Children's Communication Style in Peer Group Interactions

Variations According to Temperament and Sociometric Status

Birgit Schröter

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Department of Psychology
University of Strathclyde
Glasgow

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Dedicated to the memory of my father, Heinz Schröter (1943-2003)

Abstract

Peer rejection has frequently been identified as a risk factor for development. Amongst other factors, peer rejection is predicted by the temperamental characteristics that underlie problem behaviours. Research has also demonstrated relationships between communication style and peer rejection, while a possible link between temperament and communication has scarcely been explored.

This research presents two studies investigating the relationships between temperament, communication and peer popularity, using Howe and McWilliam's (in press) coding scheme. A cross-sectional study obtained parental ratings on temperament and peer nominated sociometric status for children in nursery class, Primary 3 and Primary 6. Children were observed during free play and structured tasks, and communication was coded. A follow up longitudinal study was conducted with children in Primary 2 and Primary 3 only.

It was hypothesised that difficult temperament would be associated with peer rejection, that communication would vary with children's temperament and popularity and that both temperament and communication would vary across gender. Variations in temperament and communication across age were expected in the cross-sectional, but not in the longitudinal study.

Results showed that difficult temperamental traits, especially impulsivity, were associated with peer rejection, while simple communication was predictive of peer rejection in some cases. Moreover, impulsivity was consistently associated with simple communication. Age differences in temperament were evident across the six year period of the cross-sectional study, but not the two year period of the longitudinal study, while age differences in communication were sparse. No significant gender differences were obtained, gender group composition rather than gender itself being associated with differential use of communication.

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Chapter 1: General Introduction

1.1 Overview

The focus of this investigation is the role of childhood temperament and social interaction as predictors of peer popularity. Firstly, the concept of peer popularity is analysed (1.2), and possible predictors are discussed (1.3). The contribution of socialisation to problem behaviour is mentioned in section 1.4, while the relations between temperament and social interaction are investigated in section 1.5. Section 1.6 addresses relationships between temperament, communication style and peer popularity, and section 1.7 introduces the current study.

1.2 Peer popularity

This section defines the concept of peer popularity (1.2.1), and comments on its measurement (1.2.2) and attendant ethical concerns (1.2.3). It concludes by highlighting the negative outcomes of low peer popularity (1.2.4).

1.2.1 Peer popularity defined

Peer popularity is the average standing of a child in a given classroom environment. It is usually conceptualised in the form of distinct categories such as popular, rejected neglected, controversial and average children (e.g. Coie, Dodge and Coppotelli, 1982) or popular, rejected and indifferent children (e.g. Howe and McWilliam, in press). Alternatively, popularity can be expressed by a continuous scale ranging from low to high popularity (e.g French, 1988, 1990).

Although peer popularity is related to friendship, in so far as popular children tend to have more friends than unpopular children, the two constructs are distinct from each other, because even unpopular children may have some friends. Gest, Graham-Bermann and Hartup (2001) for example, collected sociometric nominations, social behaviour nominations and choice of best friend for a sample of seven to eight-year-olds at the first point of data collection in a longitudinal study. At the second point of data collection, unlimited friendship nominations were taken and descriptions of friendship networks obtained. Results showed that 39% of the rejected children had mutual friends, while 31% of the popular children actually had no mutual friends. Similarily, Howes (1990), followed kindergarten children to third grade, taking same-gender sociometric nominations and ratings. Her results showed that children of all social status groups had friends, although rejected, neglected, and controversial children had fewer friends than popular or average children.

It is not only the case that sociometric popularity fails to correspond exactly to number of friendships. Rather, Bukowski and Newcomb (1984), who assessed variability scores on sociometric nominations and ratings on social roles in third, fourth, and fifth grade children, note that it is exactly the variability of friendship nominations that defines the cluster of children with controversial social status. Being well liked and being popular are also distinct in terms of the behavioural dimensions underlying these constructs. Lease, Kennedy and Axelrod (2002) for example, differentiate between popularity and liking in a sample of fourth to sixth grade elementary students.

The researchers measured perceived popularity, liking, social dominance and set characteristics, such as disruptive, prosocial, and excluding behaviour, social visibility, and ownership of expressive equipment. Results showed that children, who were only sociometrically popular, displayed more social aggression than popular and well-liked children. Sociometrically popular girls were also more socially visible than well liked girls.

The stability of sociometric status varies according to time scale and status group. Coie and Dodge (1983), taking yearly sociometric nominations and standardised behaviour descriptions over a five-year period in a sample of third and fifth graders, found continuity of social preference over one-year periods. Parke, O'Neil, Spitzer, Isley, Welsh, Wang, Lee, Strand and Cupp (1997) followed participants from kindergarten to second grade, taking sociometric ratings and nominations as well as behaviour nominations and teacher rated social behaviour. They also found that social acceptance and competence were stable over two years, especially for popular and rejected children.

However, in their review, Frederickson and Furnham (1998) note that while studies report fair to good stability for rejected, popular and average groups when the time period in question is shorter than six months and no major transition, such as change of school, has taken place, studies investigating a longer time-span achieve, at best, moderate stability.

Concurrent with Terry and Coie (1991), who followed children from third to fifth grade using four different sociometric techniques, Frederikson and Furnhan (1998) report that stability of sociometric status is best for popular groups and worst for rejected groups. Continuity or discontinuity of social status may also describe different social trajectories for children. For example, Parke et al.'s (1997) study showed that stably rejected children were rated worse in social competence than transiently rejected children.

Research by Sandstrom and Coie (1999) suggests that it might be socially beneficial behaviours that determine whether a child remains rejected or not. The researchers assessed rejected fourth grade children at three points in time over a period of two years. They initially took peer nominations for aggression and sociometric status and assessed self-perceived social preference. These were followed by a sociometric interview at the end of the study. They compared children who remained rejected to children who improved their rejected status on measures of aggression, self-perception, locus of control, participation in extracurricular activities and parental monitoring. Their results showed that children who improved their social status displayed more social engagement through participation in extracurricular activities, and a more internal locus of control by accepting some responsibility for their experience of rejection.

Thus, peer popularity is related but not equal to friendship. Continuities and discontinuities of peer popularity relate to methodological characteristics of studies, while different social status categories show varying patterns of stability. The stability of rejection itself is linked to child behavioural characteristics.

1.2.2 Measures of peer popularity

As mentioned in section 1.2.1, peer popularity can be conceptualised as either distinct "categories" of peer status, such as popular, controversial, neglected or rejected, or as a continuous rating scale, ranging from "unpopular" to "popular".

The categorisation approach was introduced by Coie et al. (1982) who, assessing the reliability of sociometric status nominations over 12 weeks, employed sociometric nominations and standardised behavioural descriptions in their sample of third and fifth graders. Using regression analyses to predict social impact, the degree of salience of a certain child in the classroom, and social preference, the degree of social acceptance, the authors proposed the five status distinction of popular, neglected, rejected, controversial and average children. Working with standardised nomination scores, the authors argue that popular children are high both in social impact and social preference; neglected children are low in social preference and low in social impact; rejected children are high in social impact and low in social preference, and controversial children are high in social impact and dichotomous, i.e. both high and low in social preference. Average children are those children who are neither particularly high nor particularly low in impact and preference.

The rating scale approach differs from the categorisation approach in that it does not employ nominations - where participants are asked to **select** a fixed number of individuals who are liked or disliked - but aims at rating **all** of the participant's classmates. Most commonly, peers are rated on five or seven-point scales, often including a "don't know" option. Three-point scales have also been employed with younger children. Asher, Singleton, Tinsley, and Hymel (1979) for example compared sociometric nominations on a three point rating scale with four-year-old children, reporting high reliability for the rating scale.

There is some debate over which approach is preferable, especially as outcomes vary according to the technique employed. Erdley, Nangle and Gold (1998) for example obtained both sociometric nominations and ratings to compare friendship constructs in their sample of fourth and fifth grade students. They found that the constructs obtained differed according to the tool used. Mutual high ratings identified the largest number of friendship dyads, whereas mutual nominations revealed the smallest number. The combination of positive nominations reciprocated with a high rating, yielded an intermediate number of friendship dyads.

On the one hand, Terry and Coie (1991) argue that the advantages of peer nominations include better behavioural discrimination and better identification of children with specific patterns of social preference and impact. In addition, it requires less time, as the child only focuses on a limited number of classmates. Cognitive load is reduced since no decisions have to be made about less well-known classmates.

On the other hand, rating scales ensure that that every child in the classroom is explicitly assessed by all of its peers. Data yielded from rating scales are more amenable to complex statistical analyses, having obtained interval rather than nominal levels of measurement. Rating scales are able to make finer-grained distinctions, especially with regards to children who might not be the others' favourite but possibly `second best' or `second worst' friend (Maassen, Van der Linden, Goossens & Bokhorst, 2000). In addition, required scale results can be translated into categories by using standard deviations and means. Asher and Dodge (1986) for example, using ratings and nominations to identify rejected children in two samples spanning grade two to grade six, successfully used a rating of 1, the most negative scale point, in place of negative nominations.

More recently, Maassen's work has highlighted the benefits of a two-dimensional classification obtained through rating scales. Maassen and Verschueren (2005) compared their rating system with Coie et al.'s (1982) system and Asher and Dodge's (1986) system on children who were followed from third to sixth grade. Taking sociometric nominations and ratings to determine social status categories, the authors report superiority of the rating-based approach.

Weighing up the advantages and disadvantages of ratings and nomination systems, Terry and Coie (1991) conclude their study by arguing that the method chosen is primarily guided by the researcher's goals.

In the first study reported here, a peer nomination procedure will be utilised, as this was deemed more appropriate for pre-school children for whom even a simple scale might be too complex. In contrast, the second study will employ a peer rating procedure with older children, in order to obtain data suitable for a regression analysis.

Another matter of debate (and research goal) is whether same-gender or cross-gender assessments should be utilised. On the one hand children show same gender bias, preferring to play with children of the same gender rather than the opposite gender. Maccoby and Jacklin (1987), observing pre-school and first grade children during free play, noted the gender of the playmate, play with gender-typical toys or themes, activity level and social behaviour. The researchers found that play was more common with same gender friends and that gender segregation increased between the ages of four and six. This preference may well skew sociometric measures.

Concurrently, looking at an older age group, Shrum, Cheek and Hunter (1988) assessed the gender preferences of children from third to twelfth grade by using unlimited positive nominations. They found that when same grade friendships were assessed, there was a greater tendency for friendships to be within the same gender. This segregation was evident from third year and peaked when children entered middle school, with heterosexual friendships increasing in high school.

In addition, Hayden-Thomson, Rubin and Hymel (1987) followed kindergarten children to third grade and third grade children to sixth grade. Collecting sociometric nominations for each age group, the researchers found that opposite gender classmates were consistently rated lower than same gender classmates, the younger age group showing an age-graded increase in bias. Results obtained by Foster, Bell-Dolan and Berler (1986) also indicated poor overlap across genders for extreme scores.

On the other hand, Maccoby and Jacklin (1987) note that the same-gender preferences expressed in their sample were not predictive of gender preference for individuals, suggesting that every child played with a child of the opposite gender at some point. Similarly, despite the poor overlap across genders for extreme scores, the overall correlations obtained by Foster et al. (1986) were still moderate. In addition, the majority of studies meta-analysed by Newcomb, Bukowski and Pattee (1993), employed mixed gender ratings, showing that cross-gender ratings or nominations are considered acceptable as means of measurement.

Many studies, including some that will be addressed later (e.g.French, 1988; Hymel, Rubin, Rowden and LeMare, 1990; Lancelotta and Vaughn, 1989; Parke et al., 1997) have chosen multi-method investigations drawing on multiple raters, such as teachers, parents, and peers, in the attempt to strengthen the validity of their results.

Ashenbach et al. (1987) conducted a meta-analytic review of cross-informant data for studies assessing behavioural and emotional problems, including studies assessing likeability/popularity. Ashenbach and colleagues report high correlations (r=.60) between similar informants, and lower correlations (r=.28) for correlations between different participants, questioning the assumption that multi-method investigations contribute to increased convergent validity. However, Ashenbach et al. do not interpret their result as evidence for unreliability, but suggest that different informants contribute different information, as children adapt their behaviour according to different situations. The following studies employ peer assessment of popularity only, as peer popularity, rather than classroom behaviour or behaviour in the home is the dependent variable under investigation and peers themselves are therefore deemed to be the best source of information.

1.2.3 Ethical considerations in the assessment of peer popularity

On the face of it, there would be grounds for assuming that sociometric procedures may be damaging to the child and therefore unethical to use. A child could be taunted by others ("I have given you 0 points!") or experience distress as a consequence of admitting their dislike of someone. In reality, research has shown that there is little basis for these concerns.

Bell-Dolan, Foster and Sikora (1989), compared a group of fifth grade children after a sociometric nomination procedure with a control group. They found no evidence of any effect of the nominations on behavioural observations and on mood or loneliness questionnaires. Likewise, Iverson, Bateson and Iverson (1997) took positive and negative sociometric nominations in their sample of third to sixth grade students, together with an interview about the nomination experience and an assessment of loneliness. They detected no serious problems. Although a small sub-sample of low sociometric status children were talked about behind their backs and some high sociometric status children were openly complimented, no one reported hurt feelings. Overall, risk was not greater than expected in real life interaction. Therefore, the current study is not hesitant about using sociometric assessments, being confident that no harm is done to the children participating.

1.2.4 Low sociometric status: outcomes

Low sociometric status has been linked to exceedingly serious long-term outcomes, especially with regards to school performance and personal well–being. Roff, Sells and Golden (1972) reported a programme on social adjustment covering third to sixth grade. They used peer and teacher sociometric nominations, interviews with school personnel, and real life adjustment measures, also taking into account socio-economic status and family factors. The researchers found that rejected children were more likely to drop out of school than their non-rejected peers.

Concurrently, Woodward and Fergusson (2000) longitudinally assessed teacher rated sociometric status and child functioning in a sample of nine-year-olds. They found that at eighteen years of age, early rejected children had obtained fewer school certificates and were more likely to be unemployed than their not rejected peers.

Ladd (1990) followed kindergarteners for a year and measured the number of friends and school adjustment for each participant. His results showed that children with more friends developed more positive school perceptions, whereas rejected children evidenced negative school perceptions, higher levels of avoidance and lower performance. Likewise, Li (1985) followed kindergarten children up to grades two and three. Taking measures and rates of social interaction at time 1 and a teacher rated adjustment measure at time 2 and time 3, she obtained results showing that rejected children had lower school performance and acted out more than popular and average children did.

Hymel, Rubin, Rowden and LeMare (1990) followed their sample from second to fifth grade. They collected sociometric nominations and assessed social behaviour, self-concept, loneliness and dissatisfaction as well as teacher ratings of externalising problems, such as acting out aggression, and internalising problems, such as depression. Results indicated that low sociometric status predicted aggression and externalising problems, while low sociometric status paired with isolation and low perceived confidence predicted internalising problems. Results obtained by Roff et al. (1972) showed that the externalising problems of rejected children even reached the level of juvenile delinquency.

Worst of all, perhaps, early peer rejection may lead into a self-perpetuating cycle of failure. Coie and Kupersmidt (1983) provided support for the hypothesis that behaviour precedes sociometric status by observing that distinctive playgroup behaviour patterns of fourth grade boys, who were previously unknown to each other, led to a replication of school social status within the space of three sessions.

Conversely, results obtained by Miller-Johnson, Coie, Maumary-Gremaud and Bierman (2002), who followed first grade children through to fourth grade and assessed peer rejection and aggression, showed that peer rejection in first grade partially predicted conduct problems in grades three and four. Haselager, Cillessen, Van Lieshout, Riksen-Walraven and Hartup (2002) assessed sociometric rejection or acceptance, aggression, and prosocial behaviour ratings at three points with a sample consisting of kindergarten and first grade boys. The researchers stated that changes in social behaviour either co-occurred with or followed, but never preceded changes in sociometric dimensions. Thus, it seems that not only may problematic behaviour foster rejection, but continuing rejection may play a part in the maintenance of problematic behaviour.

1.3 Predictors of peer popularity

The following paragraphs will address possible predictors of peer rejection, namely aggression (1.3.1) withdrawal (1.3.2), the combination of aggression and withdrawal, as well as prosocial behaviour (1.3.3), physical attractiveness (1.3.4) and mental maturity (1.3.5).

Two of the most frequent correlates of low peer sociometric status are childhood aggression and/or withdrawal. Cillessen, van IJzendorn, van Lieshout and Hartup (1992) collected repeated sociometric status ratings for five to seven-year-old boys over a one-year interval. Cluster-analysing the ratings, the researchers detected rejected children who were aggressive and/or shy. Likewise, French (1988), looking at peer rejected nine to ten-year-old boys and obtaining sociometric ratings alongside teacher ratings and observation of social problem solving, also reported aggressive and withdrawn clusters of rejected boys. French's (1990) follow-up study with girls revealed again a cluster marked by shyness, consisting of withdrawal, anxiety and low performance, and a cluster marked by uncontrolled aggression, consisting of aggression and low self control.

1.3.1 Aggression

Aggression is associated with externalising problems and is linked to low peer popularity. Coie, Lochman, Terry, and Hyman (1992) obtained measures of aggression and teacher, parent, and adolescent self reports of social adjustment in a sample of third grade children. Their results indicated that aggression predicted self-reported externalising and internalising problems and parent-reported externalising problems. Teacher ratings of school adjustment were predicted by the combination of aggression and rejection. Likewise, Lancelotta and Vaughn (1989), collecting peer and teacher ratings of acceptance and aggression in a sample of third and fourth-graders, obtained negative correlations between popularity and aggressiveness.

The connection between aggression and peer rejection not only holds for aggressive behaviour itself, but also for temperamental predictors of aggression. Walker, Berthelsen and Irving (2001), assessed sociometric status in a sample of nursery school children with Asher and Dodge's (1986) method and collected teacher temperament questionnaires. Results indicated that rejected children displayed a more difficult temperament than popular children in terms of higher activity levels, more negative mood and lower persistence, all factors associated with acting out behaviours.

