variation-selection and retention to be clearly stated. Variation is a result of the differential interpretation of meaning as knowledge is exchanged. Selection occurs as the result of past exposure to other memes and the attractiveness of current meme 'strategies' making certain memes more attractive than others. Retention occurs if the meme is continually exchanged within the subsequent knowledge exchange and hence remains in the collective knowledge pool. What is not considered in this thesis is retention (and duration of retention) in individual minds beyond continuing to exchange that knowledge in the conversation under study. Agency is explored, firstly in terms of determining what drives the system man operates within and then, secondly deciphering what control she has over the nature of these attributes in terms of how they affect the nature of knowledge emergence in the future.

The development of a stance with regards to evolution in social life is defended in terms of the whole field of evolutionary theory (which is broad and not without controversy) brings organizational evolutionary research closer to the broader field of evolutionary theory. The application of memetics to organizational life does not require metaphors as the tradition of evolutionary organizational research involves, either implicitly (Nelson and Winter, 1982) or less implicitly (Lovas and Ghoshal, 2001). Memes are said to literally compete and be selectable just as genes are said to do the same.

#### **6.4 Future research agenda**

The future research agenda has two components, the first of which will substantiate the contribution whereas the second will extend it to a new domain. Firstly, it is very necessary to apply the theory more extensively to develop both the theory and its associated methodology into a far more authoritative approach. In particular, the nature of knowledge emergence in different settings needs to be investigated. Inert and highly innovative organizations could be compared, as could different industries, knowledge emergence (enabled or not by varying Information and Communication Technologies {ICT}) and knowledge emergence in different national and organizational cultures could be investigated. Alongside this greater exposure of the theory to diverse empirical settings, the methodology needs to be made more robust through the successive creation of code-books (Neuendorf, 2002) that would standardise the identification of memes, their clustering and their classification into categories of emergence.

Specifically, there is the opportunity to work with a pharmaceutical company that has set up an ideas database within a commercially important but tough division, which makes data collection over a long period more viable. In this context specific ideas can be followed as the database has been set up to collate information about the community of practice / interest as it evolves and about information on the content of the idea as it evolves.

There is also an opportunity to link the micro-level dynamics discovered here with the macro-level assumption for organizational advantage to be sustainable variety production needs to be aligned with that of the broader system within which the organization competes. This advance could be in the form of adding the system attributes to a computer model of organizational variation production and fitness and subjecting the model to empirical study

knowing that it represents reality. Ethiraj and Singh (2002) have such a model whereby they are able to simulate what happens to organizational fitness in relation to internal versus external variety production and a future research agenda which already points in this direction. Furthermore there is a recognised need for such micro-macro work (Johnson, Melin and Whittington, forthcoming in 2003) in terms of advancing theory and aiding practice. The relationship between speed of knowledge emergence and depth of knowledge emergence and organizational performance needs to be established in terms of testing that the assumption that variation production inside an organization must match that of the system in which it operates. Ethiraj and Singh (2002) use a computer model to simulate how organizations in periods of change must adapt to that change. They recognise that their model needs to be developed in two ways. Firstly, links with complexity and ways of managing variety need to be added in order to model the management aspect. Secondly, the hypotheses regarding what organizations need to do in varying environments that have emerged from the simulation need to be empirically tested in organizations.

Secondly, and with policy-making as well as managers in mind, the work could be extended to include knowledge emergence beyond a single organization and hence incorporate industry and organizational clusters. Memetics would allow for the emergence of knowledge to be traced as it evolves in parallel and in sequence across groups of organizations. This research would aim at integrating the disciplines of economic geography and strategy. Economic geographers know that geography matters but that economic growth is not governed by geographical determinism and that companies remote from clusters can survive (Vernon-Henderson, Shalizi and Venables, 2001). With the advent of ICT there is the additional complexity of an organization being geographically remote but virtually next-door. To take a knowledge-based perspective on clusters to examine evolution within clusters would help further research in this topical area that is the focus of many national knowledge economy policies.

Specifically such clusters are a component of regional economic policy in the South East of the England and in Scotland. The regional development agencies in these areas are aware that to some extent these clusters work. They do not know how they work in the sense of how the evolution of knowledge helps and hinders single companies and clusters, whether certain industries such as high tech (e.g. opto-electronics and biotechnology) and low tech (e.g. forestry and tourism) benefit more or less from being clustered and whether the clusters need or need not to be geographically close or whether ICT can counter geographical

distances. The research agenda would investigate these facets of the relationships between cluster types and single organization and cluster level performance and would also compare different styles of cluster management between the South East and Scotland. There is also the possibility of making the work international and working with clusters in Malaysia and Mexico, both countries for which clusters make up a significant part of national economic policy.

## **6.5 Managerial implications**

On the basis of this thesis a series of questions need to be asked about a knowledge system in order to understand it. These questions help to describe, explain and better manage the knowledge system. Specifically, as regards describing the system, the following questions need to be asked:

- What knowledge is being created?
- How much knowledge variety is being created?
- How popular or not is each piece of knowledge?
- What are the process dynamics of knowledge emergence? For example, is the difference in knowledge content being created incrementally or through infrequent large jumps interspersed with very little introduction of variety?

Equally, not only can the emergence of knowledge be described by adopting a memetic perspective, but it can also be explained in terms of the four attributes of knowledge systems of which the thesis found supportive empirical evidence. Questions which need to be asked for knowledge emergence to be explained, include:

- How closed or open is the system? How many communities lie within the system, how likely it is they will interact, how are they interacting and how is this affecting the emergence of new knowledge?



- What are the rules of knowledge emergence and how are they affecting knowledge emergence?
- What type of differential retention is present within the system and how is this affecting knowledge emergence?
- What amount and type of reflexivity is present within the system and how is this affecting knowledge emergence?
- What are the relative strengths of these forces?
- How do these forces interact?

As regards the management of the system, the following questions need to be asked:

- Is the intended knowledge still appropriate given possible changes in the strategic intent and in the broader system in which the organization sits, including competitors and potential competitors that for spurious reasons now possess the same knowledge?
- If there is a difference between intended knowledge and emergent knowledge, and if so why?
- What do system dynamics need, and realistically, whether they can be reinforced, repositioned, altered or transformed to reduce the difference?
- In what ways might reflexivity be practically increased or altered in order to reduce the chances of a difference between intended and emergent knowledge occurring in the future?

By asking these questions a manager is able to generate a memetic perspective of organizational knowledge emergence dynamics within his or her organization. This creates an understanding of the differences between intended and emergent knowledge, allowing the re-evaluation of what 'appropriate' knowledge is subsequently leading to attempts to influence the system dynamics accordingly. As regards managerial agency the thesis

suggests it is possible to intentionally create a knowledge system by encouraging appropriate community interactivity, creating appropriate rules of emergence and using reflexivity to adjust knowledge dynamics. As however the system is uncontrollable and the theory says it survives because it is so, over time it will evolve into a system which no longer produces the intended type and amount of knowledge. Furthermore, as the system sits within a bigger system which is also changing, the intended knowledge may no longer be appropriate, if indeed it ever was.

By becoming more aware of knowledge dynamics through reflexive action, managers can undertake the following:

- Compare the fastest level of knowledge emergence in the industry with the organizational level of knowledge emergence and take action to improve the speed of knowledge emergence where appropriate. Taking into account that this might be speeded up if a new entrant grossly perturbs the system such that the industrial boundaries are altered (Sampler, 1998) and knowledge emergence speeded up. Comparing rates of patenting is a way of so achieving within scientifically based companies and has been used in the pharmaceutical industry.
- Compare rates of knowledge emergence within different areas of the organization and decide whether they are appropriate. For example, in R&D, knowledge emergence is likely to need to be faster than many other areas of the business. Other areas that might need speeding up include areas which have, because of a change in strategic intent, become more crucial (e.g. the patent office in a company which becomes an Intellectual Property Company). Alternatively, certain areas of the business might need managing so that they do not evolve, for example after many changes in strategic intent a company might wish to ensure the intent does not change anymore as it would have the effect of jeopardising the ability of the company to deliver to a strategic intent.
- Identify sources of natural retention dynamics, either preferred or lack of retention, and assess their impact on organizational performance. Take action to reframe, encourage or discourage these sources of differential retention as appropriate for organizational performance. Natural retention dynamics can be very engrained and difficult to alter, especially in well established and institutionalised firms. Where

possible, attempts should be made to make adjustments so that the dynamics are productive rather than transform them. This is perhaps where normative transformation change programmes frequently do not work as they usually work against natural retention dynamics. For example, a company with a history of employing the nation's best scientists to secretively create high tech defence equipment found itself often financing green ecological projects which had very little chance of becoming commercial (data not presented in this thesis). Underlying this was a desire to produce 'good science' of which they could be openly proud of now that they no longer needed (for reasons that cannot be disclosed) to work within the secretive defence industry. Having discovered that retention dynamics of this firm involved preferentially retaining 'greenness and good science' and this was having a detrimental effect on organizational performance, efforts were made to reframe the level at which these dynamics worked. So greenness and good science were taken up to the level of strategic intent where they became more of a philosophy and ethos that united the firm and gave it an identity, rather than a decision criterion for bad investments in non-commercial 'green' projects.

- All areas of organizational knowledge emergence promote forms of social interaction which are likely to encourage the appropriate types of knowledge emergence and the appropriate amounts of prevalence in stakeholders at the appropriate times in the life cycle of development and commercialisation. Such involves tracking ideas on a database registering the type of new knowledge needed for that idea to grow at each point in its development, which social interaction needs to take place consequentially, determining how that interaction can take place and following up on the consequences (as the uncontrollability of the system does not mean that the idea will evolve in the way required). This type of approach is very relevant to New Product / Service/IP development where exactly what the knowledge needed is, by definition, not known.
- Consider how rules of emergence might be made more appropriate for the type of knowledge emergence being sought by the organization. Many organizations have very rigid rules which, even if knowledge evolves that might be of value, is discarded because it does not fit into current strategic intent. Evidence of bending of the rules at a middle management level within a firm should make senior

managers question whether the rules of knowledge emergence need to be changed. The bending or breaking of rules should be therefore encouraged if a reason can be provided as to why this should happen.