However, the aggression-rejection relation is not unequivocal, in that not all aggression leads to rejection. Dodge, Coie, Pettit and Price (1990) observed first and third grade boys and followed their observations with sociometric interviews. They obtained four types of aggressive behaviour that related differently to peer status. Rough and tumble play, for example, was not related to rejection, whereas reactive and instrumental aggression was highly associated with low peer popularity.

Concurrently, an increasing number of studies have obtained a sub-group of aggressive popular children, which is distinct from the group of aggressive-rejected children. Bagwell, Coie, Terry and Lochman (2000), for example, assessed sociometric nominations, aggression and membership in social cliques for a sample of fourth grade children. They found that aggressive children were central members of deviant cliques, and did not differ from non-aggressive children in terms of centrality.

Estell, Cairns, Farmer and Cairns (2002) also report a popular-aggressive sub-group. They followed first grade children for two years, collecting teacher evaluations of social competence and academic achievement and using face–to–face interviews to establish peer group and network centrality. They obtained a competent aggressive cluster with high network centrality for boys. Likewise, Gest et al. (2001) report that high network centrality was associated with both prosocial and antisocial behaviour. Rodkin, Farmer, Pearl and Van Acker (2000), looking at teacher ratings, peer and self-assessments and a social centrality measure in a sample of fourth to sixth grade popular boys, also showed the presence of both "model boys", who were popular and non-aggressive and "tough boys", who were popular and aggressive.

It is interesting to note that this aggressive popular cluster is primarily found in the population of boys. Indeed Stormshak, Bierman, Bruschi, Dodge and Coie (1999), assessing the sociometric status of first grade children, using hierarchical linear modelling to tease out individual and classroom contributions to popularity, found that while aggressive girls were disliked across all classrooms, aggressive boys were unpopular in low aggression classrooms but popular in high aggression classrooms. Likewise, Sandstrom and Coie (1999) obtained results indicating that rejected boys who were rated high on aggression actually showed an improvement in social status over a two year period. No significant improvement was detected in rejected girls.

1.3.2 Withdrawal

Withdrawal refers to the absence of peer interactions rather than to their negative quality. It is associated with inhibition rather than aggression. Asendorpf (1990), for example, assessed inhibition from pre-school to grade one in multiple settings over time. Results showed that inhibition was increasingly connected to failure at contact initiation attempts. Likewise, Kochanska and Radke-Yarrow (1992) followed toddlers to age five, assessing inhibition to social and non-social events at time 1 and peer interaction at time 2. Their results showed that social inhibition at time 1 predicted shy and inhibited interaction, whereas non-social inhibition predicted decreased involvement in group play.

There is no doubt that aggression has traditionally received more attention than withdrawal in the peer rejection literature. As Rubin and Coplan (2004) state in their essay review, withdrawal is harder to spot than acting out problems and invokes less of a reaction in others, especially in group settings where acting out behaviour becomes easily the focus of attention. Nevertheless, withdrawal is no less of a problem with regards to concurrent and longitudinal adjustment. A meta-analytic review of 38 studies by Newcomb et al. (1993), for example, confirmed that rejected children evidenced a significantly greater level of withdrawal than average children.

Studies comparing both aggression and withdrawal with reference to peer rejection highlight the inflated risk for children who experience a combination of aggression and withdrawal, i.e. the children who avoid social contact and who manage the little contact they have by using hostility towards their peers.

Ladd and Burgess (1999) took teacher ratings of aggression and social behaviour, peer assessed friendship and acceptance measures, and self assessed victimisation and loneliness reports in an at-risk and a control group of kindergarten children. Results indicated that aggressive withdrawn children were more unpopular than children who were only aggressive, who in turn were more unpopular than children who were withdrawn but not aggressive.

The different sets of competencies associated with aggression, withdrawal and withdrawn aggression were assessed by Hymel, Bowker and Woody (1993). They measured self-concept and peer assessed popularity and social competence in fourth and fifth grade children who were withdrawn, aggressive, or both. Like Ladd and Burgess (1999), their results showed that aggressive withdrawn children were less well accepted than their aggressive or withdrawn peers. Aggressive children were perceived as lower on academic competence, behavioural conduct, adult relations, cooperativeness and leadership than their withdrawn peers. Withdrawn children scored lower than aggressive children on athletic competence, appearance, style, social competence, humour, and social integration. The aggressive withdrawn children fared worst on most of the factors. Thus, both aggression and withdrawal have been linked to peer rejection, while children who experience a combination of both are at even higher risk of poor adjustment.

1.3.3 Prosocial behaviour

Prosocial behaviour is a third important correlate of peer popularity. Hayes Greener (2000) looked at a sample of eight to twelve-year-olds. Using child-generated aspects of prosocial behaviour, she collected peer nominations of prosocial behaviour and sociometric status, alongside self-ratings of social behaviour characteristics and teacher ratings of child generated social behaviours. Results showed that popular children were more prosocial than their peers, whereas rejected children were less prosocial than others. Likewise, Warden and Mackinnon (2003) used a social behaviour questionnaire to identify prosocial children in their sample of nine to ten-year-olds. Results again confirmed that prosocial children were more popular than non prosocial children.

Pakaslahti and Keltikangas-Järvinen (2001) assessed fourteen-year-olds who were aggressive and popular, aggressive and unpopular, non-aggressive and popular or non-aggressive and unpopular. Using peer nominations for a set of prosocial behaviours, namely friendliness, trustworthiness, helpfulness, and leadership, the researchers found that trustworthiness and leadership were more strongly related to popularity than friendliness and helpfulness. Subsequent analyses indicated that while popular girls scored higher on trustworthiness and helpfulness than on leadership, popular boys scored higher on trustworthiness and leadership than on helpfulness or friendliness, showing that different types of prosocial behaviour may be appropriate for boys and girls.

1.3.4 Attractiveness

Next to aggression, withdrawal, and prosocial behaviour, physical characteristics, such as attractiveness and mental maturity, impact on peer popularity. As early as 1975, Salvia, Sheare and Algozzine, measuring self concept and peer acceptance in a third, fourth and fifth grade sample, followed by experimenter rated attractiveness, noted that attractive children were more socially accepted and had higher self-concepts than their less attractive peers.

Eagly, Ashmore, Makhijani and Longo (1991) conducted a meta-analytic review of 76 studies investigating the relationship between physical appearance and perceptions of social competence, adjustment, intellectual competence, integrity, and concern for others. Their analysis suggests that there is a strong relationship between attractiveness and perceived social competence, including peer popularity. Likewise, results obtained by Lease et al. (2002) indicate that attractiveness and spending power related positively to both sociometric popularity and liking scores.

1.3.5 Mental maturity

Studies investigating aspects of mental maturity such as intelligence, moral reasoning and theory of mind, also report correlations between these factors and peer acceptance. Guralnick and Groom (1987) for example, assigned non-delayed and mildly delayed three and four-year-olds to groups with heterogeneous age and heterogeneous developmental level. Their results showed that mildly delayed children were consistently less popular than their non-delayed peers.

Slaughter, Dennis and Pritchard (2002) found that four to six-year -old children, who were nominated as popular, performed better on a theory of mind task than rejected children. A second study taking into account verbal intelligence and teacher rated prosocial and aggressive behaviour, revealed that while high popularity in younger children was predicted by prosocial behaviour, theory of mind remained the best predictor of popularity for older children. Bear and Rys (1994) assessed second and third-graders on moral reasoning dilemmas, having collected sociometric nominations and teacher ratings of behaviour. While results for girls were non-significant, hedonistic moral reasoning explained a unique variance in teacher rated lack of competence, acting out behaviours and low sociometric status in boys.

Richard and Dodge (1982), obtained sociometric nominations and ratings of isolated, aggressive and co-operative behaviours in a sample of second to fifth-graders. Results showed that when children were given hypothetical situations concerning either conflict scenarios or friendship initiation, popular children fared better on general conflict management and problem solving skills than rejected children.

In summary, peer aggression, withdrawal, prosocial behaviour, attractiveness and mental maturity all contribute to a child's popularity status. The real picture however, is likely to be much more complex when interactions between these factors are taken into account. As shown above, the combination of aggression and withdrawal seems to be more detrimental to a child than either characteristic in isolation, and other interactions are sure to reveal both additive and ameliorative effects.

Aggression and withdrawal, the two behaviour patterns that are associated with peer rejection rather than with peer popularity, can either be "caused" through a difficult upbringing or could be traced back to the personality disposition or temperament of the child. The next section will briefly address the role of upbringing in the socialisation of disruptive behaviour, before – pertaining to the hypotheses of the current study – the role of temperament in social interactions will be addressed at greater length.

1.4 The socialisation of problem behaviour

The socialisation of problem behaviours such as aggression is addressed by studies that assess both parents' and children's characteristics. These studies either include both parents and children in their sample or address children's perception of parenting.

Hale III, Van Der Valk, Engels and Meeus (2005), working with ten to nineteen-year-olds, asked their participants to complete depression, aggression and perceived parental rejection questionnaires. Structural equation modelling showed that perceived parental rejection was associated with adolescent aggression, and that this association was partially mediated through adolescent depression.

Likewise, Nicholas and Bieber's (1996) undergraduate student sample completed questionnaires on aggression and hostility, involvement in physical fights and exposure to abusive and supportive parenting. Results showed that emotionally abusive parenting was related to higher hostility and aggression in the students.

Black, Smith Slep and Heyman (2001), reviewing effect sizes of six studies pertaining to risk factors for child psychological abuse, report that parental aggression, hostility and neuroticism were all related to psychological abuse of children, again supporting the possibility of self-perpetuating cycles of intergenerational transmission.

Using an observational design, Snyder, Stoolmiller, Wilson and Yamamoto (2003) coded display and regulation of anger and antisocial behaviour with questionnaires for a sample of six-year-old children. They also conducted child–parent observations. Their results showed that child anger increased as parents' negative and insensitive responses towards the child accumulated during the observations. Moreover, persistent child antisocial behaviour was associated with the frequency of parental negative behaviour displayed during the observations.

Similarly, Strayer and Roberts (2004) investigated families with children aged from four to five years, eight to nine years, and twelve to thirteen years. The researchers assessed child, teacher and best friend rated empathy, child, mother and teacher rated anger, child measures of emotional expressiveness, role taking skills and prosocial behaviour, as well as parental measures of empathy, encouragement, independence, warmth and discipline. Path analyses revealed that paternal authoritarianism and maternal anxiety and guilt control were associated with higher degrees of child anger.

In a twenty-five-year longitudinal study whose sample consisted of families with children aged one to ten, Johnson, Smailes, Cohen, Kasen and Brook (2004) assessed the history of maternal and paternal antisocial behaviour and problematic parenting at home, as well as childhood behavioural and emotional problems. When the children had reached the age of thirty, the researchers obtained questionnaire assessed aggression measures and police records.

Results indicated that problematic parenting was associated with childhood aggression even after the history of parental antisocial behaviour was controlled. Problematic parenting also mediated the relationship between a parental history of antisocial behaviour and offspring aggression. Thus, there is good evidence that parenting practices contribute to child social problem behaviours, such as aggression. However, child social behaviour has also been linked to intrapersonal characteristics of the child, primarily temperament.

1.5 Temperament and social functioning

The following paragraphs will explore the role of childhood temperament in relation to social behaviour. The first section (1.5.1) will introduce the historical origins of temperament before arriving at a definition based on Allport's (1961) approach (1.5.2). Pertinent to the current study, Rothbart's (1981) conception of temperament will become the focus in section 1.5.3. Subsequently, the temperamental traits assessed in the current study, namely negative affectivity, impulsivity and effortful control, are explained and related to children's social functioning in section 1.5.4, before section 1.5.5 acknowledges cultural influences on temperament.

1.5.1 Temperament defined: The historical roots

The notion of temperament (from the Latin: temperamentum = mixture) originated in ancient Greece, where Empedocles (492BC-432 BC) proposed that all matter could be classified into the four elements of water, earth, air and fire.

These elements were integrated into the study of medicine by Hippocrates (460BC-380BC) and Galen (131AD-201 AD), who, in addition to investigating their role in physical health (as blood, phlegm, yellow bile and black bile), hypothesised their relations to different personality typologies. The personality aspect of the four-humour doctrine stayed popular well into the Middle Ages and the Elizabethan period, being cited by Shakespeare (1564 – 1616, for example in *Antony and Cleopatra*), Jonson (1572-1637, for example *Everyone in his humour*, 1598) and their contemporaries.

Temperament made its way into 20th century thinking via the works of Kretschmer (1888-1964) and Sheldon (1940), who both proposed an association between body build and temperamental characteristics. Kretchmer proposed a relation between “leptosome”, “athletic”, and "pyknic" physique and personality traits of “schizothymes”, whose reactions are abrupt and disregulated, and “cyclothymes”, who are, on the whole, more fluent and regulated.

Similarly, Sheldon related different temperamental traits to three body types, namely the overweight, good humored and relaxed "endomorph", the athletic and competitive "mesomorph", and the lean and introverted "ectomorph". Jung (1875 – 1961) greatly popularised the study of personality types. He developed eight personality types from combinations of extraversion or introversion and the functions of thinking, feeling, sensation, and intuition. His typology was later adapted by Myers (1962), who devised the Myers Briggs Type Indicator (MBTI).

The "modern" field of temperament studies was introduced by Allport's (1961) work on "pattern and growth in personality", which presents a survey of the field of personality psychology at that time. This survey shaped, amongst others, studies conducted by Thomas and Chess (1977). Thomas and Chess, starting in 1965, followed infants to ten years of age, assessing them on the factors of activity level, rhythmicity (regularity), approach/withdrawal, adaptability, threshold of responsiveness, intensity of reaction, quality of mood, distractibility, and attention span and persistence. Ratings on previously specified behaviours at each age level distinguished easy children, difficult children - who were at risk of later behaviour problems - and those who were slow to warm up.

Buss and Plomin (1975) criticised methodological issues in Thomas and Chess' study, such as the lack of justification for the specified behaviours. Disagreeing with such a high number of factors, they conducted a large questionnaire-based study with children aged from one to nine years. Factor analyses of scores led them to reduce the nine traits of Thomas and Chess into the four traits of emotionality, activity, sociability, and impulsivity (EASI). Impulsivity was later dropped on the grounds of insufficient evidence for heritability. The field was further developed by contributions from Rothbart (1981), whose work will be addressed later in this chapter.

1.5.2 Temperament defined

Allport (1961) defined temperament as "*the characteristic phenomena of an individual's nature, including his susceptibility to emotional stimulation, his customary strength and speed of response, the quality of his prevailing mood, and all the peculiarities of fluctuation and intensity of mood, these being phenomena regarded as dependent on constitutional make-up and therefore largely hereditary in origin*" (p.34).

Although Shiner and Caspi (2003), reviewing current advances in the investigation of temperament, caution that measures with the same name may not necessarily measure the same concept and that the same concepts are sometimes measured under different names, Allport's (1961) definition still highlights some accepted conceptual characteristics of temperament.

The first of Allports's (1961) characteristics relates to valence of mood ("the *quality* of the prevailing mood"). The idea that individuals can be predisposed to either positive or negative emotions has found support in theories of temperament, such as Thomas and Chess' (1977) *general mood* factor, Buss and Plomin's (1975) *emotionality* contruct and Rothbart's (1994) factor of *negative emotionality.* Accordingly, in their review of major contributions to the study of temperament, Shiner and Caspi (2003) also assert *irritable distress* as a core factor of childhood temperament.

The second of Allport's characteristics, the intensity of mood ("*speed* of response and *intensity* of mood, *susceptibility* to stimulation") refers to temperament as "behavioural style" (Thomas and Chess, 1977, p.9). Here, the *how* rather than the *what* of behavioural responses is under investigation. This *how* is reflected in Thomas and Chess' (1977) factors of *sensitivity threshold, intensity* and *energy level* of responses, and Buss and Plomin's (1975) concepts of *activity and impulsivity*. In Rothbart's conceptualisation, the *how* is implied in the interplay between negative affectivity and inhibitory control mechanisms, although Rothbart, Ahadi and Evans (2000) argue that there is no generic behavioural style, but rather that specific behavioural styles accompany specific emotions.

The third component given by Allport (1961) is the factor of heritability ("*constitutional* make-up and therefore largely *hereditary* in origin"). Buss and Plomin (1975) draw on heritability estimates to justify the inclusion of a given behavioural trait into their concept of temperament. They presented twin-study data supporting the argument for the heritability of their three traits of activity, sociability and emotionality, while support for their trait of impulsivity was somewhat questionable. Nonetheless, impulsivity was specified as a core factor of temperament by Derryberry and Rothbart (1988), who also argue that heritability does not equal being observable in infancy, because some aspects of temperament, such as inhibitory control, may become evident only later in life (see also Rothbart, Ahadi, Hershey and Fisher, 2001).

According to Shiner and Caspi (2003), temperament may affect life by impacting on the achievement of developmental milestones, by characterising the role the individual plays in his or her social environment, and by predisposing the individual to select patterns of behaviour. These patterns may represent differential responses to events and may evoke different reactions from the environment, which in turn may reinforce certain behaviour patterns.

1.5.3 Rothbart's concept of temperament

The current study will draw on Rothbart's concept of temperament utilising the Child Behaviour Questionnaire (CBQ, Rothbart et al., 2001) based on Rothbart's dimensions. Rothbart's approach to temperament has received much attention with regards to social functioning.

A number of studies that will be reported later (e.g. Eisenberg, Spinrad, Fabes, Reiser, Cumberland, Shepard et al., 2004; González, Fuentes, Carranza and Estévez, 2001; Howe and McWilliam, in press; Murphy, Shepard, Eisenberg and Fabes, 2004) draw on the CBQ as an assessment measure. In addition, through collaboration with Posner, Rothbart's research facilitates links to research investigating the neuropsychological processes underlying temperament (e.g. Jones, Rothbart and Posner, 2003; Rothbart, Ellis, and Posner, 2004; Rueda, Posner and Rothbart, 2004). The CBQ has been successfully used cross-culturally, for example by Van den Bergh and Ackx (2003) in the Netherlands, by Zylicz (2000) in Poland, by Jyothi Shenoy, Kapur and Shanmugam (1995) in India, and Chen, Cen, Li and He (2005) in China.

Rothbart, Ahadi and Hershey (1994) have defined temperament as: "*constitutionally based individual differences in reactivity and self-regulation, with the term* **constitutional** *referring to a person's relatively enduring biological makeup influenced over time by heredity, maturation and experience*" (p. 22). Rothbart (e.g. Rothbart et al., 2000) disagrees with Thomas and Chess (1977) about a generic behavioural style that is independent of emotional valence, because some behavioural patterns are shown in specific settings only and the intensity of emotional reactions varies across modalities. She proposes a three-component structure of temperament that is organised around the factors of reactivity / negative affectivity, surgency and effortful control.

Here, negative affectivity refers to emotional valence in either positive or negative domains. Surgency refers to the dispositional readiness to respond and the intensity of responses. Effortful control encompasses mechanisms that monitor and modulate reactive experiences (controlling reactive stimuli), and regulate expressive tendencies (controlling emotional responses to stimuli). Concurrently, the CBQ, based on Rothbart's suggested structure, assesses the domains of negative affectivity, extraversion/surgency and effortful control. The CBQ is by now a well validated instrument, reported internal consistencies being .77 (Ahadi, Rothbart and Ye, 1993) and .78 (Kochanska, DeVet, Goldman, Murray, and Putnam, 1994).

The current study, arguing that low inhibition, high impulsivity and high negative affectivity may be predictive of low peer popularity, will use a short form of the CBQ. This short form incorporates the Anger/Frustration (A/F) scale from the negative affectivity factor, the Impulsivity (IM) scale from the extraversion/surgency factor and the Inhibitory Control (IC) scale from the effortful control factor. According to Rothbart et al. (2001) loadings for six to seven-year-olds were .64 for A/F on the negative affectivity factor, .87 for IM on the extraversion/surgency factor, and .60 for IC on the effortful control factor. Loadings for four to five-year-olds were comparable. The short form has previously been used by Howe and McWilliam (in press). The subsequent paragraphs will explore the concepts of negative affectivity, impulsivity and inhibitory control in more depth, relating each to quality of social functioning.

1.5.4 The temperament components employed in the current study and their relation to social functioning

The next three sections (1.5.4.1 – 1.5.4.3) will discuss negative affectivity, impulsivity and inhibitory control and their role in social functioning. The reader should bear in mind that although these components are separate from each other, they work in conjunction with each other. Derryberry and Rothbart (1988) highlighted this point, when they theoretically decomposed the factors of arousal, emotion and self-regulation into nineteen sub-scales.

Assessing these scales with undergraduate students and using correlations and factor analyses to confirm constructs obtained, Derryberry and Rothbart's data suggested that temperament was more complex than the three factors per se. However, rather than assuming multiple independent systems, the authors state that the known distinct systems may work in conjunction or underlie the same higher order mechanisms.

1.5.4.1 Negative affectivity

Negative affectivity, measured via the Anger/Frustration scale of Rothbart's (1989) CBQ, refers to the amount of negative affect related to interruptions of ongoing tasks or goal blocking.

Biologically, experiencing negative emotions has been associated with the activity of the amygdala. Phan, Fitzgerald, Nathan, Moore, Uhde and Tancer (2005) presented adult participants with aversive pictures and instructed them either to maintain or to suppress the negative emotions. Functional magnetic resonance imaging showed that the amygdala became more active with increasing negative affect. Likewise Panksepp (1998) locates his "rage system", the neurological system associated with anger, frustration and hot aggression, in the medial amygdala and the perifrontal hypothalamus. Suppression of negative emotion has been associated with the dorsal anterior cingulate, which in Phan et al.'s (2005) study was inversely related to the intensity of negative affect.

In terms of social development, studies report problematic social relations in children with high negative affectivity, particularly if this negative affectivity is accompanied by poor control mechanisms. Eisenberg, Pidada and Liew (2001) collected parent and teacher information on regulation, emotionality, and social functioning, peer nominations of sociometric status and social behaviour, and self reports on regulation, in a sample of third grade children. They found that low regulation and high emotionality related to low appropriate social behaviour, high problem behaviour and peer rejection.

Lengua (2003) obtained comparable results in a sample of third to fifth graders. Lengua employed Rothbart's Early Adolescent Temperament Questionnaire (Capaldi and Rothbart, 1992) to assess emotionality and self-regulation and collected behavioural measures of emotionality, self-regulation and impulsivity as well as mother and child reports of adjustment. Results showed that high irritability was linked with higher internalising and externalising problems and lower social competence. Likewise, Murphy et al. (2004) obtained teacher ratings of social behaviour, popularity, negative affectivity and attention, and parent ratings of problem behaviour and negative emotionality alongside measures of inhibition and self control for a sample of ten to twelve-year-olds. Results showed that children high in social functioning were low on negative emotionality and high on regulation.

Children high in negative emotionality show poor anger management and poor conflict resolution skills. Having collected mothers' reports of temperament and observed participants during free play and during play with limited toys, Calkins, Gill, Johnson and Smith (1999) assessed a sample of two-year-olds on frustration eliciting tasks and a cooperation task. Measuring distress and regulation, the researchers found that high negative affectivity and low regulation predicted conflict behaviour.

Using an older sample of four to six-year-olds, Murphy and Eisenberg (1997) performed a puppet procedure, in which children were asked to show how they would react if their peers were angry with them. The researchers related responses to emotionality, regulation and social functioning. Results showed that boys with teacher rated behaviour problems, who were emotionally intense and unregulated, showed more unfriendly responses than their less intense peers.

Good anger management skills, in turn, are important for peer relations. Fabes and Eisenberg (1992) for example, observed children's responses to anger in pre-schoolers' free play, and collected measures of social competence and popularity. They found that socially competent and popular children had better anger management skills. Similarly, Eisenberg, Fabes, Bernzweig, Karbon, Poulin and Hanish (1993), obtained parent ratings of preschoolers' emotionality, regulation and social skills and teacher ratings of constructive coping, attentional control, and sociometric status. Their results indicated that coping through acting out behaviour was negatively related to social skill and boys' peer status.

Furthermore, the relationship between high emotional reactivity and rejection seems to grow worse over time. Using a growth curve analysis over three months, Fabes (2002) assessed dispositional negative affectivity and observed changes in expressed negative emotion in a sample of preschoolers. Results showed that while negative affectivity decreased with age, children scoring high on negative affectivity showed increasing rates of solitary play.

It is interesting to note that the relationship between irritability and social skill seems to be particularly applicable to boys (e.g. Eisenberg et al., 1993; Murphy and Eisenberg, 1997), a finding that perhaps relates to previously reported gender differences in the acceptability of aggression (e.g. Sandstrom and Coie,1999).

However, some positive behavioural traits may also be related to negative emotionality. Dunn and Cutting (1999) observed pre-school friendship pairs playing together on two occasions and assessed children on a test battery consisting of theory of mind at time 1, and emotional understanding, language, and teacher and mother rated reports of temperament at time 2. Results showed that emotional reactivity was positively correlated with coordinated play and bids for attention in their samples.

1.5.4.2 Impulsivity

Impulsivity is defined as the inability to delay or inhibit a dominant response in order to elicit a desired alternative response. While the inability to delay has become part of many experimental paradigms, some of which will be described below, González et al. (2001) have documented the inability to inhibit a dominant response in a Stroop task. Working with seven-year-old children, the experimenters assessed levels of activity, impulsivity and control in their sample, before conducting a Stroop test with additional distracters.

A Stroop test sets up a competition between word reading and colour naming by presenting colour names in discrepant print colours. For example, the word "red" printed in black, the word "yellow" printed in green and the word "blue" printed in orange. Successful naming of the colour of the word demonstrates the ability to inhibit an automatic reading response. González at al. (2001) used additional distracters, displaying the word "black" printed in white next to the target word. Results showed that girls with high activity and impulsivity and low control showed stronger stroop interference effects, thus showing less ability to suppress responses under instruction.

Biological correlates of impulsivity were investigated by Horn, Dolan, Elliott, Deakin and Woodruff (2003). The researchers assessed adults' trait impulsivity using Eysenck and Eysenck's (1991) impulsivity, venturesomeness and empathy inventory (IVE –I) and Barratt's (1994) impulsivity scale. They then conducted a go/no-go task to test inhibition. Functional magnetic resonance imaging revealed a strong association between Eysenck's impulsivity score and posterior orbital activation. Furthermore, the lateral anterior orbifrontal cortex was active in the maintenance of inhibition in impulsive participants, a finding that can be related to the activation of the frontal cortex in inhibition, which will be described in section 1.5.4.3.

In a normal population, impulsivity has been found to decrease over time. Olson, Schilling and Bates (1999) measured impulsivity in six and eight-year-olds, obtaining parent and teacher ratings on externalising problems at age seven to ten, and parent and self-ratings at age fourteen to seventeen. Results showed that impulsivity decreased with age in academic settings and also when incentives were offered for an interactive task.

Clinical approaches to impulsivity are addressed by research into attention deficit hyperactivity disorder (ADHD), where Gray's (1987) theory of a biologically based behavioural activation system (BAS) and behavioural inhibition system (BIS) is a dominant paradigm. It is argued that ADHD symptoms stem from an underactive BIS. The social cost of an underactive BIS has been addressed by Matthys, van Goozen, de Vries, Cohen-Kettenis and van Engeland (1998). Matthys et al. worked with ten-year-old boys who were diagnosed with conduct disorder (CD), CD comorbid with ADHD and a group of normal controls. Participants were rated on attention, aggression, delinquency and depression and took part in two experimental tasks.

The first task was a computerised door opening task, in which the ratio of "losses" to "rewards" increased steadily, and the second task was playing a game with a research assistant. During the game, the assistant used comments to activate either the BAS or the BIS. Participants' social behaviour during the game was coded as prosocial or antisocial behaviour of varying degrees.

Results showed that attention problems were related to performance on the door opening task, showing response preservation, the inability to inhibit a previously rewarded action in order to avoid punishment. Attention problems were also related to moderately antisocial behaviour and thus to impaired social functioning.

The long-term social costs of impulsivity in non-clinical samples have been addressed by Campbell, Breaux, Ewing and Szumowski (1984), who followed three-year-olds identified as inattentive, overactive and disruptive by teachers and parents. Results showed that children with problems at three years continued having social problems at four years of age. Likewise, Shoda, Mischel and Peake (1990), who assessed four-year-olds on a self-imposed delay situation, found that the ability to delay at age four was related to the ability to cope with frustration and stress at ages fifteen to nineteen. Similarly, Caspi and Silva (1995) report that three year-old-children who evidenced a lack of control, scored high on danger seeking, aggression and interpersonal aggression at age eighteen.

Due to their social problems, highly impulsive children are at risk of peer rejection. Pope, Bierman and Mumma (1989) obtained measures of sociometric status and teacher rated impulsivity, inattention, motor hyperactivity and aggression in primary school children. They found that although both aggressive and hyperactive children were unpopular with their peers, it was the factors of impulsivity and attention that predicted negative sociometric status over the years.

Furthermore, Snyder, Prichard, Schrepferman, Patrick and Stoolmiller (2004) followed kindergarteners for two years and assessed child impulsiveness-inattention and peer rejection as predictors of conduct problems in a growth curve analysis. Results suggested that the relation between impulsiveness-inattention and conduct problems is mediated through peer rejection for boys. For girls, the effects of rejection and impulsiveness-inattention are additive.

Moreover, social rejection has been reported to increase impulsive behaviour, once more creating a possibly self-perpetuating cycle. Baumeister, DeWall, Ciarocco and Twenge (2005) report a series of experiments that show that adult participants who were asked to envisage a lonely future or rejection by friends were less likely to take a healthy but bad tasting drink and ate more cookies. Participants who were made to feel rejected also showed less persistence and less attention regulation than a control group.

1.5.4.3 Inhibitory Control

Inhibitory control is defined as the capacity to plan and suppress inappropriate approach responses under instructions or in uncertain situations. Mirrored in the concepts of behavioural inhibition (Barkley, 1997) and emotional and behavioural inhibition (Eisenberg and Fabes, 1998), inhibitory control is concerned with those mechanisms that *modulate* reactive behaviour and *regulate* expressive tendencies.

The biological bases for a general inhibitory system have been addressed in Gray's (1987) concept of the BIS and Norman and Shallice's (1980) supervisory attentional system, both based on the executive functions of the frontal lobes. Ruff and Rothbart (1996) note that the maturation of the pre-frontal cortex co-occurs in time with increased self control. More specifically, Bush, Luu and Posner (2000) highlight the role of the anterior cingulate cortex in the role of attention, supporting findings by Phan et al. (2005) who note that the dorsal anterior cingulate relates to the suppression of negative affect. The dorsolateral prefrontal cortex may also be implicated in inhibition (MacDonald, Cohen, Stenger and Carter, 2000).

Inhibition has been found to increase with age. Kochanska, Murray, and Coy (1997), following toddlers to early school age, assessed their participants on an observational battery. Results showed that levels of control were stable across individuals, that control increased with age and that girls showed more control than boys did.

This was corroborated by Kochanska, Murray and Harlan's (2000) study with children aged 22 to 33 months. Obtaining parent ratings of effortful control and assessing performance on behavioural tasks, results indicated an increase in control over the eleven months period, with higher level of control found in girls. In addition, effortful control was linked to more regulated anger and joy and to stronger restraint. Likewise, Jones et al. (2003) observed three to four-year-old children on a 'Simon Says' task, paying attention to inhibition of action, error detection and correction, and verbal and physical control strategies. Again, Jones at al. found an increase of executive attention/inhibition with age.

Trembach, Belyaev and Lysenko (2004), working with seven to ten-year-old children, determined normative values of attention, impulsivity, response time, and response time variability with the "Test of Variables of Attention" (TOVA). They as well, obtained an age-related increase in attention that was accompanied by a decrease in impulsivity.

Very high levels of inhibition are predictive of social maladjustment because they are linked to withdrawal which, as noted earlier, is a predictor of peer rejection. Asendorpf (1990) followed pre-school children to first grade, assessing inhibition in multiple settings. He found that over time, inhibition was increasingly connected with rejection. Within a normal range however, higher inhibition has been consistently linked to superior social functioning, even from young ages.

Kochanska, Coy, Tjebkes and Husarek (1998) looking at eight to ten-months-old infants, collected parental reports on temperament and observed children's emotional tone during interactions with the mother. The children then underwent a standard experimental procedure used to elicit emotions of joy, fearful distress, angry distress and discomfort. The researchers measured the latency of responses, discreet emotional behaviours, and the average and peak intensity of behaviours. Their results indicated that focussed attention was associated with better modulated negative affectivity.

Moving on to older children, Fabes, Eisenberg, Jones, Smith, Guthrie, Poulin, Shepard and Friedman (1999) found that the emotional intensity of children's peer interactions moderated the relation of effortful control to social competence. Effortful control was measured for pre-schoolers, who were then observed during peer interactions. Results showed that children with high effortful control experienced low levels of negative affect in peer interactions and were good social responders, provided the interactions were not too intense.

Eisenberg, Spinrad, Fabes, Reiser, Cumberland, Shepard, Valiente, Losoya, Guthrie and Thomson (2004) followed pre-school and primary school children for a period of two years. The researchers obtained parent and teacher reports on regulation, reactive control, resiliency, negative emotionality, and reactive problem behaviour. They then empirically tested children's persistence on a challenging puzzle box task.

Structural equation models showed that although both effortful control and impulsivity contributed positively to resilience, effortful control was negatively linked to aggression and impulsivity was positively linked to aggression. Aggression, as shown by Coie et al. (1992) and Lancelotta and Vaughn (1989), is negatively related to peer popularity.

Likewise, Eisenberg, Fabes, Shepard, Murphy, Guthrie, Jones, Friedman, Poulin and Maszk (1997) report on a sample that was followed from four to ten years of age. Using teacher assessed social skill and popularity, parent rated problem behaviours and teacher and parent reported emotionality (emotional intensity, negative affect and measures of regulation), they tested participants using a puppet assessment and observed their peer interaction style. Their results showed that high quality social functioning was predicted by high regulation and low levels of non-constructive coping, negative emotionality and emotional intensity. Also, as noted previously, Murphy, et al. (2004) found that children who were high in social functioning were high on regulation, while results by Lengua (2003) showed that inhibitory control was linked to lower depression, higher social competence and well being.

While Calkins et al. (1999) reported that measures of emotional regulation predicted co-operation rather than conflict, research by Liew, Eisenberg and Reiser (2004) showed that controlled children are also better at handling negative interactions when they occur. The researchers obtained parent and teacher ratings of negative emotionality, effortful control, social competence, adjustment, popularity and externalising behaviour, as well as peer nominations of prosocial behaviour, popularity, externalising behaviours and aggression. They then asked their participants to rate five gifts in order of preference. After the testing session, participants initially received the least liked gift, which was later to be exchanged for the most liked gift.

Rating responses to the disappointment on intensity and duration, results showed that children, who were rated high on effortful control and low on negative emotionality, expressed fewer immediate reactions to disappointment and were perceived more socially competent and well adjusted.

Jensen-Campbell, Gleason, Adams and Malcom (2003) investigated the factor of agreeableness from Costa and McCrae's (1985) 'big five' personality factors, which consist of neuroticism, extraversion, agreeableness, openness to experience and conscientiousness, pointing out the association between agreeableness and effortful control. They collected self-assessed 'big five' and conflict resolution measures alongside parent and teacher rated coping, self-regulation and interpersonal adjustment measures in a sample of sixth grade children. Results showed that agreeableness was associated with constructive conflict resolution. A follow-up study with the same sample showed that pairs of agreeable children displayed more harmony in a cooperative conflict task and that peers were more comfortable in the presence of agreeable children.

Thus, there is a body of evidence that links high anger/frustration, high impulsivity and low inhibitory control to social problem behaviours and rejected peer status, while high inhibition, low negative affectivity and low impulsivity are associated with socially competent behaviour.