- Acknowledge that different speeds of knowledge emergence will be appropriate at different times within the history of an organization. For example, after a period of rapid changes in strategic intent, the organisation might need to freeze change for a while so the organization can adapt to the change. Or changes in strategic intent, for example towards being an Intellectual Property Company, might require the speed of knowledge emergence in the patent department to be speeded up, as was suggested in the Internal case within the organizational setting.
- Introduce change initiatives and align them with what is preferentially retained at a whole company level – i.e. what binds the company together as a community. See example above about retention dynamics.
- Ensure recruitment and selection is geared towards people with the right combination of memes for the organization. Recruitment frequently does psychology tests to ensure people are as introvert / extrovert etc. as desired. Teams often do such tests to ensure that they are balanced in terms of 'innovators' and 'completer finishers' for example. Perhaps, however, teams and organizations should also recruit and check for natural community interactivity and retention dynamics which are in keeping with their intentions.

It is suggested that improvements in performance in the case of the organization studied may be gained from:

- making strategic memes more attractive to ensure they are retained.
- looking at strategic change more in terms of knowledge creation than purely competencies as is now the case, especially as competencies are not discussed in terms of their relationship with knowledge emergence.
- looking at the speed of knowledge emergence in all areas of the organization and deciding whether it is appropriate (for example the case of the patent office is

mentioned in the internal case) and whether the stance is communicated well to the relevant staff.

It is highly likely that the nature of knowledge emergence in organizations varies widely. In turn this is likely to be, not only because performance varies tremendously, but also because there is no recipe for best practice or successful adaptation to the environment. If the assumptions above are correct, success is a function of whether the knowledge that emerges is appropriate for that industry and whether, if it is not, the system dynamics can be and are altered. Such 'naturally' successful dynamics are likely to be present in a number of circumstances. For example, new science-based companies can choose to employ staff who retain both technical and commercial memes, whereas already established companies that have employees that prefer technical knowledge might find it hard to transform those natural dynamics. Scientific Generics, an innovative IP company, for example, only recruits people who are attracted to making science commercial. Such natural retention of technical and commercial memes might also exist in industries in which innovation is institutionalised, for example the pharmaceutical industry, in which new employees change upon entering the industry even if naturally they do not retain both types of memes. Lastly, such natural dynamics may exist in companies that change the dominant business model of well-established industries e.g. the airline industry in terms of low cost airlines or the banking industry in terms of Internet banking and stockbroking. This area is discussed further in section 6.5 on managerial implications.

The assumption on which the above suggestions are made is that there is not one 'right' speed of knowledge emergence, nor is there any 'right' way of achieving that speed. As Spender (1996) explains the theory itself becomes a quasi-object. Instead, the organizational speed of knowledge emergence should suit the environment within which the organization exists and is best achieved by working with the unique dynamics operating within that context not transforming these dynamics.

## **6.6 Lessons learnt**

The first lesson is that such work is highly iterative to an extent that for this researcher, a natural scientist whose only philosophical reality prior to the PhD was normative and positivist, could never have been imagined. As such the thesis is not written as it took place. Much iteration took place between evolutionary theory and the organizational literature,

between memetics and the empirical data and between the data and organizational theory as the data made the researcher think about assumptions that could or could not be made. As one section of the thesis was written, implications ensued about other areas of the thesis that did not necessarily appear in a subsequent chapter. Equally writing the opening and concluding chapters that summarised the thesis, made the researcher realise that the remaining areas of the thesis lacked important insights and logic. Also surprise events took place. That evolutionary theory was a knowledge based theory and could be used to move towards a knowledge-based dynamic theory of the firm was not planned, it just so happened that these two lines of thought were being followed. Equally Internet chat rooms were chosen as a simple setting in which firstly explore the theory but turned out to be more complex than the organizational setting and a setting that did provide a theoretical and practically relevant contrast. This presentation is as full and logical account as is possible of an exploratory piece of research, which it is argued produced some interesting preliminary new insights into how and why organizational knowledge does emerge.

The second lesson is that working with qualitative data is extremely challenging as very few tried and tested methods exist for qualitative work, few exemplars exist and reducing, analysing and interpreting qualitative data is far more difficult than doing the same with quantitative data. Thirdly, but far from least, it was learnt that in conducting an exploratory thesis a very difficult route was travelled in comparison with using standard methods, established theories and well elucidated phenomenon of interest.

The need to be focussed and clear in what was being achieved versus unclear through trying to achieve too much is another lesson learnt. The iterative process can lead to embracing too much literature and feeling that your contribution is wider than it is causing you to be less clear about what your potential achievement.

## 6.7 Conclusion

This thesis is exploratory. It involves evolutionary theory which exists not only outside of organizational theory but also outside of the social sciences. It applies the branch of this broad theory that is relevant to everyday social life, memetics, to a special case of social life, namely organizational life. The theory is under-developed theoretically and empirically. Nevertheless this, a contribution is made that consists of the development of a knowledge-based unit of analysis which directly adds value to the organization, which transcends time and which is arguably what is differentially selected for or against as the future unfolds.

Empirically the thesis shows the emergence of organizational knowledge can be described in terms of the distribution of variety (breadth and depth) in knowledge content within organizational discourse and the nature of the process that results in the creation of that distribution in terms of speed of the introduction of variety. It also shows that knowledge emerges in a system characterised by the concepts of community interactivity, differential retention dynamics, rules of knowledge emergence and reflexivity. Most importantly the thesis has shown that it is not possible to perfectly control the system, in that man is more or less able to understand and explain these attributes, thereby making some more manageable than others.

The system attributes moderate the production of variety and depth of variety. Community interactivity, by which is meant the dynamics of communities forming, overlapping and disbanding, is related to variety in that new communities form when new variety is produced and new variety tends to be produced when communities overlap. Evidence is found for different community dynamics in different settings and cases. Differential retention dynamics is a concept that highlights that within discourse according to context certain knowledge is nearly always retained in further discourse, whereas other knowledge is never or rarely retained (as well as all degrees in between but for practical reasons these are not identified). Communities are distinguished by their retention dynamics. Retention dynamics are characterised by the type of knowledge that is favoured, for example scientific rational knowledge, subjective socially constructed knowledge, humour etc. If heavily biased towards retention of the same knowledge (as they were in the organizational case), retention dynamics tend to reduce breadth of variety and increase the depth of the knowledge because the discourse is dominated by that which is frequently retained. Evidence for rules of knowledge emergence is found. These rules direct the emergence of a certain type of knowledge as knowledge emerges. Evidence is found that shows how, over time, these complex systems alter in nature such that the knowledge that emerges is different from that is produced before. Evidence for reflexivity, seen as the ability to understand past knowledge dynamics and hence potentially intervene in future knowledge dynamics, is scarce but present in the data.

As regards intentionality, purposeful intervention can take the form of encouraging certain community dynamics over others, using retention dynamics for a certain purpose or attempting to alter them, changing the rules of knowledge emergence or reinforcing adherence to them and lastly increasing the frequency of reflexivity and/or increasing the

types of reflexivity in operation in the discourse. The data suggest that the uncontrollable nature of everyday social interaction means that the system will sooner or later move away from any goal laid out in terms of rules of knowledge emergence or inherent within any reflexive action. Reflexivity can then be used once again to alter the system dynamics to move the system back to an intended state. In none of the six cases is reflexivity evident and prevalent in all its possible forms. This fact suggests none of the cases are as managed as they could theoretically be. Being constantly reflexive at every step of social interaction is however not possible. According to the data, managing knowledge, in the sense of directing its emergence through the manipulation of these system attributes, is not an easy task.

The contribution, when placed within the context of current literature, suggests that the dynamics of knowledge emergence might help in the elucidation of sustainable differential advantage, if advantage is assumed to be related to producing depth and breadth of knowledge variety that matches the environment the organization is working within. Knowledge emergence dynamics are likely to be unique to the setting and discourse and are unique in the six cases investigated in this research but nonetheless more or less similar. The level, nature and underlying process of the emergence of organizational knowledge can help managers determine whether they are likely to produce sufficient variation of the type envisaged as being beneficial to organizational performance. These natural dynamics can be reframed, encouraged or discouraged as appropriate. Appropriate in this case means both being in line with the environment and using current dynamics as much as possible to improve performance, rather than attempting to change current dynamics which are difficult to control.

As regards the strategy literature, the thesis moves towards a knowledge-based dynamic theory of the firm as outlined by Spender (1996). It suggests the knowledge is held within structures (memeplexes or to use Spender's terms quasi-objects) where knowledge is related to other knowledge. It views the individual as an agent of how the environment shapes, over time, his or her rationality in terms of the memes he or she is most likely to be attracted to. It takes an approach that looks at the interaction between the components of the system; memes in people's heads that are exchanged (or not) when people interact (or not).

As regards organizational evolutionary research, the thesis introduces memetics to the field. By doing so it claims a relevant and theoretically robust evolutionary approach to organizational research is to adopt a knowledge-based perspective. Within this perspective



the thesis empirically identifies the details of the variation mechanisms (imperfect copy-fidelity of various types) and by showing that content is differentially selected, reveals how differential retention dynamics (akin to context dependent meme strategies) alter the breadth and depth of the variety of knowledge exchanged in discourse. The question of agency that is at the heart of any evolutionary perspective is empirically investigated. Evidence is found for rules of knowledge emergence which alter the amount of variation produced in future knowledge emergence. Evidence is also found to show how, over time; communities may interact in an unpredictable way, creating unexpected new variety and altering retention dynamics. Rules may not be adhered to causing knowledge to emerge in unpredictable and uncontrollable ways. Reflexivity may be more or less present and have more or less effect on future knowledge emergence. Thus, evidence is found for man's ability to analyse and understand these dynamics and use that understanding to alter future knowledge dynamics towards some goal. It is noted however that the uncontrollable nature of social interaction makes this a difficult task.