1.5.5 Cultural considerations

Because temperament in its evolutionary role has to be adaptive to given cultural parameters, it should be no surprise that the social desirability of certain temperamental traits varies across cultural settings, giving rise to goodness of fit considerations. The concept of goodness of fit, introduced by Thomas and Chess (1977), considers how well the temperament of the child is suited to given social environments.

De Vries (1984), following a group of Masai infants with easy temperament and a group with difficult temperament, found that infant mortality was higher in children with easy temperament. Children with difficult temperament increased their chances of survival, by drawing attention to themselves. Thus, for the Masai, difficult temperament was preferred over easy temperament. There are also big differences in the acceptance of aggressive behaviour between the Harney Valley Paiute and the Siriono tribes (Whiting, and Child, 1953). The former severely discourage aggression, while the latter accept aggression quite readily.

Although an overly inhibited child in Northern Europe and the United States might be perceived to be withdrawn and unpopular, research with eight to ten-year-old children showed that in China, inhibited children scored higher on peer-leadership and popularity than their more sociable counterparts.

Chen, Rubin and Li (1995) followed eight and ten-year-olds for two years and obtained peer assessed social behaviour and sociometric nominations, and teacher rated school related competencies. The researchers found that at ages eight and ten shyness-sensitivity was positively related to peer-acceptance, leadership and academic skill. Interestingly however, at age twelve, shyness-sensitivity related positively to rejection.

A recent study by Chen et al. (2005), who collected data from third and fourth grade children in 1990, 1998 and 2002, attributes this association to cultural development. Chen et al. collected peer assessments of social functioning, sociometric nominations, and teacher ratings of school related social competence, alongside statistics of leadership, academic performance and depression in all three cohorts. Results showed that although shyness was positively related to social and academic achievement in 1990, the associations fell below significance in 1998. In 2002, the relation between shyness and social and academic adjustment was negative, perhaps indicating the influence of a changing culture.

Within a given culture, variation in perceptions of temperament may contribute to cross-rater discrepancies found in multi-method investigations. Achenbach, McConaughy and Howell (1987) conducted a meta-analysis focusing on different informants' reports of behavioural and emotional problems. Results showed that correlations between different reporters (teachers, parents) were only modest, suggesting that behaviour that is conceived to be a problem by one informant, is seen as more benign by other sources.

Eisenberg et al. (1997) found that while teacher and parent ratings were positively associated on measures of regulation, there was no association on measures of negative emotionality. They attribute these results either to the possibility of increased differentiation in children's behaviour across contexts or to differences between teachers' and parents' perceptions.

1.6 Communication, popularity and temperament

Thus far, the review of the literature suggests that children with a difficult temperament, in particular under-controlled children and those high in negative affect, are likely to engage in disruptive or inappropriate social behaviour which, in turn, is related to peer rejection and to disadvantageous long-term outcomes.

The majority of studies mentioned above make the link between temperament and social outcomes by using behavioural observations, drawing on reports of aggressive or prosocial behaviours, delay task performances or controlled reactions to disappointment. Fewer studies have taken into account more verbal expressions of temperament.

However, as Samter (1992) notes, while young children spent most time playing together, older children spent time talking, with even play becoming increasingly verbal. Thus, it is pertinent to explore whether different communicative abilities also relate to social behaviour.

This section will address possible relations between communication - as opposed to behaviour - popularity and childhood temperament. Communication as related to peer popularity will be reviewed in section 1.6.1, which argues for specific communication patterns that differentiate popular and rejected children. Gender specific communication will be addressed in section 1.6.2. Following, the possibility of a temperamental basis for communication will be suggested in section 1.6.3.

1.6.1 Communication and popularity

Like the behavioural characteristics outlined in section 1.5.4, verbal communication characteristics have been found to be related to peer popularity. For instance, studies of group entry situations, where the target child has to negotiate successful entry into an already existing dyad, have shown that popular children are more likely to take turns and respond contingently to their peers.

Black and Hazen (1990), looking at acquainted and unacquainted pre-school children, took sociometric nominations and observed communication in a group entry situation. Results showed that disliked children were less responsive and made more irrelevant comments than their peers.

Likewise, Black and Logan (1995), observing two to five-year-olds with their parents and collecting teacher nominated sociometric status, coded turn taking styles in a peer entry situation. Their results showed that popular status children were more likely to provide explanations to peers and participate in episodes of cohesive discourse.

Kemple, Speranza and Hazen (1992) drew on a sample of three to four-year-old children and a sample of four to five-year-old children. Children were videotaped during play in a group entry situation on two occasions and discourse was coded. Results showed that non-contigent responding correlated with disliked scores at time 2. In addition, regression analyses indicated that while acceptance of initiation at time 1 predicted popularity at time 2, trend results showed that popularity at time 1 negatively predicted non-contingent responses at time 2.

Hazen and Black (1989), obtaining pre-schoolers' sociometric nominations and observing their communication in a group entry situation, found that contingency was also important with regards to rejections. Liked and low impact children showed higher proportions of turnabout rejections – rejections that provided new avenues of progress and thus enabled future contingency – than rejected children. Similarly, Murphy and Faulkner (2000), working with four to six-year-olds, obtained sociometric status interviews and let children play a game that had potential for cooperative or uncooperative behaviour. They coded cooperative and uncooperative behaviour, verbal communication characteristics including directives, rule reminders, questions, disagreements and elaborated disagreements, and nonverbal aspects of communication in mixed and same gender pairs.

Murphy and Faulkner found that popular children were more likely to elaborate disagreements than their unpopular peers. In addition, the researchers demonstrated that children took their partners into account, popular girls showing more elaborated disagreements when paired with unpopular girls than when paired with popular girls.

In addition to contingent responding, popularity seems to be associated with verbal perspective taking, popular children being better at giving explanations. Rubin (1972) collected sociometric nominations from children in kindergarten, grade two, grade four and grade six. He assessed all children on a describing figures task and combined the mean number of distinctive features explained and responses to enquiries into a "communicative egocentrism" score. His results showed that communicative egocentrism was negatively related to popularity in kindergarten and at grade two, even when IQ was taken into account.

Similarly, Burleson, Applegate, Burke, Clark, Delia and Kline (1986) assessed several aspects of communication in first and third-graders, including referential skills, persuasive skills, comforting skills and listener adaptation skills, using a variety of measures including describing nonsense figures, distinguishing critical features and responding to hypothetical situations. Results showed that while rejected children performed significantly worse than their accepted or neglected peers on the comforting task and the distinguishing critical features task, they also performed non-significantly worse on all the other tasks.

Furthermore, the ability to give explanations is not only important with regard to the description of figures, but also in social interactions. Black (1992) obtained sociometric nominations for pre-school children and observed her participants in a group entry situation. Her results showed that liked children provided more explanations and extensions than disliked children, with girls providing more explanations than boys.

Popular children are also better at conflict resolution skills such as compromising. Kurdeck and Lillie (1985), following third to seventh-grade children, examined likeability, compromising skills, temperament, and neighbourhood friendship characteristics as correlates to popularity status nominations. They found that popular children had higher compromising scores than rejected or average children.

With regards to other conflict solution strategies, Eisenberg and Garvey (1981) found that the use of insistence led to counter insistence and insistence as resolution was associated with inequitable outcomes. However, even with young children, justifications were more effective at ending conflict (40%) than simple negations (8%). Whether popular children offer more justifications than their peers during conflict remains to be explored. This could be logically hypothesised, given that explanations are characteristic communication features of popular children and that explanations in social settings often function as justifications. Moreover, justifications are an effective way to deal with conflict and popular children have good conflict management skills.

Pertaining to verbal aggression and withdrawal as predictors of peer rejection, Chang, Lei, Li, Liu, Guo, Wang and Fung (2005) asked third and fourth-graders to assess themselves on communication avoidance, verbal aggressiveness and social competence. They also collected peer nominated aggressive and withdrawn behaviour, and peer nominated sociometric status. Results showed that verbal aggressiveness, just like behavioural aggression, negatively predicted peer acceptance.

Whether different kinds of communication are independent from each other is a question that has been explored by Howe and McWilliam (in press) who, having assessed temperament and peer popularity, coded four to seven-year-old children's communication turns in free play and three structured tasks. Turns were grouped into agreements and disagreements and disagreements were classified as simple, extended, justification or resolution turns.

Here, simple turns were those turns that did not build on or refer to a previous utterance, extended turns were turns that extended previous conversation but did not give justifications for actions or thoughts, justifications were turns that justified/gave explanations and resolutions were turns that terminated a previous conflict by giving alternatives or compromises. Alongside these turns, Howe and McWilliam (in press) coded for no action, non-aggressive action, aggressive action or aggressive speech.

The researchers found that while justifications and resolutions occurred more frequently in conflict or in what they termed 'oppositional encounters', extended turns were used proportionately more often in non-oppositions. By factor-analysing communication categories in oppositional encounters only, Howe and McWilliam (in press) obtained a two-factor solution, which dissociated complex communication turns (justifications and resolutions) and non-aggressive actions, from simpler communication (simple and extended turns), no action, aggressive actions and aggressive speech.

Moreover, previously, Howe, McWilliam and Bermejo Bravo (2001) had obtained non-significant trends indicating that the proportion of simple conflict language to complex conflict communication was greater for rejected children than for their popular or indifferent peers. These results fit well with the research reported above, as the use of justifications and resolutions is a sign of good conflict management, whereas a high proportion of simple turns may indicate non-contingent responding. Curiously however, extensions, which draw on others' contributions and are as such contingent turns, loaded on the simpler communication factor.

This result may be due to the fact that Howe and McWilliam (in press) focused on conflict situations only. As they had shown previously, extensions occurred more frequently in non-oppositional encounters, while oppositions gave rise to more justifications and resolutions. It may be the case that in conflict situations, mere extensions may be perceived as incompetent in comparison to justifications, whereas extensions may be sufficient in non-conflict situations.

In sum, evidence seems to suggest that popular children respond more contingently, meaning they build on others' contributions; they explain more and maybe also use more justifications in their interactions. However, much of the research reported here was conducted with nursery school children, while research with older children is comparably sparse.

1.6.2 Gender and communication

Associations between communication style and popularity might vary between boys and girls. Concurrent with the observation that aggression may be more acceptable for boys than for girls, evidenced by the cluster of "tough boys" reported by Estell et al. (2002) and Rodkin et al. (2000), research has documented more domineering verbal interactions for boys, while girls have been found to communicate more collaboratively.

Leaper (1991) used his now popular Psychosocial Processes Coding Scheme (PPCS) with a sample of five to seven-year-old children. Classifying children's speech into categories depending on the degree of influence/assertion and involvement/ affiliation expressed, he derived the categories of collaboration (high in assertion and high in affiliation), control (high in assertion and low in affiliation), oblige (low in assertion and high in affiliation) and withdrawal (low in assertion and low in affiliation).

Coding the verbal turns produced by his sample, he obtained results showing that girls used more collaborative language, while boys used more controlling approaches. Likewise, Walker, Irving and Berthelsen (2002), assessed pre-school children on social problem solving scenarios. They categorised the answers given and rated these answers on competency. For example, prosocial responses were rated as very competent and aggressive responses as very incompetent. Results showed that boys were more likely to choose verbal and physical aggression, whereas girls' responses were more competent.

Leaper, Tenenbaum and Shaffer (1999) obtained comparable results with a sample of seven-year-old African American children, who they observed playing together for five minutes, coding responses with the Psychosocial Process Coding Scheme. The researchers found that boys were more likely to use controlling acts, while girls were more likely to show a combination of collaborative and informing acts. Likewise, Leman, Ahmed and Ozarow (2005), who presented pairs of eight-year-olds with a collaborative task in which the children received incongruent information, also found that girls were more collaborative and affiliative, and boys more controlling.

Concurrently, Hartup, French, Laursen, Johnston and Ogawa (1993) found that when interacting with friends, girls used assertions accompanied by rationales more frequently than boys, whereas boys used assertions without rationales more frequently than girls. Black's (1992) results also showed that girls provided more explanations than boys.

Interestingly, Leman et al. (1999) also found more collaboration and more assertion in same gender than in mixed gender pairs, while Leaper et al.'s (1999) results showed that boys' controlling discourse was found in same gender pairs, but not in mixed gender pairs. In addition, Howe and McWilliam (in press), who obtained no main effects for gender in their sample, found a significant main effect for gender composition, with single gender groups using justificatory turns more often than mixed gender groups.

In sum, there is evidence to suggest that boys and girls may not only communicate differently, but may also adapt their communication differently from their peers, although it is unclear whether single gender groups use more controlling discourse (Leaper et al., 1999) or more justificatory turns (Howe and McWilliam, in press).

1.6.3 Temperament and communication

If, as the paragraphs above suggest, verbal communication style can impact on peer popularity just like behavioural characteristics can, it would be pertinent to ask whether, just like behavioural characteristics, communication may be influenced by childhood temperament. Although research addressing a possible connection between temperament and communication is sparse, a number of studies by McCroskey and colleagues suggest a possible link. McCroskey, Heisel and Richmond (2001), for example, conducted three studies with college students. Students were given a short form of Eysenck's personality questionnaire (EPQ, Eysenck and Eysenck, 1975) and were assessed on several communication trait measures.

Eysenck's personality theory groups personality around the three factors of extraversion, neuroticism and psychoticism. Extraversion is characterised by being outgoing, talkative, high on positive affect and in need of external stimulation, neuroticism as being high on negative affect, and psychoticism as being high on aggression and showing disregard for social norms. Results showed that extraversion was positively related to argumentativeness, responsiveness, competence and tolerance for disagreement, and negatively to verbal aggression. Psychoticism related positively to argumentativeness and verbal aggression, and negatively to responsiveness.

Cole and McCroskey (2000), reported similar results for the EPQ, but also assessed the students on Costa and McCrae's (1985) 'big five'. Results showed that openness to experience, like extraversion, correlated positively with both assertiveness and responsiveness. Agreeableness, which, as Jensen-Campbell et al. (2003) note, is related to effortful control, correlated negatively with assertiveness and positively with responsiveness.

Howe and McWilliams (in press), relating temperament to their "justificatory" and "aggressive" communication factors, found that Primary 1 children who were high in anger/frustration and in inhibitory control, used more justifications in oppositions than other children. In addition, children high in inhibitory control used less of the simpler "aggressive" factor.

Thus, it seems that there are, indeed, specific communication patterns that relate to peer popularity, while sparse evidence suggests a possible link between temperament and communication style. Clearly, more needs to be done to investigate these issues, particularly since the corresponding behaviour-popularity links and temperament-behaviour links are fairly well established.

Moreover, the majority of research looking at a communication–popularity link draws on nursery school children, while research looking at a temperament-communication link almost exclusively draws on adult participants. What would be needed however, are studies that look at relations between communication and popularity and temperament and communication in the same age groups, ideally using the same sample. Apart from Howe and McWilliam's (in press) study, no research has utilised such a methodology, and follow up studies are needed.

1.7 The current research

The introduction highlighted some clear relationships between the temperamental factors of negative affect, impulsivity, and effortful control, and peer social functioning including sociometric status. Accordingly, the current research investigated whether children who are impulsive and experience negative affectivity are more rejected by their peers than children high in effortful control, and whether these associations varied across age and gender.

Moreover, the introduction suggested associations between communication style and peer popularity. The current research will explore possible associations between communication style and popularity, drawing on Howe and McWilliam's (in press) factor structure of communication.

Thirdly, the introduction asks whether specific uses of communication can themselves be linked to temperamental factors. Taking on this suggestion, the current research will investigate whether communication varies in relation to different levels of negative affect, impulsivity, and effortful control. The first study will investigate the above issues cross-sectionally across three age groups, whereas the second study takes the form of a longitudinal investigation, examining whether communication style could be predictive of peer popularity.

Chapter 2: Introduction and Method of the Cross-sectional Study

This chapter presents the rationale for the cross-sectional study and the hypotheses to be tested. Section 2.1 presents a brief introduction, and outlines the hypotheses, while section 2.2 gives methodological detail. The results of the cross-sectional study are reported in chapter 3, while chapter 4 discusses the results and provides the introduction to the longitudinal study.

2.1 Introduction and hypotheses

The first study presented here is a cross-sectional study investigating the relationships between temperament, communication and peer popularity. From research summarised in chapter 1, it is apparent that the link between temperament and social functioning including peer popularity has been examined with many different age groups, and there is a great deal of longitudinal research. However, the age range is much narrower when the relations between communication and popularity, and temperament and communication are considered.

With regards to associations between temperament and social functioning/popularity, researchers have conducted cross-sectional studies with children from ten months of age up to middle childhood and early adolescence, longitudinal studies covering time spans from one to ten years. Figures 2.1.1 and 2.1.2 depict findings from cross-sectional and longitudinal studies reported in the introduction arranged by age or time span covered.

Figure 2.1.1 Cross-sectional studies investigating relationships between temperament and social functioning/peer popularity

Young

Authors: Kochanska et al. (1998)
Age: Ten months old
Results: Focussed attention related to better modulated negative affectivity.

Authors: Kochanska et al. (2000)
Age: 22 and 33 months old
Results: Increase in control with age, higher level of control in girls, control linked to more regulated anger and joy and to stronger restraint.

Authors: Eisenberg et al. (1993); Fabes and Eisenberg (1992); Fabes et al. (1999); Jones et al. (2003)
Age: Preschoolers
Results: Acting out behaviour is negatively related to social skill and boys' peer status. Socially competent and popular children had better anger management skills. Children with high effortful control experienced low levels of negative affect in peer interactions and were good social responders. Increase of executive attention/inhibition with age.

Authors: Trembach et al. (2004)
Age: Seven- to ten-year old
Results: Age-related increase in attention, accompanied by a decrease in impulsivity.

Authors: Eisenberg, et al. (2001)
Age: Third grade children
Results: Low regulation and high emotionality related to low appropriate social behaviour, high problem behaviour and peer rejection.

Authors: Murphy et al. (2004)
Age: Ten-to twelve-year old
Results: Children high in social functioning were low on negative emotionality and high on regulation.

Authors: Lengua (2003); Newcomb and Bukowski (1984)
Age: Third, fourth and fifth grade children
Results: Better regulated children were better liked. High irritability linked to higher internalising and externalising problems and lower social competence.