The limitations of the thesis lie in its inability to be certain that within memetics the best and most comprehensive way of describing and explaining organizational knowledge emergence has been found and in the lack of a genetics-based explanation of differences in the dynamics of organizational knowledge emergence. A limitation might also be considered by some as the broad and knowledge-base definition of evolution adopted within the thesis. This is arguably a theoretical contribution to the field and would, if adopted within organizational theory, redefine what could and should be accepted as organizational evolutionary research. Furthermore, the thesis provides only one perspective on knowledge emergence, in time superior perspectives may be developed. Lastly, the thesis does not analyse or account for the stock of knowledge in each mind at the beginning, during or after the discourse. It is argued that in the spirit of an 'organic' perspective this would not be appropriate in that it is not possible to account for all the memes in people's minds, let alone how the stock changes over time.

In terms of future research, the application of evolutionary memetics to organizational life holds promise. There is no reason to think that the perspective of knowledge emergence generated here could not be generated from any organizational knowledge exchange, either at the level of the whole organization, cluster of organizations or discourse within some smaller bounded element thereof. Much future research needs to take place if academics, policy makers and managers are to be convinced that the perspective of organizational

knowledge emergence created by the thesis is theoretically authoritative and practical. This can be achieved by showing that 'appropriate' knowledge emergence is related to organizational performance and that organizational performance can be enhanced through an improved understanding of knowledge emergence.

Overall the thesis reveals that organizational knowledge does evolve in that it changes over time to create new knowledge. It is the dynamic, ever changing aspect of knowledge, rather than knowledge as a stock, that is emphasised in the thesis. The choice to study knowledge as a dynamic rather than a static construct is made on the basis that the knowledge stock of any mind is impossible to record or know and anyway forever changing, making the dynamics of knowledge emergence a more practical and useful mode of thinking about knowledge. For managers the implication is that they should spend time understanding these dynamics.

# APPENDIX I

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# APPENDIX II

## SECOND CODING AND ANALYSIS

In this appendix, the samples of data from all three cases of each setting (Internet and organizational), which were given to the second coder, are listed. They are accompanied by the two sets of codings and the differences in coding in an analysed, commented upon and summarised fashion.

Firstly, the actual transcript of the source data divided in to either posts or talks and the researchers coding per talk/ post are provided.

Below this, the coding of the second coder is provided.

Below this again, comments, written by the researcher, are provided which discuss the differences.

Lastly, a table is provided that summarises the nature of the differences, in terms of type of difference, classifying the difference as either 'methodological' or 'coding' and registering whether the second coding should or should not result in a change in the original coding done by the researcher. By 'methodological' it is meant that the difference in coding could be avoided in the future through use of a coding book in which this potential error in coding would be highlighted and instructions given to avoid it being made. By 'coding' it is meant that, even with a coding book, this type of difference would be difficult to avoid and could only be resolved through a discussion between researcher and second coder or perhaps by using a third coder!

At the end of the document some comments from the second coder are provided

In the page that follows is a numerical summary of the second coding exercise.

Section 3.7, in Chapter Three, provides an overview of the analysis of this second coding exercise and comments upon it in terms of what it implies on the thesis as a whole.

<b>SUMMARY OF ANALYSIS</b>	
Number of memes	104
Number of categories of emergence	104
Total number of data points	208
Number of corrections identified post second coding as a % of the total number of data points	$10/208 = 5\%$
Number of coding issues	44
Number of methodological issues	21
Number of methodological / coding issues	34
Number of differences in coding as % of all potential differences	$(44+21+34)/208 = 48\%$
Number of methodological issues as a % of all differences (content +methodological +both)	$21/(44+21+34) = 21\%$
Number of coding issues as a % of all issues (content +methodological + both)	$44/(44+21+34) = 44\%$

<b>Type of difference</b>	<b>methodological or content</b>	<b>% of cases</b>
Coder using different definition of content	Methodological	$6/71=8$
Humour not coded as content by second coder	Methodological	$9/71=13$
Researcher working at higher level of abstraction	Both	$6/71=8$
Implicit meaning not coded as a meme by second coder	Both	$8/71=11$
Mis / lack of understanding of context	Both	$11/71=15$
Difference in category of emergence	Coding	$14/71=20$
Division of content (researcher and coder finding same number of memes but different memes)	Coding	$1/71=1$
Division of content (second coder finds more memes than researcher)	Coding	$7/71=10$
Division of content (second coder finds less memes than researcher)	Coding	$9/71=13$

## **INTERNET SETTING:**

### **MARS, RELIGION AND GUN POLICY CASES**

Please note that the posts were given in the order that they were replied to so that the second coder follows a line of conversation. The posts are therefore not necessarily sequentially ordered as this ordering represents the order of temporal posting that might and did involve replying to other posts.

#### Mars case

##### *Transcript*

##### *Mars Post 1*

Even worse than the dummies at Lockheed Martin are the reporters who report on it. I just found parts of the AP story that my local paper didn't carry at the Washington Times <http://www.washtimes.com/news/news3.html>

'Measure' of failure for Mars orbiter was human, NASA says

By Matthew Fordahl  
ASSOCIATED PRESS

...

The numbers were used in figuring the force of thruster firings used by the spacecraft to adjust its position. Because the two systems are so different -- there are 1.6 kilometers to a mile and 2.2 pounds in a kilogram -- the spacecraft got conflicting readings and instructions.

Even though he is specifically talking about the force of thruster firings, this reporter is too dumb to figure out that the relevant conversion factor is not 2.2 pounds in a kilogram but 4.45 newtons in a pound force.

That's even though the author specifically says (in the version in the Minot Daily News):

JPL said that its preliminary findings showed that Lockheed Martin Astronautics in Colorado submitted acceleration data in English units of pounds of force instead of the metric unit called newtons.

Why wasn't the conversion factor between pounds and newtons given at this point?

In fairness, note that this paragraph is probably a later version; the article in the Washington Times this paragraph is different:

JPL said that its preliminary findings showed that Lockheed submitted acceleration data in the English -- or avoirdupois -- system of measuring, which utilizes miles, yards, feet and inches as well as pounds and ounces instead of the metric system -- kilometers, meters, kilograms and gram.



Oh, yes, the old avoirdupois yard! Now not only do we have to worry if NASA figures are in nautical miles or statute miles, but we also have to check out the avoirdupois miles. No wonder it was all screwed up.

The article in my newspaper also includes a graphic which talks about "The 1,387-pound orbiter." I'll bet that neither the author nor 99 percent of the readers understands English units well enough to know that these pounds are different units from the pounds force used to measure thrust.

**RESEARCHER**

First-order Memplex	Emergence category
1.What reports said	New
2.Scientific journalism inaccurate / inadequate	New
3.Cause of failure conversion factors	New
4.Pounds and Newton and thrusts	New

**SECOND CODER**

First-order Memplex	Emergence category
Dummies at Lockheed Martin	New
Reporters are also dummies!	Extension
AP story in Washington Times	New
Mars orbiter 'measure' failure was human	New
Force of thruster firings measurement	Extension
Two systems (Imperial and metric) leading to conflicting readings	Extension
Relevant conversion factor	Extension
Acceleration data submitted by Lockheed in avoirdupois measuring system instead of metric	Extension
Pounds force used to measure thrust	Extension

Comments researcher - The second coder is tending here to work at a lower level of abstraction / higher level of detail than the researcher both in terms of the words used to describe the memplexes and the number of memes found in the data. The differences include that the researcher condenses the second coders memes of 'acceleration data submitted to Lockheed ....' and 'mars orbiter failure human ....' and 'dummies at Lockheed' into 'cause of failure conversions factors.' Equally, the second coders memes of 'force of thrusters .....' and 'pounds force used the measure thrust' are condensed in the researchers coding to 'pounds, newtons and thrust.' Also whereas the researcher gives a meme as 'scientific journalism inaccurate and unscientific' the second

coder talks of two memes 'reporters are also dummies' and 'AP story in Washington Times'. Researcher suggests no change in coding.

These differences show how memetic content can be difficult sometimes to cut up.

Nature of Difference	Methodological or coding problem	Correction needed
Division of content (second coder finds more than researcher)	Coding (1)	No
Researcher working at higher level of abstraction	Methodological (1)	No

*Mars Post 2*

(As far as reporters go, they are writing for a general audience, who are not familiar with mass vs weight anyway. Its fairly common for them to simplify things for the masses. But it makes it really frustrating for folks like us to read.)

**RESEARCHER**

First-order Memeplex	Emergence category
5.Scientific journalism as inaccurate / inadequate	Extension
6.Purpose of scientific journalism	New
7.Offensive derogatory humour / sarcasm	New

**SECOND CODER**

First-order Memeplex	Emergence category
Reporters simplify things for general audience.	Extension

Comments researcher - Here the first meme has been coded very similarly. The second meme the researcher has included is arguably too subtle involving implicit rather than explicit meaning. The last is a matter of whether humour should be coded for. This as Neuendorf states (2001) is notoriously difficult to code for. I would argue the humour meme should be kept in and the more subtle meme removed.

Nature of Difference	Methodological or coding problem	Correction needed
Implicit meaning not coded as memes by second coder	Both (2c) (2m)	Yes (1)
Humour not coded as content by second coder	Methodological (3)	No

I DELETED A COUPLE HERE AS I MADE A MISTAKE SORRY!

*Mars Post 5*

On the back of my HP11C calculator (fast approaching its 18th birthday, a fine piece of equipment) is the helpful info:

cm / 2.54 -> in

kg x 2.204622622 -> lbm

l / 3.785411784 -> gal

c x 1.8 -32 -> F

That's definitive enough for me :)

**RESEARCHER**

First-order Memeplex	Emergence category
8.Generic differences in rates	Emphasis
9.HP calculators	New

**SECOND CODER**

First-order Memeplex	Emergence category
Conversion rates	Emphasis

Comments researcher - Here there is no difference in one meme bar wording but the second coder has not coded the HP calculators

Nature of Difference	Methodological or coding problem	Correction needed
Division of content (second coder finds less memes than researcher)	Coding (3)	No

*Mars Post 10*

My HP28S (1986, though the model is a couple of years older than that) has internal conversion factors for dozens of things. It agrees precisely with the 453.59237 grams.

**RESEARCHER**

First-order Memeplex	Emergence category
10.Models of HP calculators	New
11.HP calculators as sources of conversion factors	New
12.generic metric differences	Repeat

**SECOND CODER**

First-order Memeplex	Emergence category
Confirmation of pound avoirdupois in g	Emphasis
HP28S	New dimension

Comments researcher - Here there is agreement in term of the HP calculator content as being new although it is coded more generically as the researcher has 'models of HP calculators' whereas the second coder

specifies the model number. In the case of the remaining content, the two coders divide it differently. The researcher codes the 'confirmation of pound avoirdupois' as 'generic metric differences' so is more general than the second coder. The researcher knowing the rest of the material identifies a further meme that of 'HP calculators as a source of conversion factors'. Arguably the 'generic metric difference's could be made more specific but the extra meme of HP calculators being used as a source of conversion factors' does seem justifiable.

Nature of Difference	Methodological or coding problem	Correction needed
Researcher working at higher level of abstraction	Methodological (4)	No
Division of content (second coder finds less memes than researcher)	Coding (4)	No

#### *Mars Post 11*

I've got an HP28S of around the same vintage and use it regularly. I didn't change the batteries for 7 years! I can't bring myself to purchase one of the new models. Useless aside complete,

#### RESEARCHER

First-order Memplex	Emergence category
13.Models of HP calculators	Repeat
14.Battery life of HPs	New
15. Emotional attachment to calculator	New

#### SECOND CODER

First-order Memplex	Emergence category
HP28S	Repeat

Comments researcher - Here the coders agree on the same meme, except the researcher codes at a higher level. The other two memes have not been seen by the second coder but arguably are there, one involves whether humour should be coded and the other is just missing.

Nature of Difference	Methodological or coding problem	Correction needed
Humour not coded as content by second coder	Methodological (5)	No
Division of content (second coder finds less memes than researcher)	Coding (5)	No

*Mars Post 12*

I have an HP28S from around '91. I use it to balance my checkbook. Is that blasphemy? :)

**RESEARCHER**

First-order Memplex	Emergence category
16.Models of HP calculators	Repeat
17.Emotional attachment to calculator	Repeat
18.Battery life of HPs	Repeat

**SECOND CODER**

First-order Memplex	Emergence category
HP28S	Repeat

Comments researcher - Same situation as above. Two coders code the first meme the same, the other two not seen by the second coder but the researcher would stick by them.

Nature of Difference	Methodological or coding problem	Correction needed
Humour not coded as content by second coder	Methodological (6)	No
Division of content (second coder finds less memes than researcher)	Coding (6)	No

*Mars Post 13*

I have a 15c I bought when they were new. I was on contract at Boeing (BCS) so it must have been about '83. I have replaced the batteries once!  
I have a 45 in its original box that I retired when I got the 15c. I cringe at the cost of the 45 when I was a student!

**RESEARCHER**

First-order Memplex	Emergence category
19.Models of HP calculators	Repeat
20.Emotional attachment to calculator	Repeat
21.Battery life of HPs	Repeat

**SECOND CODER**

First-order Memplex	Emergence category
15c	New dimension
45	New dimension

Comments researcher - Here the second coder has coded the two models as two memes whereas the researcher has coded them as one which is a problem of level of abstraction and has added the two other memes ( one

humour one appears just to be missing from second coding). The researcher would argue to stick with this coding.

Nature of Difference	Methodological or coding problem	Correction needed
Researcher working at higher level of abstraction	Methodological (7)	No
Humour not coded as content by second coder	Methodological (8)	No
Division of content (second coder finds less memes than researcher)	Coding (7)	No

Religious Case

*Transcript*

*Religion Post 90*

Isn't fear of God more accurately ascribed to Christians. I mean, why else do you hear the term God-fearing Christian so often? (eds in reference to previous post about Christianity being associated with domestic violence!) And isn't it strange that this situation occurs almost solely in Christian areas.

RESEARCHER

First-order Memplex	Emergence category
22. Christianity and domestic violence and psychological illness	Extension

SECOND CODER

First-order Memplex	Emergence category
Fear of God in Christianity	New dimension

Comments researcher - Here arguably both coders are right and both these two memes should be coded as they stand.

Nature of Difference	Methodological or coding problem	Correction needed
Division of content (researcher and coder finding same number of memes but different memes)	Coding (8)	Yes (2)

*Religion Post 91*

Thanks Elroy

Now I'm going to throw up. I've always suspected that. The more I learn about those bastards the more I come to loathe their twisted belief system. When is the fucking DSM-IV going to start listing Christianity as a psycho disorder right up there with antisocial personality disorder and funzies like that?

RESEARCHER

First-order Memplex	Emergence category
23. Christianity and domestic violence and psychological illness	New
24. Personal offensiveness / banter	Repeat

SECOND CODER

First-order Memplex	Emergence category
Christianity is a twisted belief system / disorder	Combination

Comments researcher - Here one meme is coded nearly identically. The other involves humour, which the researcher has coded for and thinks is

legitimate but this is disputable. The second coder has coded one meme as a combination, arguably she is right.

Nature of Difference	Methodological or coding problem	Correction needed
Humour not coded as content by second coder	Methodological (9)	No
Difference in category of emergence	Coding (9)	Yes (3)

*Religion Post 92*

It won't because most of the doctors are infected with the mental disorder called theism. The inmates are running the asylum

RESEARCHER

First-order Memplex	Emergence category
25.Christianity and domestic violence and psychological illness	Extension
26.Religion as dangerous - a virus/brainwash / addiction / abusive relationship /master slave relationship	Extension

SECOND CODER

First-order Memplex	Emergence category
Maintains the doctors in the DSM-IV infected with the disorder!	Emphasis

Comments researcher - The second coder is right in that this is very difficult to interpret! It seems to imply that religion will not be ever classified as a psychological disorder as most doctors are brainwashed by religion. If this is the case the researcher stands by her coding.

Nature of Difference	Methodological or coding problem	Correction needed
Mis / lack of understanding of contextet	(10m) (?c)	No

*Religion Post 93*

Most atheists have studied Christianity longer and deeper than most Christians

RESEARCHER

First-order Memplex	Emergence category
27.Making an effort as a route to faith	Emphasis

SECOND CODER

First-order Memplex	Emergence category
Study of Christianity	Emphasis



Comments researcher - Here the two coders have coded in a very similar way but as per usual the researcher has abstracted up more!

Nature of Difference	Methodological or coding problem	Correction needed
Researcher working at higher level of abstraction	Methodological (11)	No

*Religion Post 94*

Well I accept their apology then!

RESEARCHER

First-order Memeplex	Emergence category
28. Personal offensiveness / banter	Emphasis

SECOND CODER

First-order Memeplex	Emergence category
Christians' apology???	Emphasis

Comments researcher - Once again the researcher has chosen to code for the sarcasm / banter and therefore humour. It's arguable whether this should be the case but I think it is better coded as such on balance.

Nature of Difference	Methodological or coding problem	Correction needed
Humour not coded as content by second coder	Methodological (12)	No but borderline

*Religion Post 95*

Apology for?

RESEARCHER

First-order Memeplex	Emergence category
29. Personal offensiveness / banter	Emphasis

SECOND CODER

First-order Memeplex	Emergence category
Apology??	Emphasis

Comments researcher - The same applies here. The coders are agreed that there is one meme and that the category of emergence is emphasis, the question is whether to code it as humour.

Nature of Difference	Methodological or coding problem	Correction needed
Humour not coded as content by second coder	Methodological (13)	No but borderline

*Religion Post 96*

Jesus willingly can from heaven to earth and dies. God allowed this to happen because he loves us so much. Jesus prayed beforehand asking God that if any other way was possible to do it. He had at any time given time to many legions of angels to rescue him, however he held in there for us.

**RESEARCHER**

First-order Memeplex	Emergence category
30.Definitions of fear	Extension
31.Nature of sacrifice / crucifixion	Extension

**SECOND CODER**

First-order Memeplex	Emergence category
Jesus died with God's approval	Extension

Comments researcher - Here there is total agreement over one meme except slight differences in words. The second meme is, as the second coder points out, doubtful but arguably in the broader concept of the chat room this does provide an alternative definition of fear.

Nature of Difference	Methodological or coding problem	Correction needed
Division of content (second coder finds less memes than researcher)	Coding (10)	No

*Religion Post 96*

Do you have any idea how disgusting that is? Lemme ask, if you could invent any religion you wanted, based on any event, idea or ideal, would you really invent one based on some poor guy's slow agonizing death? Come apologist, and tell me that religion isn't based on death, but on life. After all, he was resurrected (no mean feat) wasn't he?

But the trigger event is wrong, wrong, wrong. If you are going to invent a religion, at least try to base it on something not quite so revolting as a Roman crucifixion. The whole idea is monstrous.

**RESEARCHER**

First-order Memeplex	Emergence category
32.Definitions of fear	Extension
33.Nature of sacrifice / crucifixion	Extension

**SECOND CODER**

First-order Memeplex	Emergence category
Jesus' death and resurrection	Emphasis
Religion is based on life	Emphasis
Opinion on Roman crucifixion	Emphasis

Comments researcher - Here there are a number of differences. The researcher has chosen to combine the resurrection and opinion on the crucifixion under the title 'nature of sacrifice/ crucifixion. Arguably the second coder is right to divide this into two. Once again the definition of fear it left out, where the researcher would claim it is necessary. There is also a disagreement between extension and emphasis on hindsight the researcher feels the second coder is right

Nature of Difference	Methodological or coding problem	Correction needed
Division of content (second coder finds more memes than researcher)	Coding (11)	No
Difference in category of emergence	Coding (12)	Yes (4)

*Religion Post 97*

Exactly, now maybe you can understand the passion involved in his sacrifice! But as far as inventing is concerned, you'd have to ask Him about that. It was his plan not ours.