Author: Jensen-Campbell et al. (2003)
Age: Sixth grade children
Results: Agreeable children showed more harmony in a cooperative conflict task. Peers were more comfortable in the presence of agreeable children.

Old

Figure 2.1.2 Longitudinal studies investigating relationships between temperament and social functioning/peer popularity

Time span covered

Short

Author: Szumowski (1984)
Time span: Three years old > four yearsold
Results: Children with problems at three years continued having problems at four years.

Authors: Kochanska et al. (1997)
Time span: Toddlers followed to early school age
Results: Levels of control were stable across individuals, control increased with age, and girls showed more controls than boys did.

Authors: Snyder et al. (2004)
Time span: Followed kindergarteners for two years
Results: The relation between impulsiveness-inattention was mediated through peer rejection for boys, effects of rejection and impulsiveness-inattention were additive for girls.

Authors: Eisenberg et al. (2004):
Time span: Followed pre-school and primary school children for a period of two years.
Results: Effortful control and impulsivity contributed positively to resilience, effortful control was negatively linked to aggression, and impulsivity was positively linked to aggression.

Authors: Eisenberg et al. (1997)
Time span: Four years old > ten years old
Results: High quality social functioning was predicted by high regulation and low levels of non-constructive coping, negative emotionality and emotional intensity.

Authors: Shoda et al. (1990)
Time span: Four year sold > fifteen to nineteen years old
Results: Ability to delay at age four was related to the ability to cope with frustration and stress at ages fifteen to nineteen.

Authors: Caspi and Silva (1995)
Time span: three year olds > eighteen years old
Results: Children who evidenced a lack of control at age three scored high on danger seeking, aggression and interpersonal aggression at age eighteen.

Authors: Olson, Schillig, and Bates (1999)
Time span: Followed six to eight years old> seven to ten years old> fourteen to seventeen years old
Results: Impulsivity decreased with age in academic settings and when incentives were

Long

As can be seen, these studies reconfirm the benefits of high inhibitory control, low impulsivity and low anger/frustration for successful social functioning across several age groups, spanning the ages from ten months to nineteen years and thus the entire period of childhood and adolescence.

The research on associations between communication and peer popularity on the other hand, has mainly focussed on work with pre-school children (e.g. Black, 1992; Black and Hazen, 1990; Black and Logan, 1995; Hazen and Black, 1989; Kemple et al., 1992). Only a few studies, such as Burleson et al.'s (1986) investigation into referential skills, persuasive skills, comforting skills and listener adaptation skills, and Kurdeck and Lillie's (1985) research into compromising skill have investigated the relation between communication and popularity at older ages. Burleson et al. drawing on a sample of first and third graders, Kurdeck and Lillie on a sample of third to seventh grade children

In contrast, McCroskey's studies into temperament and communication (e.g. Cole and McCroskey, 2000; McCroskey et al., 2001) have drawn exclusively on adult participants. As the relationships between communication and popularity and temperament and communication apply to many age groups in additions to nursery children or adults, it is pertinent to explore relations between these constructs in a different sample.

The current study draws on a sample of nursery children (four to five years of age), primary three children (seven to eight years of age) and primary six children (ten to eleven years of age), and explores relationships between temperament, communication and popularity for all three age groups.

The age groups chosen represent the Piagtian stages of pre-operational (up to seven years), concrete operational (between seven and eleven years of age) and formal operational thought (from eleven years onwards).

In terms of communication, it could be expected that pre-operational children, who are still egocentric, may have difficulties in giving explanations and responding contingently. As mentioned in the introduction, Rubin (1972) derived a "communicative egocentrism" score from measures of explanations and responses, highlighting the communicative challenges young children may experience. Throughout the concrete operational period, where children begin to show evidence for organised and logical thought and become less and less egocentric, the ability of explaining and responding should increase, reaching even higher levels during the formal operational period, which is characterised by the ability to use abstract concepts and formal logic. The attainment of formal logic in particular should be related to proficient use of justifications, justifications being the very tools of successful reasoning.

Furthermore, the current study investigates Howe and McWilliam's (in press) two factor solution for communication, as outlined in the previous chapter. Howe and McWilliam's two factors dissociated complex communication turns (justifications and resolutions) and non-aggressive action from simpler communication (simple and extended turns), no actions and aggressive actions.

So far, studies looking at children's communication have used contructs, such as "cohesive discourse", "non-contigent responding" (Kemple et al., 1992), "turnabout rejections" (Hazen and Black, 1989) and "communicative egocentrism" (Rubin, 1972). While these communication categories have all been useful, Howe and McWilliam's (in press) approach is the only study that statistically derived the simple and complex communication factors. In addition, apart from trend results reported by Howe and McWilliam, no research has investigated the relation between Howe and McWilliam's factors, temperament and peer popularity.

The introduction also noted a mismatch between Howe and McWilliam's factors and other communication research, in that extensions loaded on Howe and McWilliam's "simple" factor, whereas they are intrinsically linked with cohesion in discourse. Suggesting that this may be due to Howe and McWilliam's focus on disagreements, the current study applies Howe and McWilliam's coding scheme to both oppositional and non-oppositional interactions.

Furthermore, the current study uses Howe and McWilliam's design in which a period of free play is followed by three structured tasks and another period of free play. The structured tasks, described in more detail in the methods section (section 2.2), were used to create discussion between the children. Although this may artificially heighten the occurrence of disagreement in proportion to harmonious communication, this design was chosen to elicit justifications and resolutions, turns that according to Howe and McWilliam (in press) occur more frequently in conflict situations.

Temperament is assessed with the Anger/Frustration, Impulsivity and Inhibitory Control scales of Rothbart's (1989) Child Behaviour Questionnaire. Using these three scales amounts to an abbreviated version of the whole questionnaire, which as stated in the introduction captures the three main aspects of temperament, namely negative affect, surgency and effortful control. This version has been successfully used by Howe and McWilliam (in press).

The current study employs a cross-gender sociometric nomination procedure to assess peer popularity. Cross-gender nominations were chosen partly because this counteracts small sample size and partly because the overall standing of a child in the classroom rather than the acceptance by same-sex peers only is of importance. Sociometric nominations rather than ratings were employed to reduce the cognitive load on pre-schoolers and increase time efficiency.

For the nominations, children will be asked to nominate children they like to play with. While this measurement requires a friendship rather than a popularity nomination, the aggregated friendship nominations were deemed as adequate measures of popularity, supporting views by Howes (1990), that popular children have more friends than unpopular children.

Drawing on the research presented in the introduction, the following relationships are expected:

In terms of temperament, the current study expects to find a strong association between temperament and peer popularity, in that high levels of inhibition will relate positively to peer popularity, while high levels of impulsivity or negative affectivity will relate negatively to peer popularity. Moreover, the current study expects to find an increase in inhibition with age, as observed by Trembach et al. (2004) and an associated decrease in impulsivity, as reported by Olson et al. (1999). Concluding from research that suggests that the expression of negative affect can be modulated by control processes (e.g. Fabes et al., 1999; Kochanska et al., 1998) the current study also expects to find a decrease in negative emotionality with age. It is also expected that girls will show more inhibition than boys, as was found by Kochanska et al. (2000) and Kochanska et al. (1997), while boys will be expected to score higher in impulsivity and negative affectivity due to less inhibition.

With regards communication, the current study argues that complex aspects of communication, such as justifications and resolution will be associated with higher inhibitory control. Results by Howe and McWilliam (in press) showed a trend result indicating that P1 children who were high in inhibitory control used less "aggressive" communication and more "justificatory" communication, although differences were less consistent in P3 children.

Both justifications and resolutions pre-suppose an acknowledgement of the other's perspective, a justification aiming to help the other to make the change from their own perspective to the perspective of the speaker, and a resolution reconciling two perspectives. The study argues that performing these complex operations will rely on inhibitory control mechanisms, hypothesising that children who are more inhibited will use complex communication more frequently than low inhibited children.

Accordingly, as girls have been found to have higher levels of inhibition than boys (Kochanska et al., 1997, 2000) and have been found to explain more than boys (Black, 1992), the current study expects girls to use the complex communication factor more frequently than boys. Conversely, children high in impulsivity may find it difficult to inhibit a dominant simple response in order to produce a complex, considered response.

The current study therefore argues that children who are impulsive will produce simpler and less complex communication than non-impulsive children. Boys, whose discourse has been reported as being more domineering and controlling (e.g. Leaper, 1991; Leman, Ahmed and Ozarow, 2005) are expected to use higher frequencies of simple communication turns than girls.

No clear expectations are formulated with regards to the Anger/Frustration score. On the one hand it may be that an increased level of negative affect will lead to an increase in oppositional encounters, which as reported by Howe and McWilliam (in press), are associated with a higher frequency of justifications. On the other hand, negative affect may be associated with angry outbursts, which will not allow time for justifications or resolutions. Alternatively, it may be that anger/frustration is not at all associated with a specific usage of communication. Howe and McWilliam (in press) for example found that anger/frustration was associated with higher frequency of both simple and complex communication turns, thus indicating the absence of a specific relationship.

In terms of relationships between communication and popularity, the current study expects to find evidence consistent with the non-significant trends obtained by Howe et al. (2001). Howe et al. found that the proportion of simple conflict language to complex conflict communication was greater for rejected children, than for their popular or indifferent peers.

This is in line with results reported by Hazen and Black (1989) and Murphy and Faulkner (2000), who showed that popular children used more elaborated disagreements. Moreover, as complex communication moves require a degree of mental maturity, the current study expects to find that older children will offer more justifications than younger children.

In sum, it will be hypothesised that:

H_1: There will be associations between temperament and popularity, "easy" temperament (low impulsivity, low negative emotionality and high inhibitory control) being related to high peer popularity.

H_2: Popular children will use more complex communication than rejected children, while rejected children will use simpler communication than popular children.

H_3: There will be some variation in communication according to temperamental characteristics, in that children scoring lower on impulsivity and higher on inhibitory control will show a higher proportion of complex communication than their more impulsive and less controlled peers.

H_4: There will be gender and age differences, in that

1. Impulsivity and negative affectivity will decrease with age, while inhibition will increase.
2. Girls will show less impulsivity and more effortful control than boys at all age levels.
3. The use of complex communication will increase with age.
4. Girls will show more complex and less simple communication than boys.

2.2 Method of the cross sectional study

2.2.1 Design

The study employed a cross-sectional observational design. Children of three age groups were recruited from two Scottish primary schools. To assess child temperament, parents completed an abbreviated version of the Child Behaviour Questionnaire (CBQ, Rothbart, 1989). Sociometric status was assessed through peer nominations, and children's interactions were videotaped in four different activity contexts. Frequency of communication turns during the interactions was coded with the Noldus Observer package, and data were analysed using SPSS 10 for Windows.

2.2.2 Participants

Children of three age groups were recruited from two Scottish primary schools. The children attending the recruited schools were pre-dominantly Caucasian and came from working-class backgrounds. Census statistics (Scottish Census, 2001) for the area the samples were drawn from show that in comparison with the percentage average in the whole of Scotland, there was a higher percentage of unemployment, a higher percentage of employees in the lowest occupation categories (process and plant and machine operatives and elementary occupations), a higher percentage of households with no persons in employment and dependent children and a lower average age of a person with good health.

A total of 247 children attended the participating classes, namely nursery class (4-5 years old), Primary 3 (henceforth P3, 7-8 years old) or Primary 6 (henceforth P6, 10-11 years old). 141 of the children were girls and 106 were boys. For classroom statistics, please refer to table 2.2.1.

Table 2.2.1 Classroom statistics

	School 1			School 2		
Class	Gender	N	Total	Gender	N	Total
Nursery	Boys	48	85	Boys	22	42
	Girls	37		Girls	20	
P3	Boys	11	25	Boys	16	28
	Girls	14		Girls	12	
P6	Boys	14	31	Boys	19	36
	Girls	17		Girls	17	

From the total sample of 247 children, the parents of 10 children withdrew their consent, resulting in 237 potential participants. From these participants, only the children whose parents had returned a completed CBQ were retained for video-observations. The Response rate for the CBQ was 40.5 %, leading to a final sample of 95 children.

From these 95 children, the interactions of 80 were analysed to meet time-schedule demands. All statistics reported are based on the analysed sample of 80 children. Of these 80 children, 35 were boys and 45 were girls. 37 attended the nursery class, 22 were P3 students, and 21 children were in P6. The distribution across schools, ages and sex is shown in table 2.2.2.

Table 2.2.2 Participating children

	School 1			School 2		
	Nursery	P3	P6	Nursery	P3	P6
Boys	11	5	6	5	4	4
Girls	11	9	9	10	4	2
Total	22	14	15	15	8	6

2.2.3 Materials

Child Behaviour Questionnaire

Parents received an abridged version of the CBQ in conjunction with information letters and consent forms. The full questionnaire would have been too time-consuming to complete and would have generated information that was irrelevant for present purposes. The abridged version consisted of the Anger/Frustration (A/F) subscale, the Inhibitory Control subscale (IC) and the Impulsivity subscale (IM), as measures pertinent for predicting valence (negativity), intensity (impulsivity) and control (inhibition) of temperament. These scales were supplemented with the Smiling and Laughter (SL) and High Pleasure (HP) subscales as fillers in order to avoid an overly negative tone (see appendix 1 for a sample questionnaire).

The CBQ is a collection of statements about the child (for example: my child gets angry when told s/he has to go to bed), scored on a 7 point scale ranging from 1 = extremely untrue of my child to 7 = extremely true of my child, with the possibility of a 'not applicable' option. Reverse items were scored accordingly, and items receiving the non-applicable option were discounted. A single A/F, IC and IM score was calculated for each child by dividing the total of all scores received on each scale by the number of scale items minus any non-applicable items, resulting in a total numeral score. SL and HP scores were not analysed any further and were not included in the remainder of the study.

Peer popularity nominations

In order to assess sociometric status, a multiple stage peer-nomination procedure was employed. For comments on the use of such a procedure, please refer to section 1.2.2 (page 5). At stage one the researcher visited the schools, accompanied by a photographer, to take pictures of all participating children. Pictures were used to build a collage of every participating class. This was done by pasting the pictures of the relevant children on a large piece of cardboard. These collages were used to conduct popularity ratings at stage two.

Video observation: Play and task contexts

Video observations took place in a quiet room at the school. A video camera was installed in the corner of the room to capture the children's interactions. In the free play context, the children were left to play with a farm set (in school 1) or a train set (in school 2).

After six minutes had elapsed, the children were asked to put the train or farm set away. They were then given two toys between the three of them (limited toys condition). The toys were a pig that could walk and grunt, and a flow kaleidoscope.

The picture-sorting task consisted of three series of twelve pictures each, each series displaying a logical sequence of events that had to be put into the right order. The first story showed a cat building a tower with wooden bricks, a dog pushing the tower over, the cat being upset at the broken tower, the dog re-building the tower, and the dog and the cat making up. The second story consisted of a sequence displaying the baking of a cake, first showing the ingredients being assembled in a bowl, the cake during the baking process, the cake being decorated and finally being eaten. The third story shows a flower opening and closing with the sun completing its orbit in the background (see appendix 2 for sample pictures).

The picture stories were followed by Raven's matrices (Raven, 1958), a nonverbal reasoning test for children. Children are required to detect a pattern in a series of shapes where one shape is missing, and decide which one of several given options would complete the series (see appendix 3 for examples). [1]

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[1] The author would like to highlight that for the current study, Raven's matrices were used as a tool to elicit peer discussion, NOT as an assessment in ANY FORM.

2.2.4 Procedure

Recruitment and consent

Prior to conducting the study, consent was obtained from the departmental ethics committee and from the regional council in which the study was to take place. Two Roman Catholic primary schools with associated nursery classes were recruited. Information letters and consent forms were sent out asking head teachers and relevant classroom teachers (nursery class, P3, P6) for their permission to run the study at their schools.

Consent was in written form from the head teachers who also collected verbal consent from the class-teachers. Next, all parents were sent an information letter with a consent form provided by the council. Parental information letter and consent forms are given in appendix 4. Parents were told that they would receive a portrait photograph of their child as a thank you for completing and returning the questionnaire within a week, using stamped self-addressed envelopes provided by the researcher. As mentioned above, this measure yielded 95 returned questionnaires (40.5 % response rate).

Popularity nominations

After photographs were taken of every child, two copies were made of every picture. One picture was reserved as a thank-you for the parents, while the second was used for the popularity nominations. Children were invited into a quiet room, where the photo collage was displayed.

P3 and P6 children were assured confidentiality, the experimenter stating that she would not "say anything to anyone", aiming at putting them at ease. However, this procedure was not followed for nursery age children, as it was feared that – contrary to the older children – the experimenter saying that she would not say anything might have raised suspicions with regards to the task and the experimenter, thus affecting their nominations.

All children were then shown the photo-collages and asked to point out up to five children they liked to play with, as well as five children they did not like to play with. P3 and P6 children were also asked to show the children who liked or did not like to play with them, in order to increase the reliability of the overall scores.

The items were correlated, with .52 (likes to play with x likes to play with me) and .53 (does not like to play with x does not like to play with me) for P3 children, and .76 (likes to play with x likes to play with me) and .79 (does not like to play with x does not like to play with me) for P6 children. All correlations were significant at $p < .01$.

As said in section 2.1, although "liking to play with someone" is a property more of friendship than of popularity, and respondents were thus asked to nominate their friends, the sum of nominations *received* by any given child reflects this child's popularity, rather than individual friendships.

Positive and negative nominations were assessed by adding up the two "likes to play with" and the two "does not like to play with" nominations for the older children, while they consisted of the single nominations of nursery age children. For each of the two derived indices, the overall mean was calculated alongside the 95% confidence intervals. Based on these nominations and following Coie et al. (1982), a standardised social impact index (positive nominations + negative nominations) and social preference index (positive – negative nominations) was calculated for each child, The former gave an indication of the social salience of each child in the classroom, while the latter was a measure of popularity.