**RESEARCHER**

First-order Memeplex	Emergence category
34.Nature of sacrifice / crucifixion	Extension
35.God's plan versus our plan	New

**SECOND CODER**

First-order Memeplex	Emergence category
Jesus' sacrifice is God's plan	Emphasis

Comments researcher - Here the coding is different and can be argued either way. On hindsight towards the second coder's version. Also here the second coder has merged the two memes the researcher identified into one. The second coder is considered right.

Nature of Difference	Methodological or coding problem	Correction needed
Division of content (second coder finds less memes than researcher)	Coding (13)	Yes (5)
Difference in category of emergence	Coding (14)	Yes (6)

*Religion Post 98*

What sacrifice? Is your clipping a long fingernail a sacrifice?

Ask who about what? On you must mean the omni-incompetent drooling idiot written about in a two millennia fictional tome of bovine excrement that is totally clueless.

You think people would finally upgrade their comic book hero to one that has integrity, and stand for truth and justice and leads by example.

**RESEARCHER**

<b>First-order Memplex</b>	<b>Emergence category</b>
36. Personal offensiveness / banter	Emphasis
37. Role of truth / reason / mortals in faith	Emphasis

**SECOND CODER**

<b>First-order Memplex</b>	<b>Emergence category</b>
Various derogatory comments about Jesus	Emphasis
Belittling the sacrifice aspect	Emphasis

Comments researcher - Here the coders agree on the derogatory banter and classify it as an emphasis. With respect to the other meme they disagree on the exact wording but nevertheless are close with the researcher creating a more abstract category

<b>Nature of Difference</b>	<b>Methodological or coding problem</b>	<b>Correction needed</b>
Researcher working at higher level of abstraction	Coding (15)	No

## Gun Policy Case

### *Transcript*

#### *Gun policy Post 1*

Each year, gun violence kills or wounds more than one hundred thousand children and adults. Ethnic and religious minorities, gays and lesbians have been singled out as special targets. Recent shootings have shown that this crisis is reaching epidemic proportions. While 75% of Americans support reasonable gun control, such as licensing and registration, the US Congress has failed to act. It is time for the United States Congress to recognize the crisis afflicting our nation by passing meaningful gun control legislation.

A petition drive to gather one million names is being sponsored by the American Jewish Congress and co-sponsored by the Coalition to Stop Gun violence, Handgun control Inc, the Million Mom March plus dozens of other groups throughout the nation. Their goal is to deliver petitions from one million Americans to the US congress before February 2000.

Please join me in supporting this!

1. Sign the online petition now at <http://gun-control.homepage.com>
2. Forward this to people you know
3. Visit our website to learn more

#### RESEARCHER

First-order Memeplex	Emergence category
38. Facts about amount of violence	New
39. Government taking no action	Emphasis
40. Numbers of people that support legislation	New
41. Please sign petition	New

#### SECOND CODER

First-order Memeplex	Emergence category
No. of people killed by gun violence	New dimension
Special targets of gun violence are ethnic and religious minorities, gays and lesbians	Emphasis
It is a crisis which is reaching epidemic proportions.	Emphasis
US Congress should act by passing legislation	Emphasis
Petition is being sponsored by many groups & goal to deliver petition.	Combination??

Comments researcher - Five memes were identified by the second coder, four by the researcher. The memes government taking no action (researcher coding) and US should act by passing legislation are very

similar and have the same category of emergence. Facts about violence (researcher coding) and no of people killed by violence (second coder) are also very similar and with identical category emergence coding. The petition working is slightly different and probably needs to be a mixture of both with a coding of new as the petition is a new dimension. The other differences are quite large in that the researcher has chosen to emphasise the number of people supporting legislation and the second coder has emphasised the groups hit by violence and the epidemic proportions. All of these probably need to be included

Nature of Difference	Methodological or coding problem	Correction needed
Division of content (second coder finds more memes than researcher)	Coding (16)	Yes (7)

*Gun policy Post 2*

When you prove to me that licensing and registering will stop one single killing and ban of alcohol, tobacco and prescription drugs to your petition, I might sign up.

**RESEARCHER**

First-order Memplex	Emergence category
42.Proof of cause and effect given alcohol, tobacco etc	Extension

**SECOND CODER**

First-order Memplex	Emergence category
Killing is also caused by abuse of alcohol, tobacco and prescription drugs	Emphasis

Comments researcher – Here the researcher is operating at a more abstracted, less detailed level than the second coder. Also the category of emergence is different by one. It does lie on the border between the two categories of extension and emphasis

Nature of Difference	Methodological or coding problem	Correction needed
Difference in category of emergence	Coding (17)	No but borderline

*Gun Policy Post 3*

Dear Syracuse Stop Guns Moron. Kiss my ass

**RESEARCHER**

First-order Memplex	Emergence category
43.Personal offensiveness	New

**SECOND CODER**

First-order Memplex	Emergence category
This person backing petition.	Emphasis

Comments researcher - Here the second coder in the researchers view is not backing the petition. The content was coder as personal offensiveness because arguably this is what the majority of the content is and offensiveness is new as a new dimension

Nature of Difference	Methodological or coding problem	Correction needed
Humour not coded as content by second coder	Methodological (14)	No

*Gun Policy 4*

I have the information here everyone needs to report this site as spam to the hosts as someone was stupid enough to use his actual account to sent it. Anyway the addresses below are to report the spammer. Please keep reading to report the SITE hosted in the spam guncontrol.homepage.com.

By the way, this spam was posted to HUNDREDS of USENET news groups, so mention that in your complaints. The host of the spam site is hostmaster@rapidsite.et.abuse.....

These are the bare minimums. Please report these spammers folks.

**RESEARCHER**

First-order Memplex	Emergence category
44.This is spam	New
45.Address to report spam	New

**SECOND CODER**

First-order Memplex	Emergence category
Address given to support spammers.	Emphasis

Comments researcher - Here one meme has been coded the same, albeit as this is the first time spam has been mentioned the researcher has coded it as new rather than an emphasis as chosen by the second coder. The researcher has included another meme that is more implicit in the talk, namely that the talk represents a declaration that the first post counts as spam.

Nature of Difference	Methodological or coding problem	Correction needed
Implicit meaning not coded as a meme by second coder	Both (18c) (15m)	No
Difference in category of emergence	Coding (19)	No

*Gun Policy Post 5*

Sorry but this isn't spam. It was only a handful of cross postings to NGs which discuss these things which makes it not spam (by any current definitions). It is simply an invitation to sign which the author finds offensive.

If anyone disagrees with the content please DO write to your legislators and let them support (whatever). Start a petition drive. The good thing about democracy is this and very often our legislators listen.

RESEARCHER

First-order Memplex	Emergence category
46.This is not spam	Extension
47.Sign a petition that meets your views as legislators listen	New
48.Reporting opinions you do not agree with as spam is censorship	Extension

SECOND CODER

First-order Memplex	Emergence category
This is not spam, but cross postings.	Emphasis
Anyone disagreeing with the site content should write to their legislators.	Emphasis
Hence, this is a democratic system.	Emphasis

Comments researcher - The first meme is coded the same except for slightly more extensive wording in the case of the second coding and extension category rather than emphasis. Emphasis the researcher would argue is right. The second meme is very similar except once again the researcher has categorised the emergence as new and the second coder as emphasis. The second coder is right.

The third meme is worded quite differently but seems to be getting at the same thing, namely the nature of democracy. Again there is a slight different in category of emergence but not one that should be changed.

Nature of Difference	Methodological or coding problem	Correction needed
Difference in category of emergence	Coding (20)	No
Difference in category of emergence	Coding (21)	Yes (8)
Difference in category of emergence	Coding (22)	No



*Gun Policy 6*

I have the information here everyone needs to report this site as spam to the hosts as someone was stupid enough to use his actual account to sent it. Anyway the addresses below are to report the spammer. Please keep reading to report the SITE hosted in the spam guncontrol.homepage.com.

By the way, this spam was posted to HUNDREDS of USENET news groups, so mention that in your complaints. The host of the spam site is hostmaster@rapidsite.et.abuse.....

These are the bare minimums. Please report these spammers folks.

**RESEARCHER**

First-order Memeplex	Emergence category
49.This is spam	Repeat
50.Address to report spam	Repeat

**SECOND CODER**

First-order Memeplex	Emergence category
See gun policy 4 – this is the same.	Repeat?

Comments researcher - Given this is the same as post four, it suffers from the same differences, except here there is agreement as regards the category of emergence.

Nature of Difference	Methodological or coding problem	Correction needed
Implicit meaning not coded as a meme by second coder	Both (23c) (16m)	No

*Gun Policy 7*

I have the information here everyone needs to report this site as spam to the hosts as someone was stupid enough to use his actual account to sent it. Anyway the addresses below are to report the spammer. Please keep reading to report the SITE hosted in the spam guncontrol.homepage.com.

By the way, this spam was posted to HUNDREDS of USENET news groups, so mention that in your complaints. The host of the spam site is hostmaster@rapidsite.et.abuse.....

These are the bare minimums. Please report these spammers folks.

**RESEARCHER**

First-order Memeplex	Emergence category
51.This is spam	Repeat
52.Address to report spam	Repeat

**SECOND CODER**

<b>First-order Memplex</b>	<b>Emergence category</b>
See nos. 4 & 6 – the same.	Repeat?
Is it meant to be a repeat?	

Comments researcher - Given this is the same as post four and six, it suffers from the same differences, except here there is agreement as regards the category of emergence

<b>Nature of Difference</b>	<b>Methodological or coding problem</b>	<b>Correction needed</b>
Implicit meaning not coded as a meme by second coder	(17m) (?c)	No

*Gun policy 8*

Whether you agree or not, reporting spammers is censorship in my opinion. Gun folks think the 2<sup>nd</sup> (eds amendment) is more important than the 1<sup>st</sup>. This post is filled with mistruths but the other side does the same.

**RESEARCHER**

<b>First-order Memplex</b>	<b>Emergence category</b>
53.Reporting opinions you do not agree with as spam is censorship	Extension
54.Pro gun people think 2nd amendment more important than first	New
55.Previous post is full of mist truths	New

**SECOND CODER**

<b>First-order Memplex</b>	<b>Emergence category</b>
Opinion that supporting spammers is censorship, not democratic.	Emphasis
Post contains mistruths but other side contains them too.	Emphasis

Comments researcher - Here there is agreement on the first meme, although the wording is different and once again there is a difference between the emphasis and extension category. The same goes for the memes about truths and facts, except here the difference in category of emergence is greater. The researcher has classified it as new and would argue to stick with that, the second coder has argued emphasis. The last meme about 1<sup>st</sup> and 2<sup>nd</sup> amendments has been missed by the second coder and should be included.

Nature of Difference	Methodological or coding problem	Correction needed
Division of content (second coder finds less memes than researcher)	Coding (24)	No
Difference in category of emergence	Coding (25)	No

## ORANIZATIONAL SETTING:

### PROJECT, INTERNAL AND OFF AGENDA CASES

#### Project Case

#### *Transcript*

#### *Project Talk 171 PMI*

-I would be a bit surprised, I might have misjudged it, but I would be surprised if they had enough funding from investors if they had sufficient funding to do anything terribly significant without trying to get some kind of public money now being a SME it's very easy to get some smart money, the DTI smart money or uhmm European money which in which case as long as we are in the right type of relationship with them we can become a subcontractor with them and we get the dosh to do the work. I think that is down the line I don't think that's the .....

#### RESEARCHER

First-order Memplex	Emergence category
56. Technical explanation / development of product	Emphasis
57. Exploitation route	Emphasis
58. Relationships needed to take to market	Emphasis

#### SECOND CODER

First-order Memplex	Emergence category
Adequate funding from investors	?
Difficulty in doing anything significant without enough funding	?
Funding is easier when an SME	?

Comments researcher - Here, the same number of memes are coded. The emergence categories cannot be given as this is the first data the second coder has seen. The first meme coded by the researcher refers to the first sentence and needs access to the data prior to 171. Adequate funding has been coded by the researcher at a higher level as exploitation route. Difficulty in doing anything..... has been coded at a higher level by the researcher as exploitation route and was considered to include the funding issue or access to grant money. The researcher found the meme relationships to market which the second coder did not see. This is either because it is not justified or because the researcher knows the context more and knows that what this is about is a co-developer. The researcher would argue the latter.

Nature of Difference	Methodological or coding problem	Correction needed
Implicit meaning not coded as a meme by second coder	Both (26c) (18m)	No
Division of content (second coder finds more memes than researcher)	Coding (27)	No

*Project Talk 172 GD*

- It's worth having a feel for how much money that demo would be uhmm how translatable - their drivers and what have you uhmm do we think it would be relatively easily to translate to this – because presumably it is dependent on the devise characteristics they had to sort of tailor - I don't know

**RESEARCHER**

First-order Memplex	Emergence category
59.Nature of current supplier / competitor/competition	Emphasis
60.Technical explanation / development of product	Emphasis

**SECOND CODER**

First-order Memplex	Emergence category
Demo to raise money is dependent on the devise characteristics	Emphasis

Comments researcher - Once gain there is the problem of level of detail. The second coder has coded at a higher level of detail are regards the technical meaning with the talk. Also not knowing the context has not included the other meme has been included by the researcher

Nature of Difference	Methodological or coding problem	Correction needed
Implicit meaning not coded as a meme by second coder	Both (28c) (19m)	No

*Project Talk 173 PM2*

- We were led to believe it would not be a difficult exercise and we were aiming to produce our product to emulate the characteristics of the KC devise anyway – it should be a relatively straight forward built although it's easy to say that

**RESEARCHER**

First-order Memplex	Emergence category
61.Technical explanation / development of product	Emphasis
62.Exploitation route	Emphasis

**SECOND CODER**

First-order Memplex	Emergence category
Demo should be straight forward	Emphasis
Aim is to produce product with characteristics of the KC devise	Emphasis

Comments researcher - Here, once again the second coder has coded at a higher level of detail but has identified the same number of memes and given them the same categories of emergence

Nature of Difference	Methodological or coding problem	Correction needed
NONE		

*Project Talk 174 GD*  
- OK

**RESEARCHER**

First-order Memplex	Emergence category
63. Technical explanation / development of product	Repeat
64. Exploitation route	Repeat

**SECOND CODER**

First-order Memplex	Emergence category
Agreement	Emphasis???

Comments researcher - Here there is a problem with the definition of content. The researcher has coded 'OK' as meaning a repeat of the previous meme's content whereas the second coder as agreement. If it is considered that OK means the person has accepted the previous content then the memes involved arguably are those of the previous talk.

Nature of Difference	Methodological or coding problem	Correction needed
Coder using different definition of content	Methodological (20)	No

*Project Talk 175 PMI*

- That was the intention to do it as near as possible.

**RESEARCHER**

First-order Memplex	Emergence category
65. Technical explanation / development of product	Emphasis

**SECOND CODER**

<b>First-order Memplex</b>	<b>Emergence category</b>
Timing of the two projects	Emphasis

Comments researcher - Here the second coder has interpreted the statement as a matter of timing rather than a matter of copying the technical characteristics of the competitor as much as possible. The category of emergence is the same.

<b>Nature of Difference</b>	<b>Methodological or coding problem</b>	<b>Correction needed</b>
Mis / lack of understanding of context	Both (29c) (21m)	No

*Project Talk 176 GD*

- So you give it some current pulse that is not so different than the conventional technology

**RESEARCHER**

<b>First-order Memplex</b>	<b>Emergence category</b>
66. Technical explanation / development of product	Emphasis

**SECOND CODER**

<b>First-order Memplex</b>	<b>Emergence category</b>
Current pulse is similar to conventional technology	Emphasis

Comments researcher - Once again here we have the problem of level of detail at which the coding is being performed with the second coder operating at a higher level of detail. The number of memes are the same and the category of emergence is the same

<b>Nature of Difference</b>	<b>Methodological or coding problem</b>	<b>Correction needed</b>
NONE		

*Project Talk 177 PM1*

- It's being modelled to have the same basic characteristics

**RESEARCHER**

<b>First-order Memplex</b>	<b>Emergence category</b>
67. Technical explanation / development of product	Emphasis

**SECOND CODER**

<b>First-order Memplex</b>	<b>Emergence category</b>
Same as 176 GD really	Repeat

Comments researcher - Again the same problem of detail. In addition there is a difference in category of emergence. The variation is very much on the borderline between the two categories,

<b>Nature of Difference</b>	<b>Methodological or coding problem</b>	<b>Correction needed</b>
Difference in category of emergence	Coding (30)	No but borderline

*Project Talk 178 GD*  
- Yeah

**RESEARCHER**

<b>First-order Memplex</b>	<b>Emergence category</b>
68. Technical explanation / development of product	Repeat

**SECOND CODER**

<b>First-order Memplex</b>	<b>Emergence category</b>
Agreement	Emphasis? Or Repeat [Not clear on this]

Comments researcher - Same problem as talk 174 in which a different definition of content is being used by the second coder.

<b>Nature of Difference</b>	<b>Methodological or coding problem</b>	<b>Correction needed</b>
Coder using different definition of content	Methodological (22)	No

*Project Talk 179 MD*

- That must be an aim anyway to limit the amount of changes to the current KC, then you can just take a KC out and slot one of these in OK so we sound a little bit uncertain about the additional demonstrator the 13 k there – just how much it would involve Imaging in spending but what else have you got anything else there – timescales? – I heard we could not start until the move

**RESEARCHER**

<b>First-order Memplex</b>	<b>Emergence category</b>
69. Exploitation plan	Emphasis
70. Financial costs of development	Emphasis
71. Internal development of project (resources and timings)	Emphasis



## SECOND CODER

First-order Memplex	Emergence category
Further technology details	Emphasis
Timing of projects	Repeat

*[Jill – see 179 MD above; I found this a bit confusing ‘Imaging in spending’. I’m not sure whether to just classify this as spending. Am I supposed to understand this phrase?]*

Comments researcher - There is agreement on the timing of projects, although again a slight difference in coding of the category of emergence, with the researcher counting repeats as having to be near exact copies of the previous meme, whereas the second coder is taking a more liberal view. There is a difference in now the remainder of the talk has been coded. Because the words having been transcribed as spoken, the phrase ‘Imaging in spending’ is difficult to understand and should read ‘Imaging spending’. The researcher has coded the content in terms of financial costs and exploitation plan whereas the second coder has coded the content as technical. There is an argument for both. It can be argued that the second coder has not coded for the financial content of the talk and should have done because this is not included in her ‘further technology details’. Where the coding becomes more difficult is to differentiate between ‘further technology details’ and where the content moves on to be more commercial and therefore becomes ‘exploitation plan’. The researcher would argue that here the talk is not just technical so should be coded as exploitation. This is an example however of the most difficult side to the coding exercise.

Nature of Difference	Methodological or coding problem	Correction needed
Division of content (second coder finds less memes than researcher)	Coding (31)	No but borderline

Internal case

*Transcript*

*Internal Talk 59 MD*

- Right I do take your point but I do think there is a balance to be struck between formality and rigour and encouragement and therefore I think that with two and threes we insist whereas gate 1's I would like to keep as we are. Actually what we have spent a lot of time on today is reviews. I do not know what you think about the reviews whether we should have had all of those or whether we were happy with them coming in and going through it.