When both a child's social impact index and his or her social preference index were equal to or above the upper bound of the 95 % confidence interval of the mean, the child was classified as *popular*. A *rejected* classification was obtained when the child's social impact index was equal to or above the upper bound of the 95% confidence interval of the mean, but his or her social preference index was equal to or below the lower bound of the confidence interval. All remaining children were classified as indifferent.

Video observations

The core of the current study consisted of observing the communication style that the children displayed during small group interaction. All groups consisted of three children. Groups were single-sex and single age groups. Popularity composition was not controlled for and allocation to groups was guided by convenience once the single sex and single gender requirement had been fulfilled. There was one group in which only two out of the three children were analysed, as the third child had to leave halfway through the session and would not return in time to redo the observation.

Each video session lasted for 30 minutes and consisted of 6 minutes free play, followed by 6 minutes of each of the activity contexts, namely limited toys, story sorting task and Raven's matrices task, finishing off with 6 minutes of free play. The free play was designed to help the children to settle and to get accustomed to the presence of the researcher and the camcorder.

Distributing two toys between three children was included as it was expected to lead to disagreements over the distribution of toys and about the type of play performed, and thus hopefully to frequent use of justifications, which, according to Howe and McWilliam (in press) occur more frequently in oppositions. Thus, the limited toys task was used to increase the frequency of justifications, as they do not occur readily in non-oppositional encounters.

In the story sorting task, children were given one of the stories and told that these were picture stories that had accidentally gotten mixed up. They were asked whether they could work out the right sequence for the story. Depending on the time used completing this task, the children were then given the other stories to put into order. During the first few trials, it emerged that the dog/cat story was most successful as the first story, followed by either order of the two remaining stories. This sequence was employed throughout, with the two harder stories administered in counter-balanced fashion.

In the Raven's matrices task, children were given the book and shown the first example. They were told to look at the big block, and to note that there was a missing bit. Then they were asked to decide which bit of the six examples would go into the missing bit. After the children had made some suggestions, the experimenter let them get on with the book by themselves, until the six scheduled minutes had passed.

Coding

Children's communication style during the four activities was coded with help of the Noldus Observer software, children's dialogue being categorised according to the coding scheme used by Howe and McWilliam (in press).The coding scheme works by first classifying turns into oppositional or non-oppositional statements, and subsequently sub-categorising them into simple turns, extensions, justifications and resolutions with no action, non-aggressive action, aggressive action or aggressive speech.

For the current study, simple statistics (mean rate per minute of each sub-category per condition) were calculated using the Noldus Observer, while all other analyses were completed using SPSS 10 for Windows. For definitions and examples of Howe and McWilliam's (in press) categories, please refer to table 2.2.3 and see table 2.2.4 for a worked example.

Table 2.2.3 Definitions of Howe and McWilliam's (in press) communication categories

Category	Sub-categories	Definition / Example
Opposition / non-opposition	Oppositional statement	Any statement expressing disagreement E.g. "don't do that"
	Non-oppositional statements	Any statement not expressing disagreement E.g. "ok, that's fine"
Verbal communication categories	Simple turns	The first turn in any interaction, **and** when looking at subsequent turns, any statements simply repeating a previous point, or offering no further comment apart from "no", "don't", or "yes"
	Extensions	Adding to the dialogue but offering neither justifications nor resolutions. E.g.: "I've got the ball" "You've got the green ball"
	Justifications	Giving reasons for beliefs or actions E.g. "I like it because it makes a funny noise"
	Resolving	Settling disputes through final decisions or compromises. E.g. "No I want it now!" "Ok, and I can have it in 5 minutes".

Table 2.2.3 continued

Action categories	Non-aggressive action	For example: Choosing toys, building a farm
	Aggressive action	For example: Hitting, pushing, taking toys off another child
	No action	Verbal turn without action
	Aggressive speech	Insults/threats, E.g. you stink!

Table 2.2.4 Worked example of communication turns

This observation is a dialogue between two P3 boys.

Speaker	Turn	Classification
1	*I need the other bit of Kiwi Fruit.*	Simple (start of conversation)/ non-oppose/ no action
2	*I need some - I need it to match.*	Justification/non-oppose/ no action
1	*I need them; I need these (takes some other fruits).*	Extended/non-oppose/ non-aggressive action
2	Sees a knife, reacts, both boys go for it. Takes knife.	Non-aggressive action
1	*Hey!*	Simple/ oppose/ no action
2	*I need something*	Extended/ oppose/ no action
1	*I need it to cut up fruit*	Justification/ oppose/ no action
2	*I know, but I'm gonna do the cutting up*	Justification/ oppose/ no action
1	*No, I'm doing it, I've got the knife (Tries to grab the knife)*	Justification/ oppose/ aggressive action
2	*Why don't we both cut?*	Resolution/ no action
1	*Yeah*	Simple/ non-oppose/ no action

Data were entered and analysed using the Noldus Observer software. The Noldus Observer is a specialised software package for the coding of behavioural observations. It can be used for spontaneous coding as well as for coding videotapes and media-files. One of the several practical advantages of the Noldus Observer over pen and pencil coding is that data coding and entry are simultaneous processes, and elementary statistics can be calculated straight from the coded data. They can then be exported to statistical packages for more complex analyses.

In the initial coding stage, the Observer permits the specification of a subject and up to three modifiers, attributes that are used to further describe the subject. In the present study, data were entered in the form of *child > communication/action > respondent > communication action*. If for example Justin wanted to play with Tom, the interaction might be coded as displayed in table 2.2.5.

Table 2.2.5 Coding Howe and McWilliam's (in press) communication turns with the Noldus observer.

Interaction	Justin	*Hey Tom look at this (shows Tom a tractor)*	Tom	*That's great! can it drive all by itself?*
Code	Justin	Simple non opposition, non-aggressive action	Tom	Extended non-opposition, no action
Observer Category	Subject	Modifier 1	Modifier 2	Modifier 3

Reliability checks

10 % of observations were double coded by trained assistants. To get accustomed to the coding scheme, assistants coded two whole observations with the researcher prior to conducting reliability checks. Pearson's rho ranged from .60 to .93, with an average of .80.

Chapter 3: Results of the Cross-sectional Study

3.1 Overview

This chapter presents the results of the cross-sectional study. The first section (3.2) comments on findings with regards to temperament and sociometric status, the second section (3.3) is concerned with communication frequencies, and the third section (3.4) reports results obtained from a rotated factor analysis. Following (3.5), the occurrence of the emerging factors is analysed, and the relations between childhood temperament, sociometric status and the communication are examined (3.6).

3.2 Temperament and sociometric status

3.2.1 Childhood Temperament

Hypothesis 4, arguing for gender and age differences in communication and temperament, requires the examination of temperament across age and gender. The mean A/F score for the sample was 4.57 (*SD* = .94), while the sample received a mean IM score of 4.74 (*SD* = .77) and a mean IC score of 4.88 (*SD* = .67). Table 3.2.1 shows the correlations between the different temperamental traits. Overall, A/F correlated positively with IM and negatively with Inhibitory control. IC and IM correlated negatively with each other.

Table 3.2.1 Correlations between temperamental traits

	Anger/Frustration	Inhibitory Control
Inhibitory Control	$r = -.43, p < .05$	
Impulsivity	$r = .22, p < .05$	$r = -.42, p < .05$

Table 3.2.2 documents statistics for gender differences. Girls achieved lower scores on A/F and IM than boys, while showing a higher level of IC. However, an independent *t*-test showed that all differences were non-significant.

Table 3.2.2 Temperament scores across gender

Temperament	Gender	*M*	*SD*	*t, p*
A/F	Boy	4.63	1.16	$t_{(78)} = .56$, *ns*
	Girl	4.52	.74	
IM	Boy	4.86	.79	$t_{(78)} = 1.24$, *ns*
	Girl	4.64	.75	
IC	Boy	4.73	.67	$t_{(78)} = 1.74$, *ns*
	Girl	4.99	.66	

As Table 3.2.3 shows, nursery school children had the highest scores for both A/F and IM, followed by P3 children. P6 children scored lowest on these measures. In the case of IC scores this order was reversed, with P6 children scoring higher than P3 children, and nursery school children obtaining the lowest mean scores. These mean differences support research reported in the introduction, indicating that with progressive development impulsive processes lessen as inhibitory control mechanisms grow. A one-way *ANOVA* yielded significant differences between the three age groups with regards to IM and IC scores, while there were no significant differences between A/F scores.

Table 3.2.3 Temperament scores across age

Temperament	Age	*M*	*SD*	*ANOVA*
A/F	Nursery	4.72	.69	$F_{(2,77)} = 1.03$, *ns*
	P3	4.53	1.34	
	P6	4.35	.81	
IM	Nursery	4.95	.78	$F_{(2,77)} = 4.31$, $p < .05$
	P3	4.76	.82	
	P6	4.35	56	
IC	Nursery	4.72	.64	$F_{(2, 77)} = 3.32$, $p < .05$
	P3	4.85	.67	
	P6	5.18	.66	

A Bonferroni post-hoc test performed on IM and IC scores revealed a significant difference between children in the nursery class and children in P6. The former scored higher on items assessing IM (*mean difference: .59, $p < .05$*) and lower on items assessing IC *(mean difference: .46, $p < .05$)*.

The means obtained for nursery school children and P3 children corresponded to published norms by Rothbart et al. (2001). Table 3.2.4 juxtaposes the means obtained in the study against Rothbart's norms to show correspondence for nursery and P3 children. As the norms provided by Rothbart do not include the P6 age group, no comparison for these children is possible.

Table 3.2.4 Comparison of obtained means and Rothbart's norms

Measure	Age	Sample *M (SD)*	Norm *M (SD)*
A/F	Nursery	4.72 (.69)	4.47 (.75)
	P3	4.53 (1.34)	4.37 (.79)
IM	Nursery	4.95 (.78)	4.57 (.71)
	P3	4.76 (.82)	4.47 (.71)
IC	Nursery	4.72 (.64)	4.74 (.77)
	P3	4.85 (.67)	4.92 (.73)

3.2.2 Relations between sociometric status and temperament

In order to investigate relations between temperament and sociometric status, children were classified as indifferent, popular or rejected, employing Coie et al.'s (1982) criteria. 52 (65%) children were classified as indifferent, 16 (20%) as popular and 12 (15%) as rejected (taken across all age groups). Chi-square analyses showed that there were no differences in sociometric status across age groups ($\chi^2_{(4)} = 5.06$, *ns)* or gender ($\chi^2_{(2)} = .68$, *ns).*

Mean temperament scores as a function of popularity are presented in Table 3.2.5. The mean scores showed that rejected children scored higher than indifferent children on A/F scores, while popular children scored lowest on this measure. With respect to IM scores, rejected children scored higher than popular children, who in turn scored higher than indifferent children. Indifferent children scored highest on the IC scale, followed by popular children, with rejected children scoring lowest. A One-way *ANOVA* revealed that the differences in IM scores were statistically significant, while there were no significant differences for A/F and IC scores.

Table 3.2.5 Mean temperament scores as a function of sociometric status

Temperament	Popularity	*M*	*SD*	*ANOVA*
A/F	Indifferent	4.60	1.04	$F_{(2,77)} = .52$, *ns*
	Rejected	4.71	.76	
	Popular	4.37	.69	
IM	Indifferent	4.59	.73	$F_{(2,77)} = 3.40$, $p < .05$
	Rejected	5.17	.81	
	Popular	4.90	.77	
IC	Indifferent	4.97	.64	$F_{(2, 77)} = 2.42$, *ns*
	Rejected	4.51	.59	
	Popular	4.88	.76	

A post-hoc Bonferroni analysis confirmed that rejected children scored near-significantly higher on impulsivity than indifferent children (*mean difference* = .58, p= .052), popular children not differing significantly from the rejected or indifferent children.

Table 3.2.6 shows that for both girls and boys, rejected children scored lower on IC and higher on IM than popular or indifferent children, with the exception that popular boys received the highest IM score. The only significant difference demonstrated that the rejected girls scored significantly higher than the indifferent girls on the IM (*mean difference* = .86, $p < .05$), the popular girls' mean once again lying in-between, not being significantly different from the two other groups.

Table 3.2.6 Temperament and sociometric status scores across gender

	Popularity	A/F *M (SD)*	IC *M (SD)*	IM *M (SD)*
Boys	Indifferent	4.56 (1.40)	4.88 (.68)	4.70 (.70)
	Popular	4.44 (.61)	4.61 (.76)	5.19 (.85)
	Rejected	5.14 (.62)	4.38 (.40)	4.97 (.96)
	$F_{(2,32)}$, p	$F = .71$, *ns*	$F = 1.47$, *ns*	$F = 1.19$, *ns*
Girls	Indifferent	4.62 (.73)	5.04 (.62)	4.51 (.75)
	Popular	4.29 (.80)	5.05 (.74)	4.61 (.58)
	Rejected	4.27 (.66)	4.64 (.75)	5.37 (.65)
	$F_{(2, 42)}$, p	$F = 1.05$, *ns*	$F = .96$, *ns*	$F = 3.68$, $p < .05$

As demonstrated in table 3.2.7, the nursery children showed the expected results of high A/F, high IM and low IC for rejected children. However, the P3 children revealed a more surprising pattern, in which rejected children actually achieved a higher IC score than popular children. Popular P3 children scored higher on impulsivity than their rejected peers. As the main effect on IM was significant for P3 children, a Bonferroni post hoc analyses was conducted, which showed that indifferent children obtained non-significantly lower scores on IM than rejected children (*mean difference:* .80, $p = .14$) and popular children (*mean difference*: 1.14, $p = .15$).

At age P6, the patterns on A/F and IC resembled the pattern obtained in nursery class, in that rejected children received higher A/F and lower IC scores than popular or indifferent children with the exception that at this age, the indifferent children scored the highest IM score. However, all differences were non-significant.

Table 3.2.7 Temperament and sociometric status scores across age

Nursery

Popularity	A/F *M (SD)*	IC *M (SD)*	IM *M (SD)*
Indifferent	4.66 (.76)	4.84 (.59)	4.78 (.79)
Popular	4.66 (.55)	4.70 (.72)	5.00 (.70)
Rejected	5.19 (.55)	4.13 (4.31)	5.71 (.64)
$F_{(2,34)}$, p	$F = 1.90$, *ns*	$F = 2.65$, *ns*	$F = 2.22$, *ns*

P3

Popularity	A/F *M (SD)*	IC *M (SD)*	IM *M (SD)*
Indifferent	4.72 (1.52)	4.97 (.65)	4.48 (.77)
Popular	3.69 (.22)	4.27 (.38)	5.62 (.54)
Rejected	4.29 (.90)	4.71 (.77)	5.28 (.60)
$F_{(2,19)}$, p	$F = .59$, *ns*	$F = 1.13$, *ns*	$F = 3.82$, $p < .05$

P6

Popularity	A/F *M (SD)*	IC *M (SD)*	IM *M (SD)*
Indifferent	4.40 (.85)	5.17 (.70)	4.43 (.57)
Popular	3.74 (.74)	5.70 (.37)	4.05 (.44)
Rejected	4.74 (.45)	4.69 (.08)	4.28 (.69)
$F_{(2, 18)}$, p	$F = 1.24$, *ns*	$F = .56$, *ns*	$F = 1.92$, *ns*

3.2.3 Summary

Overall, results showed no significant gender differences on measures of temperament. Differences across age indicated that with development impulsive processes lessen as inhibitory control mechanisms grow. In terms of popularity, the current sample comprised 52 (65 %) indifferent children, 16 (20%) popular children and 12 (15%) rejected children. There were no differences in sociometric status across age or gender. A/F correlated positively with IM and negatively with IC, while IC and IM correlated negatively with each other.

Examining temperament differences as a function of popularity it emerged overall that indifferent children scored higher than rejected children on measures of behavioural inhibition, whilst scoring lower on impulsivity. There were no significant differences between popular children and the other groups on any of the temperamental measures, a Bonferroni post-hoc analysis on the IM scores of P3 children only showing non-significantly higher scores for popular children than for indifferent children.

Looking at the different gender and age groups, there were few significant differences. Rejected girls scored significantly higher than indifferent girls on the IM factor, while P3 children showed the surprising result that rejected children achieved a higher mean on the IC score than popular children, while popular P3 children scored higher on IM than their rejected peers.

3.3 Communication frequencies

To explore differences in communicative behaviour, overall communication statistics were obtained and analysed. Turns were then collated into the factors obtained by a factor analysis, whose results are reported in section 3.4. Aggressive speech occurred very infrequently in the sample and will therefore not be included in the analysis. Furthermore, no-action was not explicitly coded, and comparisons of action categories will focus on non-aggressive action and aggressive action only

3.3.1 Overall communication frequencies

Table 3.3.1 shows that simple turns occurred more frequently than extended turns, followed by justifications and resolutions. There were more simple and extended turns with non-oppositions than with oppositions, although the difference remained non-significant with regards to extensions. Justifications and resolutions occurred more frequently with oppositions. In total, the sample produced more turns with non-aggressive action (M = 1.15, SD = .86) than turns with aggressive action (M = .12, SD = .23, paired samples $t_{(79)} = 10.53$, $p < .001$.

Table 3.3.1 Communication frequencies across oppositions and non-oppositions

	Proportional frequencies *M (SD)*		Paired samples $t_{(78)}$, p
Turns	Opposition	Non-opposition	
Simple	.58 (.24)	.72 (.16)	$t = -5.09$, $p < .001$
Extension	.21 (.20)	.23 (.14)	$t = .92$, *ns*
Justification	.17 (.19)	.04 (.07)	$t = 7.52$, $p < .001$
Resolution	.04 (.11)	.006 (.02)	$t = 2.26$, $p < .05$

3.3.2 Communication frequencies across contexts

As shown in table 3.3.2, simple turns, justifications and non-oppositional resolutions occurred most frequently in the Raven's matrices context and least frequently in the limited toys context. For simple turns and justifications, the story condition produced more turns than the free play context, while non-oppositional resolutions were more frequent in the free play than in the story context.