**RESEARCHER**

First-order Memplex	Emergence category
72.Investment Process	Emphasis
73.Knowledge transfer between director, project managers and line managers	Repeat

**SECOND CODER**

First-order Memplex	Emergence category
Balance in formality needed in reviews	New dimension
Keep Gate 1s the same	Emphasis

Comment researcher - The second coder has coded the first memes but technically cannot do so as she does not know the content that came before. The difference in coding of the memes once again lies in the level of detail. Other than that the memes have been coded the same as Gates 1s are part of the Investment process and balance in formality of reviews is part of knowledge transfer.

Nature of Difference	Methodological or coding problem	Correction needed
NONE		

*Internal Talk 60 GS*

- The nature of all three reviews in my humble opinion where they were about right in what we got i.e. we got it on the day. I mean the fuel cells was one that we wanted because we could see the potential for it. This committee as a body practically demanded that they report back in a month. And it really was a progress report that was required it was not the beginnings of a gate 2.

**RESEARCHER**

First-order Memplex	Emergence category
74.Investment Process	Emphasis
75.Knowledge transfer between director, project managers and line managers	Emphasis

**SECOND CODER**

First-order Memplex	Emergence category
In agreement with three reviews	Emphasis
Committee's timing requirement	Extension

Comments researcher - Again the differences here were purely a matter of level of detail with the second coder consistently coding at a higher level of detail. 'In agreement with the three reviews' is a matter of the 'Investment process' and the 'timing requirement' is a matter of 'Knowledge transfer'. One of the categories of emergence is different however but only by one category of the continuum of added variance. With hindsight I think that the second coder is right that the knowledge transfer meme is sufficiently different to warrant an extension category rather than an emphasis category.

Nature of Difference	Methodological or coding problem	Correction needed
Difference in category of emergence	Coding (32)	Yes (9)

*Internal Talk 61 GW*

- No that was good.

**RESEARCHER**

First-order Memplex	Emergence category
76. Knowledge transfer between director, project managers and line managers	Repeat

**SECOND CODER**

First-order Memplex	Emergence category
Agreement	Emphasis

Comments researcher - Once again, as in previous talks, this is a matter of how content is defined. Here because GW has agreed with content of previous talk, then the researcher has coded it as a repeat and hence the meme is the same as the previous talk.

Nature of Difference	Methodological or coding problem	Correction needed
Coder using different definition of content	Methodological (23)	No

*Internal Talk 62 GS*

- I think with Project H in a funny way was a way of demonstrating that if everything went wrong it went wrong.

**RESEARCHER**

First-order Memplex	Emergence category
77. Progress of presented projects	New*

**SECOND CODER**

First-order Memplex	Emergence category
Project H is pivotal??	New dimension (because it seems they are on to another subject now)

Comments researcher - The same problem again with level of detail, but other than that complete consistency.

Nature of Difference	Methodological or coding problem	Correction needed
NONE		

*Internal Talk 63 DH*

If I was them I would have ducked that presentation.

**RESEARCHER**

First-order Memplex	Emergence category
78. Progress of presented projects	Emphasis
79. Knowledge transfer between director, project managers and line managers	Extension

**SECOND CODER**

First-order Memplex	Emergence category
Comment on presentation	Emphasis

Comments researcher - This is a good example of an occasion where the problems identified throughout come together in one example of coding. There is the problem of detail in that the second coder is working at a higher level of detail. There is the issue of what is content. Here the researcher argues the content lies in the implications the comments has on the progress of that project, in that the poor presentation suggests that the project is not progressing as it should and on knowledge transfer between directors and managers in that given the lack or progress the project managers should have opted to duck the presentation. Lastly, the

coding is made problematic for the second coder having not been present in the meeting and sent that the presentation was bad and reflected lack of progress.

Nature of Difference	Methodological or coding problem	Correction needed
Researcher working at higher level of abstraction	Methodological (24)	No
Coder using different definition of content	Methodological (25)	No
Mis / lack of understanding of context	(26m) (?c)	No

*Internal Talk 64 GD*

- Absolutely and I think we should have probably found a way of doing that. We should just have had a note that just sort of said first test - did not work well for a variety of reasons. We still like to go on because there is potential. We have spent £2,000 so far we believe we can do something useful with £3,000 but we do not think it is worth troubling you with this, because that was the truth of it.

**RESEARCHER**

First-order Memplex	Emergence category
80. Progress of presented projects	Emphasis
81. Knowledge transfer between director, project managers and line managers	Emphasis

**SECOND CODER**

First-order Memplex	Emergence category
In agreement with above comment and further comment	Emphasis
Spending on project	Extension

Comments researcher - Here the second coder makes a valid point about the content of the talk containing financial material that the researcher has not reflected. With hindsight therefore the second meme should read financial development of projects rather than knowledge transfer, which is far less relevant. The category of emergence logically then becomes an extension rather than an emphasis, creating agreement between the second coder and the researcher. As regards 'in agreement with above comment and further comment' of the second coder, the researcher has coded this more in meaning terms i.e. as 'progress of presented projects' agreeing with the category of emergence.

Nature of Difference	Methodological or coding problem	Correction needed
Division of content (second coder finds more memes than researcher)	Coding (33)	Yes (10)

*Internal Talk 65 MD*

- Because it seemed to me that they had the conditions wrong, the material wrong.

RESEARCHER

First-order Memplex	Emergence category
82. Progress of presented projects	Emphasis

SECOND CODER

First-order Memplex	Emergence category
Further comments on presentation	Emphasis

Comments researcher - Same problem as in previous talk (65). There is a difference in the definition of content with the researcher abstracting upwards somewhat to create the code 'progress of presented projects' rather than further comments. The category of emergence is the same.

Nature of Difference	Methodological or coding problem	Correction needed
NONE		

*Internal Talk 66 MarD*

- It was terrible

RESEARCHER

First-order Memplex	Emergence category
83. Progress of presented projects	Repeat

SECOND CODER

First-order Memplex	Emergence category
Further comments	Repeat

Comments researcher - Again as in talk 65 and 64 a problem of level of detail for the description of the meme and what content is but not how many memes or their category of emergence.

Nature of Difference	Methodological or coding problem	Correction needed
NONE		

*Internal Talk 67 GS*

- I mean the bone bonding one would have actually made some considerable progress in two months.

**RESEARCHER**

First-order Memeplex	Emergence category
84. Progress of presented projects	Extension

**SECOND CODER**

First-order Memeplex	Emergence category
Comment on bone bonding project	Extension

Comments researcher - Same problem as above, difference in level of detail but agreement in number of memes and category of emergence

Nature of Difference	Methodological or coding problem	Correction needed
NONE		

*Internal Talk 68 SD*

- Again in answer to your original question David I would still like to have a few days in advance a final version. Because the reason I could add value to fuel cells and bone bonding was because I have been in the loop in the last month or two and I have been actively involved in them and therefore been able to shape and add value. Project G other than what comes of the cuff, the moment has gone, they have gone. Part of our role is to show how we are adding value that we are not just a team - let me get this right. It's not just about the perception of us as a Board and our interaction and belief in technology and our ability to advise and shape. And coming back after the event is - has minimal impact relative being able to add value. If these people going out of this meeting say wow - crikey they helped me - yeah - I never thought of that deal before or wow yeah I can talk to ..... Our credibility goes sky high and this whole perception of the culture and belief in the people changes.

**RESEARCHER**

First-order Memeplex	Emergence category
85. Knowledge transfer between director, project managers and line managers	Emphasis
86. People, workload and their competencies	Emphasis

**SECOND CODER**

First-order Memeplex	Emergence category
Meeting information to be circulated prior to meeting so attendees can add value*	New dimension
This is too late for Project G	Emphasis

Higher impact and value when comments given 'before the event'*	Emphasis
Points above improve Board's credibility and the perception of the changes*	Extension

Comments researcher - Here there is more substantial differences between the coders. The second coder has identified three memes \* relating to knowledge transfer and the researcher one, and has given the category of emergence as extension rather than emphasis. With hindsight the second coder is correct with regards to the category of emergence and perhaps there should be at least two memes of knowledge transfer....'. The researcher has added a more subtle category of people, their workload and competencies as there seems to be some implications implicit in the talk about these. It could be argued however that this is too subtle.

Nature of Difference	Methodological or coding problem	Correction needed
Division of content (second coder finds more memes than researcher)	Coding (34)	Yes (11)
Category of emergence	Coding (35)	Yes
Implicit meaning not coded as a meme by second coder	(36c) (27m)	No

#### *Internal Talk 69 GS*

- Well I still feel – my own good feeling – if you do it that way to a certain extent when they have reached a certain maturity in what they are doing – well (if we took that stance) I can tell you now there would be nothing on the agenda next month.

#### RESEARCHER

First-order Memplex	Emergence category
87. People, workload and their competencies	Extension

#### SECOND CODER

First-order Memplex	Emergence category
Disagreement on above comment as result would be nothing on next agenda	Emphasis

Comments researcher - Again there is a difference between the two coders on level of abstraction. The high level content / implication of GS disagreeing with the previous comment (as coded by the second coder) is that the people do not have the competencies to cope with the stance being proposed re the management of the agenda of the next meeting.



This is in effect a problem of the second coder no having the same access to the context as the researcher. As regards the category of emergence, there is a level of difference between the two. I would stick with extension rather than emphasis as this talk / meme does not just add detail but adds the related dimensions of competencies being insufficient

Comments second coder -

Nature of Difference	Methodological or coding problem	Correction needed
Difference in category of emergence	Coding (37)	No
Mis / lack of understanding of context	Both (38c) (28m)	No

Off Agenda Case

*Transcript*

*Off Agenda Talk 13 GD*

- The note I made was to come to your 1100 meeting session next week (ed on IP)

RESEARCHER

<b>First-order Memplex</b>	<b>Emergence category</b>
88.IP meeting	New

SECOND CODER

<b>First-order Memplex</b>	<b>Emergence category</b>
Meeting session	New dimension

Comments researcher - The wording of the memplex is slightly different but other than that the coding identical

<b>Nature of Difference</b>	<b>Methodological or coding problem</b>	<b>Correction needed</b>
NONE		

*Off Agenda Talk 14 GS*

- You are quite welcome there will be plenty of room the way things are going we could only get a third to a half of the cluster managers there. But I am inclined not to postpone it because it will be just the same problem again next time you do it.

RESEARCHER

<b>First-order Memplex</b>	<b>Emergence category</b>
89.IP meeting	Extension

SECOND CODER

<b>First-order Memplex</b>	<b>Emergence category</b>
Number of meeting attendees	Emphasis
Timing of meeting	Extension

Comments researcher - Here the second coder has found two memes rather than one, again a problem of level of abstraction but if that level is maintained then the researchers definition should stand as it better reflects the content.

<b>Nature of Difference</b>	<b>Methodological or coding problem</b>	<b>Correction needed</b>
Division of content (second coder finds more memes than researcher)	Coding (39)	No

*Off Agenda Talk 15 GD*

- Too much comes back to the same few people really (Eds reference to previous good presenter you became engaged on how organisation internally deals with patents and making suggestions on what to change). It's one of the problems we have in driving things forward as well as we might.

**RESEARCHER**

First-order Memplex	Emergence category
90. Reflexivity – scarcity of good project champions / middle managers	Extension
91. People side of transition to New company	New

**SECOND CODER**

First-order Memplex	Emergence category
Division of work leading to problems	New dimension

Comments researcher - The second coder has seen a new dimension as has the researcher. The wording is different because of the second coder not knowing this issue is part of the move towards becoming a new company 'New company.' The second coder has not seen the content of reflexivity but would need to know more about the context to identify that

Nature of Difference	Methodological or coding problem	Correction needed
Mis / lack of understanding of context	Both (40c) (29m)	No
Mis / lack of understanding of context	Both (41c) (30m)	No

*Off Agenda Talk 16 GD*

- Speaking of which, Jim you seem to have a fair bit on your plate

**RESEARCHER**

First-order Memplex	Emergence category
92. People and their workload	New

**SECOND CODER**

First-order Memplex	Emergence category
Workload	Emphasis

Comments researcher - The wording of the coding is nearly identical and same number of memes have been identified. There is a difference in the emergence category by one category. It's difficult to say who is 'right' Although the person says 'speaking of' which I would still argue it's a new dimension.

Nature of Difference	Methodological or	Correction
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	<b>coding problem</b>	<b>needed</b>
Difference in category of emergence	Coding (42c)	No

*Off Agenda Talk 17 IP*

- Just a bit yes

**RESEARCHER**

<b>First-order Memplex</b>	<b>Emergence category</b>
93. People and their workload	Repeat

**SECOND CODER**

<b>First-order Memplex</b>	<b>Emergence category</b>
Agreement	Emphasis??

Jill – as in Project Case, I'm not sure about above.

Comments researcher - This, as the second coder recognises, is the same problem as in the project case, whereby if a person is seen to voice agreement with a previous statement then the coding should be a repeat of the former both in terms of category and memplex wording.

<b>Nature of Difference</b>	<b>Methodological or coding problem</b>	<b>Correction needed</b>
Coder using different definition of content	Methodological (31)	No

*Off Agenda Talk 18 Group*

- Laughter

**RESEARCHER**

<b>First-order Memplex</b>	<b>Emergence category</b>
94. People and their workload	Repeat

**SECOND CODER**

<b>First-order Memplex</b>	<b>Emergence category</b>
?	

Comments researcher - The researcher has coded this humour as agreement with the previous statement as that is what the laughter can be said to mean. Hence the category of emergence is repeat and the memplex the same as the previous talk.

<b>Nature of Difference</b>	<b>Methodological or coding problem</b>	<b>Correction needed</b>
Humour not coded as content by second coder	Methodological (32)	No

*Off Agenda Talk 19 GD*

- How many exploitation plans?

RESEARCHER

- How many exploitation plans?

First-order Memplex	Emergence category
95. People and their workload	Emphasis

SECOND CODER

First-order Memplex	Emergence category
Exploitation plans	Extension

Comments researcher - Here the researcher has abstracted up and knowing the context (given the tone of voice the second coder was not privy to) has coded the content as a reference to workload and hence given previous references to the same has given the meme a category of emphasis. The second coder by coding at a higher level of detail has coded it more in a straight forward sense of content and given this rightly coded it as an extension.

Nature of Difference	Methodological or coding problem	Correction needed
Mis / lack of understanding of context	Both (43c) (33m)	No

*Off Agenda Talk 20 IP*

- 16

RESEARCHER

First-order Memplex	Emergence category
96. People and their workload	Repeat

SECOND CODER

First-order Memplex	Emergence category
No. of plans	Emphasis

Comments researcher - The same applies as in talk 19, showing how important context is. The difference in categories of emergence reflect this.

Nature of Difference	Methodological or coding problem	Correction needed
Mis / lack of understanding of context	Both (44c) (34m)	No

*Off Agenda Talk 21 GD*

- Just the 16

**RESEARCHER**

<b>First-order Memplex</b>	<b>Emergence category</b>
97.People and their workload	Repeat

**SECOND CODER**

<b>First-order Memplex</b>	<b>Emergence category</b>
No. of plans	Repeat

Comments researcher - Here the discrepancy lies only with the wording of the memplex and not the category of emergence as the second coder has also now had a previous code for workload.

<b>Nature of Difference</b>	<b>Methodological or coding problem</b>	<b>Correction needed</b>
NONE		

*Off Agenda Talk 22 IP*

- Just the 16

**RESEARCHER**

<b>First-order Memplex</b>	<b>Emergence category</b>
98.People and the high workload	Repeat

**SECOND CODER**

<b>First-order Memplex</b>	<b>Emergence category</b>
No. of plans	Repeat

Comments researcher - This difference lies in the explanation of talk 20 where the second coder has not known and hence not coded this as a matter of talking about workload

<b>Nature of Difference</b>	<b>Methodological or coding problem</b>	<b>Correction needed</b>
Mis / lack of understanding of context	(35m) (?c)	No

*Off Agenda Talk 23 Researcher*

- That's after 17.00 is it

**RESEARCHER**

<b>First-order Memplex</b>	<b>Emergence category</b>
99.People and the high workload	Emphasis

**SECOND CODER**

<b>First-order Memplex</b>	<b>Emergence category</b>
Timing	Emphasis

Comments researcher - The same applies here as in talk 22 and 20

Nature of Difference	Methodological or coding problem	Correction needed
Mis / lack of understanding of context	(36m) (?c)	No

*Off Agenda Talk 24 GD*

- Only gets interesting after 17.00

**RESEARCHER**

First-order Memplex	Emergence category
100.People and the high workload	Emphasis

**SECOND CODER**

First-order Memplex	Emergence category
Interest at meeting	Emphasis

Comments researcher - This refers to a sarcastic comment that the director is making about needing to work often after 17.00. The second coder given she knows the tone of voice that accompanied this talk has coded this differently.

Nature of Difference	Methodological or coding problem	Correction needed
Mis / lack of understanding of context	(37m) (?c)	No

*Off Agenda Talk 25 MarD*

- I mean what is encouraging is the degree to which people are putting effort into these despite the huge amount of work they have to get through in the normal course of the day anyway. Some of these things are still being done at some cost I should think. You know, people are putting themselves out to do these and the question is what the payback will be....

**RESEARCHER**

First-order Memplex	Emergence category
101.People and the high workload	Emphasis
102.People side of transition to New company	New

**SECOND CODER**

First-order Memplex	Emergence category
Effort of people despite heavy workload	Emphasis

Comments researcher - Here the second coder and researcher are in agreement with respect to the workload meme but the researcher has

seen the more subtle reference to the transition to the new company as the increased workload is related to this.

Nature of Difference	Methodological or coding problem	Correction needed
Implicit meaning not coded as a meme by second coder	(38m) (?c)	No

*Off Agenda Talk 26 GD*

- Well you make a lot of progress against a sense of urgency

RESEARCHER

First-order Memplex	Emergence category
103. People side of transition to New company	Emphasis

SECOND CODER

First-order Memplex	Emergence category
Progress under pressure	Emphasis

Comments researcher - Here the second coder has, as before, recognised the same number of memes, given the same category of emergence and has through a better understanding of the context coded the memplex with more similar language to the researcher than before as the connection with the transition to 'New company' is more explicit.

Nature of Difference	Methodological or coding problem	Correction needed
NONE		

*Off Agenda Talk 27 MarD*

- Yep, yep yep

RESEARCHER

First-order Memplex	Emergence category
104. People side of transition to New company	Repeat

SECOND CODER

First-order Memplex	Emergence category
Agreement	Emphasis

Comments researcher - Once again, the same problem related to definitions of content



Nature of Difference	Methodological or coding problem	Correction needed
Coder using different definition of content	Methodological (39)	No

**Comments of second coder**

I did not find this an easy task but I did find it an interesting one. Many of the queries I faced whilst doing the coding became clear to me when we sat down and looked at the differences. For example one of the areas of coding that became much clearer was that 'agreement' and 'OK', whereby someone agreed with the person who had spoken before, had to be coded the same way. It was difficult sometimes to understand what was being said but again this was often made much clearer when it was explained to me much more when we sat down and looked at the differences. Most of the differences were easy to resolve as they were because I did not understand the details of the meeting, having not been there, and because sometimes I had not been given enough information as to how certain things were to be coded.

The most difficult part was dividing the transcripts and posts in to memes, deciding how many there were especially. The other problem was deciding on what type of level to describe them at. Jill was always more general than me.