For oppositional resolutions, the Raven's and free play contexts were identical in terms of communication frequency, while the limited toys and story contexts also showed the same frequency of turns. Extended turns showed a less unified pattern. Here, extended non-oppositions occurred with the highest frequency in the free play context, and the lowest frequency in the Raven's matrices context. The highest frequency of extended oppositions occurred in the story task, the lowest frequency being found in the limited toys task.

The highest frequency of non-aggressive action was found in the limited toys context. Aggressive action occurred most frequently in the free play context and least frequently in the story context. The Raven's matrices context showed the lowest frequency of non-aggressive action.

Table 3.3.2 Communication frequency across context

	Condition: frequency *M (SD)*			
Turn	Free play	Lim. toys	Story	Raven's
Simple opposition	.27 (.28)	.11 (.15)	.29 (.36)	.47 (.56)
Simple non-opposition	.76 (.45)	.69 (.65)	.81 (.63)	1.4 (.03)
Extended opposition	.13 (.18)	.06 (.13)	.14 (.19)	.09 (.18)
Extended non-opposition	.46 (.40)	.25 (.34)	.38 (.43)	.14 (.22)
Justificatory oppositions	.03 (.07)	.02 (.08)	.10 (.20)	.22 (.34)
Justificatory non-oppositions	.03 (.10)	.01 (.04)	.05 (.14)	.17 (.39)
Resolutions in oppositions	.02 (.10)	.01 (.04)	.01 (.04)	.02 (.09)
Resolutions in non-oppositions	.01 (.03)	.002 (.02)	.004 (.03)	.02 (.06)
Non-aggressive action	.26 (.21)	.48 (.45)	.24 (.28)	.17 (.29)
Aggressive action	.05 (.12)	.04 (.10)	.01. (06)	.02 (.10)

Figure 3.3.1 presents two extracts from the Raven's matrices context, showing a) a sequence of simple turns and b) turns with justifications. Both observations stem from P3 groups.

Figure 3.3.1 Communication in the Raven's matrices condition

a) Simple turns

B1: It's that one
B2: No it isn't
B3 (same as b1): That
B2: So it is, that one
B1: that one, it's that
(Turn page)
B1: No wait wait wait, turn back! - that isn't it!
B2: Yes it is
B1: No, it isn't,
B3: That's it
B1: That's it

b) justifications

B: Ok, so you take away the circle
G2: You take away the circle
B: You add the circle
G2: Yeah.
B: No, you take away, you just kinda keep this bit. So you've got that bit and than you add that bit, so it must be that bit. […] You add the circle and you're left with a circle and that bit, so in that one
G1: No, I think it's that one, is it not this one, cos that's got a dot and you take away this bit
B: No it's that, it's that, isn't it that one?
G2: That one doesn't have anything to do with the square, that one

3.3.3 Summary

Simple and extended turns occurred more frequently than justifications and resolutions. There were more turns with non-aggressive action than with aggressive action. There were more simple and extended turns with non-oppositional talk, whereas justifications and resolutions occurred more frequently during opposition. Simple turns, justifications and non-oppositional resolutions occurred most frequently in the Raven's matrices context and least frequently in the limited toys context, with other communication turns showing less systematic variation across settings.

3.4 Factor Analysis

3.4.1 Inter- item correlations

In preparation for the factor analysis, the inter-correlations of each type of communication turn (oppositional and non-oppositional) across all settings were obtained. The coefficients are given in appendix 5. Simple turns in oppositions and non-oppositions correlated positively with each other, with the sole exception of the free play and Raven's matrices contexts, where simple non-oppositions failed to correlate significantly. A similar result was obtained for extended turns, although – again as an exception to the rule – extended oppositions in the limited toys setting did not correlate with any other settings.

Significant associations were less frequent with regards to justifications, due most likely to low frequencies. For oppositional justifications only Raven's matrices and free play correlated with each other, while for non-oppositional justifications the only significant associations were found between the limited toys task, and the story and free play tasks respectively. The resolution factor showed no significant associations, again probably as the result of low frequency.

In terms of non-aggressive action, all settings correlated well, apart from the Raven's matrices setting, which was only related to the story setting. The free play context correlated with the limited toys and story contexts in terms of aggressive action, while all other factors remained unrelated. While the associations shown above were by no means perfect, they were deemed sufficient to warrant a combination of communication turns across contexts. A factor analysis was computed on the combined communication turns.

3.4.2 Factor analysis

A rotated factor analysis (extracting principal components with eigenvalues greater then 1 and using varimax rotation) was run to determine whether or not Howe and McWilliam's (in press) factor structure would emerge for the current sample. The structure revealed by the analysis explained 61% of the variance and is presented in table 3.4.1.

Table 3.4.1 Factor loadings revealed by the factor analysis

Turn	Factor 1	Factor 2	Factor 3
Simple oppositions	**.84**	0004	-.005
Simple non-oppositions	**.82**	.002	.002
Extended non-oppositions	**.69**	.54	-.003
Extended oppositions	**.69**	.26	-.009
Non-oppositional justifications	.11	**.80**	.13
Oppositional justifications	.23	**.85**	.13
Non-oppositional resolutions	.007	.34	**.68**
Oppositional resolutions	.23	-.18	-.52
Non-aggressive action	**.40**	-.43	.28
Aggressive action	.004	-.27	**.72**

The factor analysis revealed the presence of three main factors, the first consisting of all simple and extended turns together with non-aggressive action, although extended non-oppositions also loaded on the second factor. However, as its loading was stronger on the first factor, it will be included here. The second factor consisted of both types of justification, while the third factor consisted of non-oppositional resolutions, which also loaded - albeit very weakly - on the second factor, and aggressive action. Resolutions in oppositions did not load on any specific factor.

Based on these results, all simple and extended turns, alongside non-aggressive actions were collapsed into the variable of "simple communication" and both types of justifications were combined into a "justification" factor. As both aggressive action and non-oppositional resolutions occurred extremely infrequently, this factor was disregarded and all future analyses focussed on the factors of "simple communication" and "justifications".

3.4.3 Summary

As preparation for the factor analysis, item inter-correlations for every communicative turn across play contexts were obtained. The correlations revealed that while simple and extended turns as well as non-aggressive actions were significantly associated across contexts, justifications were less frequently related to each other. There were almost no cross-context associations for resolutions and aggressive action turns.

A factor analysis revealed the presence of three main factors, namely a "simple" factor, consisting of simple and extended turns and non-aggressive action and a "justificatory" factor, consisting of all justifications. The third factor contained both aggressive action and non-oppositional resolutions, but as both occurred very infrequently this factor was disregarded for further analysis.

3.5 The two communication factors

3.5.1 Total occurrence

As demonstrated in Table 3.5.1, a paired sample *t*-test showed that the simple factor was used significantly more frequently than the justification factor.

Table 3.5.1 Occurrence of the two communication factors

	Frequency M (SD)	T-test
Simple factor	6.40 (3.73)	$t_{(79)} = 14.54, p < .001$
Justification factor	.62 (.83)	

3.5.2 Occurrence across age and gender

Comparing the two communication factors across age and gender, mean differences, which are given in Table 3.5.2, indicate that while boys showed a higher frequency of simple communication, there were no gender differences on the justification factor. In terms of age differences, the P3 children showed the highest frequency of simple communication, followed by the P6 children and the nursery class, while justifications increased with age.

Table 3.5.2 The two communication factors across age and gender

Factor	Frequency *M (SD)*				
	Boy	Girl	Nursery	P3	P6
Simple	7.29 (4.53)	5.71 (2.82)	4.53 (1.94)	9.90 (4.43)	6.03 (2.51)
Justify	.63 (.97)	.62 (.72)	.15 (.30)	.80 (1.02)	1.26 (.78)

A multivariate (age x gender) *ANOVA*, whose statistics are displayed in table 3.5.3, confirmed that there were main effects of age on both the simple and the justification factor, while a main effect of gender was found for the simple, but not for the justification factor. The *ANOVA* also revealed a significant interaction effect for both factors.

Table 3.5.3 Results of the multivariate *ANOVA*

Factor	*ANOVA* (simple turns)	*ANOVA* (justifications)
Age	$F_{(2.74)} = 30.37, p < .001$	$F_{(2, 74)} = 19.30, p < .001$
Gender	$F_{(1, 74)} = 10.50, p < .005$	$F_{(1,74)} = .000$, *n/s*
Age x Gender	$F_{(2,74)} = 5.20, p < .01$	$F_{(2,74)} = 3.60, p < .05$

The main effect for gender in simple communication showed that boys used more simple turns than girls, while post-hoc Bonferroni-tests were employed to analyse the main effects of age. Analyses revealed that on the justification factor the nursery children scored significantly lower than the P3 and P6 children, who did not differ significantly from each other. In terms of simple communication, the main effect of age was due to a significant difference between the P3 children and the other two groups.

Figure 3.5.1a) clarifies the age x gender interaction obtained for the justification factor. The figure shows that while nursery children always produced the least amount of justification, boys offered more justification at P3 than at P6, whereas girls showed a linear developmental increase in their use of justifications.

Figure 3.5.1a) Age x gender interaction on justifications

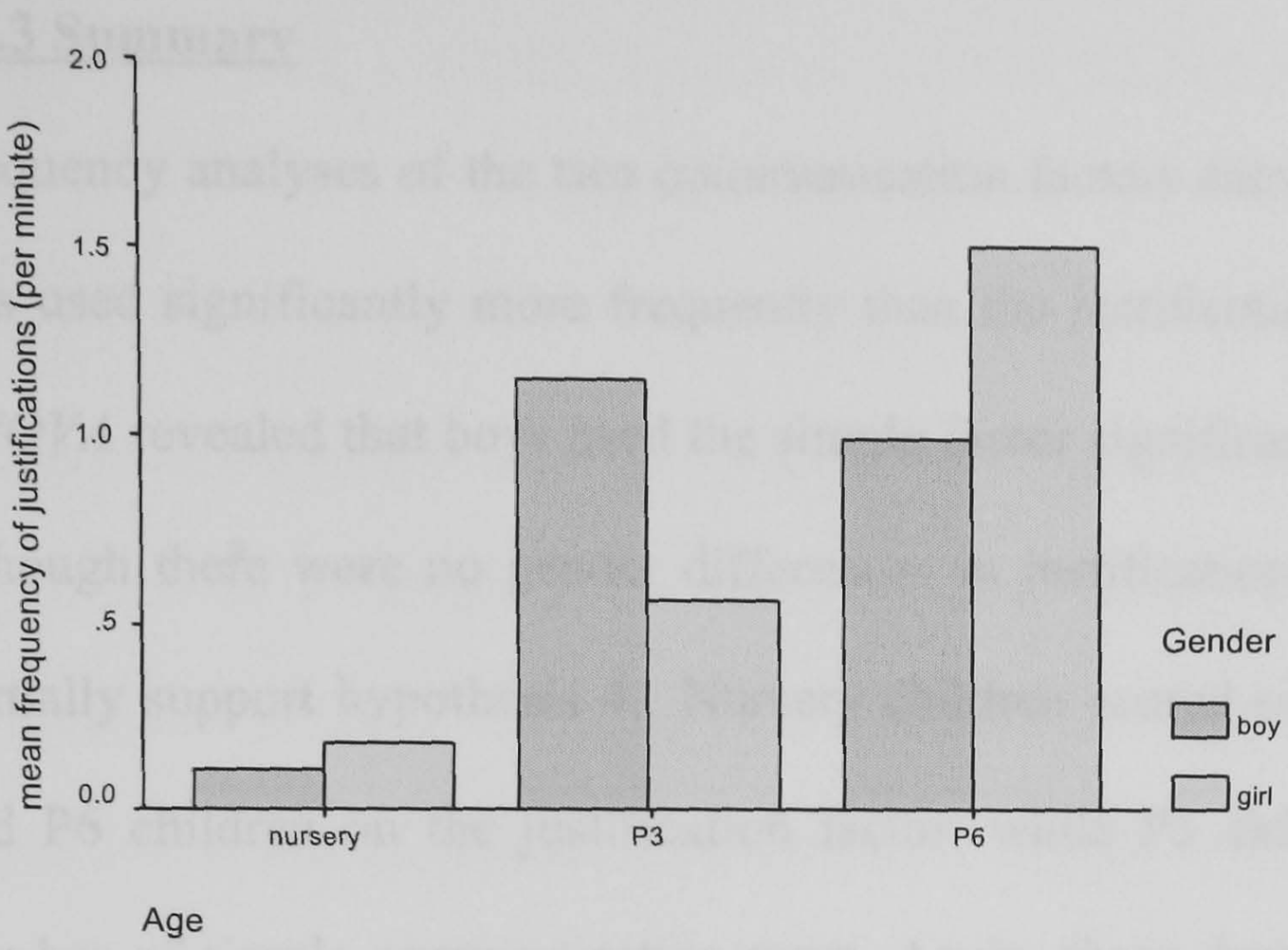
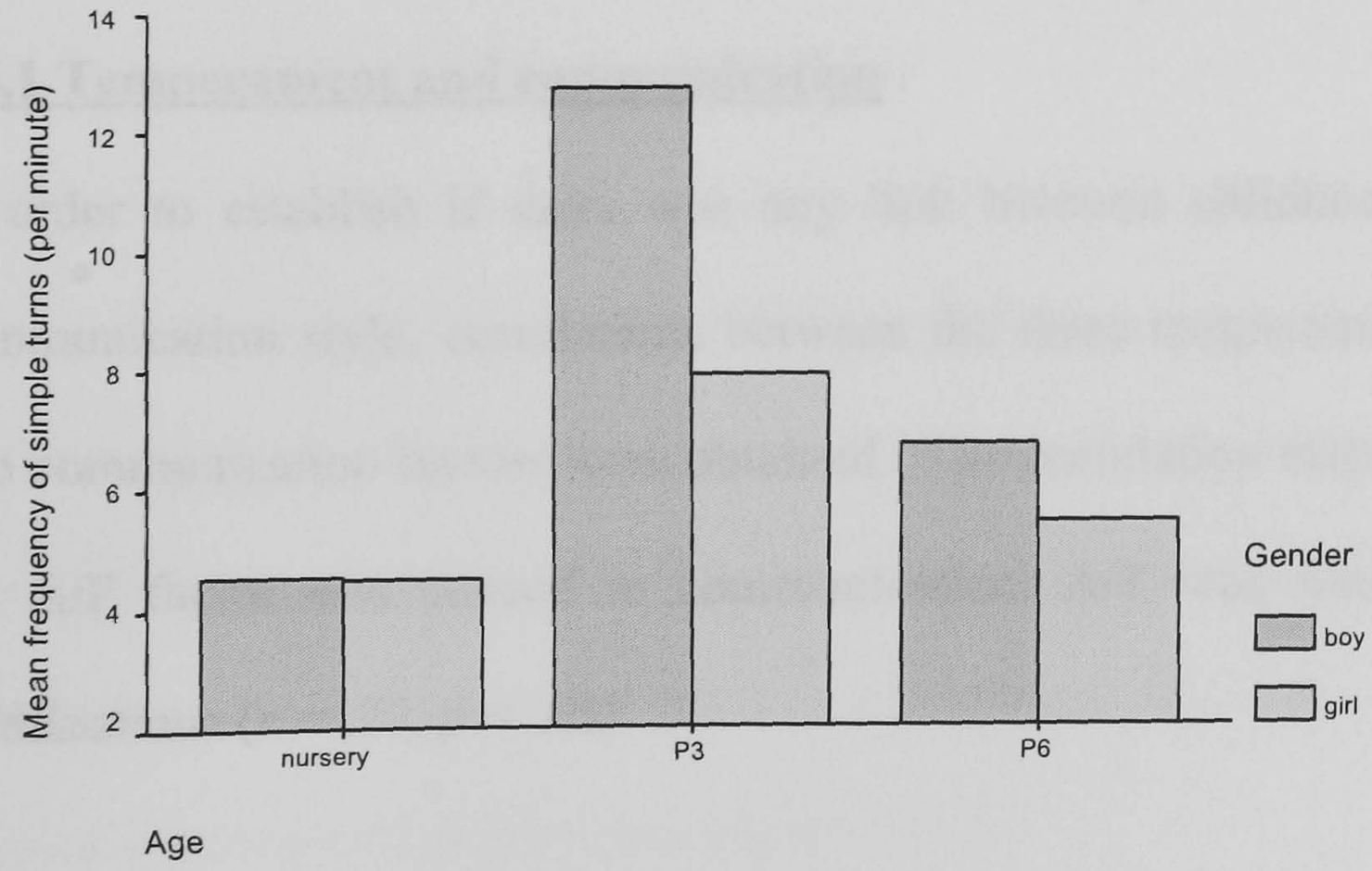


Figure 3.5.1.1b) shows that simple turns appeared least frequently at nursery age, most frequently at age P3 and dropped again for P6. This result was found for both gender groups, but the differences were more marked for boys

Figure 3.5.1 b) Age x gender interaction on simple turns



3.5.3 Summary

Frequency analyses of the two communication factors showed that the simple factor was used significantly more frequently than the justification factor. A multivariate *ANOVA* revealed that boys used the simple factor significantly more often than girls, although there were no gender differences in justifications. Therefore, results only partially support hypothesis 4. Nursery children scored significantly lower than P3 and P6 children on the justification factor, while P3 children offered the highest number of simple communication turns. Again, these results give partial support to hypothesis 4, which proposes a developmental increase in justifications. While P3 children offered more simple communication turns than their peers regardless of gender, analysis of the interaction effect indicated that boys offered more justification at P3 than at P6, whereas girls showed a linear developmental increase in their use of justifications.

3.6 Temperament, peer popularity and communication

3.6.1 Temperament and communication

In order to establish if there was any link between childhood temperament and communication style, correlations between the three temperamental factors and the two communication factors were obtained. The correlation matrix revealed that only the A/F factor was related to communication. A/F was weakly associated with justifications ($r = .22, p < .05$).

Interestingly, the two communication factors were also related positively to each other with $r = .31$, $p < .001$. For the full correlation matrix, please refer to appendix 6.

The association between A/F and justifications was also obtained for boys ($r = .41$, $p < .05$) and for P3 children ($r = .68$, $p < .001$), when gender and age groups were considered separately. P3 children also showed a negative association between IC scores and simple communication turns ($r = -.46$, $p < .05$). Girls showed a positive association between IC scores and justifications with $r = .33$, $p < .05$. The other correlations for the separate gender and age groups remained non-significant. For full correlation matrices, please consult appendix 7.

Overall, these results offer only minimal support for hypothesis 4, in that only girls and P3 children showed aspects of the predicted relation between Inhibitory Control scores and complex communication.

3.6.2 Peer popularity and communication

A one-way *ANOVA* was run to investigate whether children of differing sociometric status would employ the two communication factors to varying degrees. The mean differences, given in Table 3.6.1, indicated that while indifferent children produced the highest frequency of communication on both factors, popular children used justifications more frequently than rejected children, whereas rejected children used simple turns more often than their popular peers.

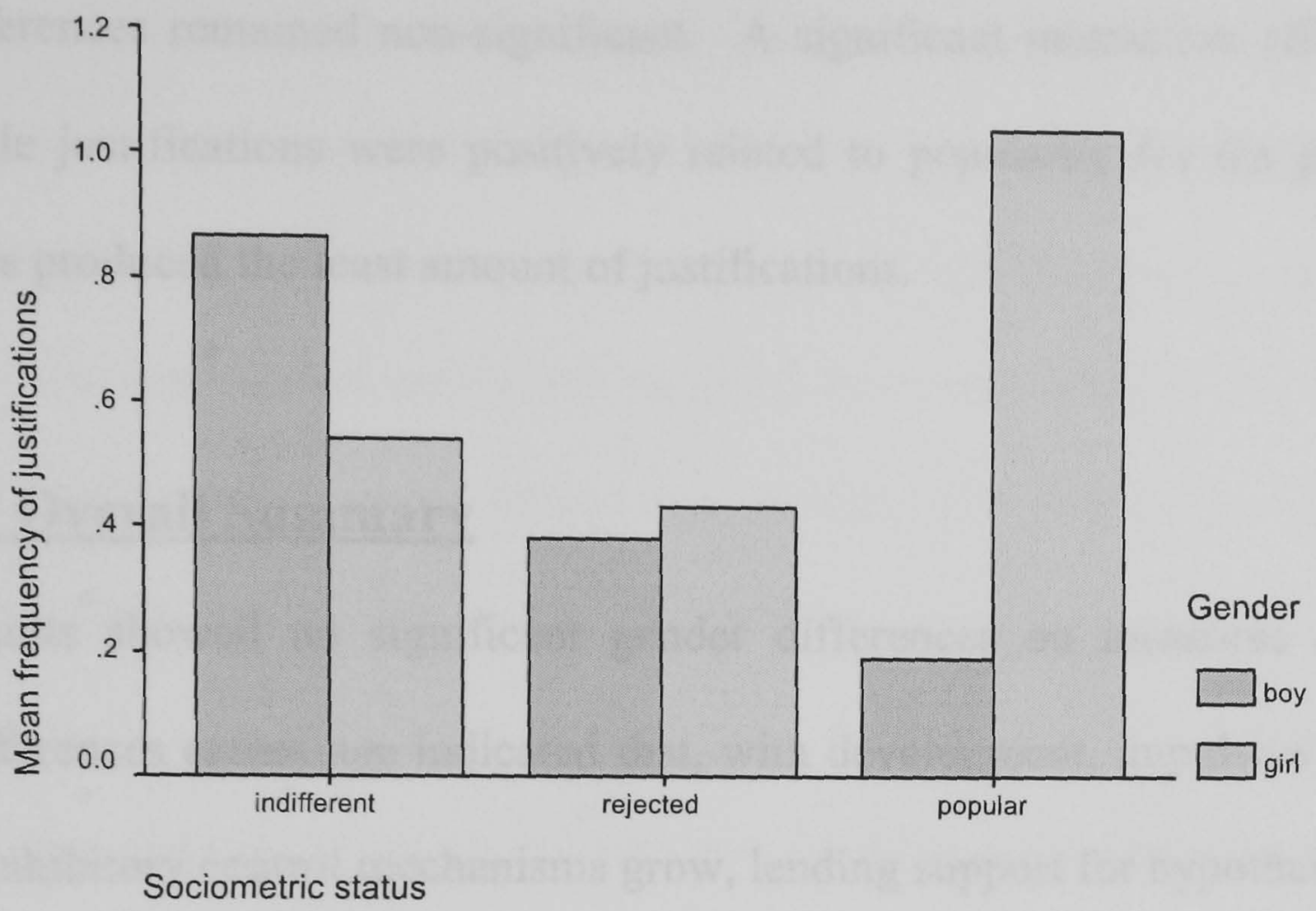
Table 3.6.1 Use of communication factors by children of different popularity

Sociometric status	Simple communication *M (SD)*	Justifications *M (SD)*
Indifferent	6.69 (3.91)	.67 (.92)
Rejected	6.39 (3.51)	.41 (.49)
Popular	5.48 (3.30)	.62 (.75)

However, the *ANOVA* showed that all differences were non-significant with $F_{(2,77)} =$ .64, *ns* for simple turns and $F_{(2,77)} = .49$, *ns* for justifications.

The one-way *ANOVA* was followed with a multivariate *ANOVA (*gender x age x sociometric status) to test for interaction effects. Results, presented in figure 3.6.1, revealed only one significant effect, namely a gender x sociometric status interaction on the justification factor ($F_{(4, 63)} = 3.45, p < .05$). The interaction showed that while rejected girls produced fewer justifications (M =.43, SD = .65) than indifferent girls (M =.54, SD = .68), with popular girls producing the most justifications (M = 1.04. SD = .86), popular boys actually produced fewer justifications (M = .19, SD = .21) than rejected boys (M = .38, SD = .32), indifferent boys producing the highest mean frequency (M = .87, SD = 1.19).

Figure 3.6.1 Justifications and popularity across gender



3.6.3 Summary

Analyses revealed little evidence of a relation between temperament and communication. A/F was the only factor positively related to justifications in the overall sample, for the boys, and - the strongest association- for the P3 children. The latter also showed a negative association between IC scores and simple communication turns. Girls showed a positive association between IC scores and justifications.

Communication - popularity relations showed that the popular children used more justifications than the rejected children, who used more simple turns. However, all differences remained non-significant. A significant interaction effect revealed that while justifications were positively related to popularity for the girls, the popular boys produced the least amount of justifications.

3.7 Overall Summary

Results showed no significant gender differences on measures of temperament. Differences across age indicated that, with development, impulsive processes lessen as inhibitory control mechanisms grow, lending support for hypothesis 4. In terms of popularity, there were no differences in sociometric status across age or gender. A/F correlated positively with IM and negatively with IC, while IC and IM correlated negatively with each other.

Examining temperament differences as a function of popularity, it emerged that indifferent children scored higher than rejected children on measures of behavioural inhibition, whilst scoring lower on impulsivity. In addition, the rejected girls scored significantly higher than the indifferent girls on the factor of impulsivity, partially supporting hypothesis 1. The rejected P3 children showed a higher mean on the IC scale than the popular P3 children, while the popular P3 children scored higher on the IM scale than their rejected peers.

Overall, simple and extended turns occurred more frequently than justifications and resolutions and there were more turns with non-aggressive action than with aggressive action. There were significantly more simple turns and nonsignificantly more extended turns in non-oppositions than in oppositions, whereas justifications and resolutions occurred more frequently in oppositions. Simple turns, justifications and non-oppositional resolutions occurred most frequently in the Raven's matrices and least frequently in the limited toys settings, with other communication turns and action turns showing less systematic variation.

A factor analysis revealed the presence of three main factors, namely a "simple" factor, consisting of simple and extended turns and non-aggressive action and a "justificatory" factor consisting of all justifications. The third factor comprised both aggressive action and non-oppositional resolutions. The third factor was discarded due to low occurrence of both aggressive action and non-oppositional resolutions.

Frequency analyses of the two communication factors showed that the simple factor was used significantly more frequently than the justification factor. A multivariate *ANOVA* revealed that the nursery children scored significantly lower than the P3 and P6 children on the justification factor, supporting hypothesis 4's assumption of developmental differences in the use of justifications. The P3 children offered the highest amount of simple communication. Further analyses indicated that the boys offered more justification at P3 than at P6, whereas the girls showed a linear developmental increase in their use of justifications. On the simple factor, the P3 children offered more communication turns than their peers, regardless of gender.

There was little evidence of a relation between temperament and communication. A/F was the only factor positively related to justifications in the overall sample, for the boys, and - the strongest association - for the P3 children, who also showed a negative association between IC scores and simple communication turns.

Communication - popularity relations showed that the popular children used more justifications than the rejected children, who used more simple turns. However, all differences remained non-significant. A significant interaction effect revealed that while justifications increased with popularity status for the girls, the popular boys produced the least justifications.

Consequentially, hypothesis 1 (variation in popularity due to temperament) was partially accepted. However, hypotheses 2 (variation in communication due to temperament) and 3 (variation in communication due to popularity) only revealed limited trend level support and were rejected on the grounds of insufficient evidence.

Hypothesis 4 (age and gender effects) was supported with regards to age effects. Age effects of temperament showed that IC increased with age, and that IM and A/F decreased. Age effects in communication showed that the nursery children displayed significantly fewer justifications than the P3 and P6 children. P3 children displayed the highest frequency of simple communication. In terms of gender effects, the hypothesis was partially supported in that the boys showed a higher frequency of simple communication than the girls, while there were no gender differences on the justification factor.

The study also obtained some interesting age x gender interaction effects. Interactions demonstrated that while girls showed a linear developmental increase in their use of justifications, boys offered more justification at P3 than at P6. In both gender groups, simple turns appeared least frequently at nursery age, most frequently at age P3, and dropped again for P6. Here, the differences were more marked for boys than for girls.

Chapter 4: Discussion of the Cross-sectional Study and Introduction to the Longitudinal Study

4.1 Overview

This chapter discusses the cross-sectional study. After reporting the outcomes of the analysis of communication frequencies and the factor analysis (4.2), the results obtained with consideration to the hypotheses will be discussed (4.3). The discussion will highlight the limitations of the cross-sectional study (4.4) that will inform methodological changes adopted in the longitudinal study. Lastly, the longitudinal study will be introduced and the relevant hypotheses stated (4.5).

4.2 Communication frequencies and factor analysis

Analyses of communication turns showed that there were more simple turns in non-oppositions, whereas justifications and resolutions occurred more frequently during oppositions, a result partially corroborating Howe and McWilliam's (in press) finding that justifications and resolutions occurred more frequently in oppositional encounters. A rotated factor analysis revealed a structure similar to Howe and McWilliams' (in press) solution. Factor one consisted of all simple and extended turns and nonaggressive action; factor two consisted primarily of justifications, although extended non-oppositions loaded on this factor too. The loading was, however, smaller than the loading of extended non-oppositions on factor one.

Factor three comprised non-oppositional resolutions and aggressive action. As both of these turns occurred very infrequently, it was argued that the third factor was a statistical artifact. This factor was therefore excluded from further analyses.

A discrepancy between results reported by Black and Hazen (1990), Black and Logan (1995), Kemple et al. (1992), and Hazen and Black (1989), highlighting the importance of contingency, and results reported by Howe and McWilliam (in press), showing that extensions loaded on a simple rather than a complex communication factor, questions whether extensions form part of a simple or a extended cluster. Results showed that extended non-opposistions loaded on both the simple and the complex factor, although the loading on the simple factor was greater. In contrast, extended oppositions loaded on the simple factor only, showing that indeed the use of extensions may vary between oppositional and non-oppositional encounters. Extensions may be particularly valuable for the maintenance of cohesion in non-oppositional communication, while they may be of lesser use in oppositions.

4.3 Hypotheses

4.3.1 Hypothesis 1

Hypothesis 1 argued for popularity differences according to childhood temperament, expecting peer sociometric status to be positively related to inhibitory control and negatively related to anger/frustration and impulsivity. Results obtained showed that, although not significant, rejected children achieved higher anger/frustration scores than indifferent children, with popular children receiving the lowest anger/frustration score.

These results concur with research reported by Lengua (2003), who found that high irritability was linked with higher internalising and externalising problems and lower social competence and with findings by Fabes (2002), which indicate that children who scored high on negative affectivity showed increasing rates of solitary play. Moreover, the current study also supports the relationship between high emotionality and peer rejection obtained by Eisenberg et al. (2001), and findings by Murphy et al. (2004), which showed that children high in social functioning were low in negative emotionality.

The current study found that rejected children had higher levels of impulsivity than popular children, indifferent children showing the lowest mean score of impulsivity. Here the difference between rejected and indifferent children was statistically significant.

The finding that rejected children were higher on impulsivity than popular children supports a body of research that has pointed out the hazards of undercontrolled temperament. Matthys et al. (1998), for example, reported that attention problems were related to moderately antisocial behaviour in their sample of ten-year-old clinically referred boys, while Caspi and Silva (1995), working with a non-clinical sample found that three-year-olds who showed a lack of control, obtained high scores on danger seeking, aggression and interpersonal aggression at age eighteen. Concurrently, Snyder et al. (2004), who incorporated peer rejection more directly into their study, showed that the relation between impulsiveness-inattention and acting out problems was mediated through peer rejection for boys, while for girls the effects of rejection and impulsiveness-inattention were additive.

Thirdly, the current study obtained a non-significant trend indicating that indifferent children achieved higher inhibitory control scores than popular children, with rejected children scoring lowest on this measure. The observation that popular children achieved higher mean scores on inhibitory control than rejected children, once again, concurs with the evidence cited in the introduction. However, it is important to emphasise that the differences were non-significant. Therefore, the results do not fully support research by Eisenberg et al. (1997), Fabes et al. (1999), Lengua (2003) and Liew et al. (2004), which indicates that children with high effortful control are good social responders and therefore popular.

The result that indifferent children were lower in impulsivity and higher in inhibition than popular children, perhaps hints that unpopular withdrawn children may be neglected rather than actively disliked. Rather than showing acting out problem behaviours, these children fail to initiate contact with their peers (Asendorpf, 1990) and show shy and inhibited interaction, with little involvement in group play (Kochanska and Radke-Yarrow, 1992). Ladd and Burgess (1999) report that aggressive withdrawn children were more unpopular than children who were only aggressive, who in turn were more unpopular than children who were withdrawn but not aggressive. This suggests that withdrawn children fell into the "indifferent" category in this study because their level of peer rejection was relatively low.

Somewhat unexpectedly, the current study obtained a significant effect for seven to eight year old children which showed that popular children were higher in impulsivity than their rejected peers, with indifferent children, as before, showing the lowest mean score on this measure. While this result contradicts the hypothesised negative relationship between impulsivity and peer rejection, it may be that this particular finding is due to socio-economic variations in accepted classroom communication styles, which favour boisterous spontaneous behaviour over restraint. This is comparable to results reported by Stormshak et al. (1999), who found that aggressive girls were disliked across all classrooms, and aggressive boys were unpopular in low but popular in high aggression classrooms.

Overall, hypothesis 1, arguing that high scores of inhibitory control and low scores of anger/frustration and impulsivity will be positively related to peer sociometric status, is tentatively supported, the main obstacle for full support being a consistent failure to meet the criterion of statistical significance.

4.3.2 Hypothesis 2

Hypothesis 2 suggested that popular children would use complex communication patterns more frequently than rejected children, the latter showing simpler forms of communication. Results obtained, although once again non-significant, showed that rejected children indeed used the simple factor more frequently than popular children, while popular children used the justification factor non-significantly more often than rejected children.

These trend-level results were comparable to those obtained by Howe et al. (2001) who also obtained trends showing that the proportion of simple conflict communication to complex conflict communication was greater for rejected children than for their popular or indifferent peers. The greater use of justifications by popular children also supports research by Black (1992) and Black and Logan (1995), which showed that popular status children provided more explanations than rejected children, and results by Hazen and Black (1989) and Murphy and Faulkner (2000) who reported that popular children were more likely to elaborate their disagreement, providing new avenues for continuing interaction.

In sum, limited support was found for hypothesis 2, but as results with regards to the complex communication factor remained non-significant, the hypothesis could not be fully accepted.

4.3.3 Hypothesis 3

Hypothesis 3 concerned the relationship between temperament and communication. It was argued that children with high inhibitory control scores would show more complex forms of communication, while more impulsive children would use simpler forms. No prediction was made with regards to anger/frustration scores, as it was conceivable that anger/frustration scores would be negatively related, positively related, or unrelated to justifications.

On the one hand, anger/frustration may relate positively to justifications because, as found by Howe and McWilliam (in press) and by the current study, justifications occur more frequently in conflict situations, and children high in anger/frustration are more likely to enter and experience conflicts than children who are less irritable. On the other hand, anger/frustration may relate negatively to justifications because children who experience a lot of anger may become too heated to give considered responses in disagreements. Thirdly, previous research by Howe and McWillam (in press) suggests that anger/frustration is associated with both simple and complex communication.

Interestingly, the only significant result obtained in the current study was a positive relationship between anger/frustration and the justification factor, showing that children who were high on angry emotions produced more justifications than children who were low on these emotions. This finding contradicts results reported by Howe and McWilliam (in press) who found anger/frustration to be predictive of both simple and complex communications, and strengthens the argument that children with high anger/frustration might enter and experience more conflict situations, which in turn are associated with higher levels of justifications.

The predictions regarding impulsivity and inhibition were only very sporadically supported, with girls showing a positive relationship between inhibitory control and justifications, and seven to eight year old children showing a negative association between inhibitory control and simple communication. Although – with the exception of Howe and McWilliam (in press) – no precedent in the literature has investigated relationships between the temperamental traits of impulsivity, inhibitory control and anger/frustration and the communication factors of simple and justificatory communication, the current findings may be compared with research Cole and McCroskey (2000), who related agreeableness to responsiveness. Considering that Jensen-Campbell et al. (2003) propose that agreeableness is related to effortful control, and considering that justifications may be understood as a responsive feature of communication (as justification is concerned with taking someone else's perspective into account), the result that inhibition is associated with the use of the justificatory factor mirrors the association between agreeableness and responsiveness.

Interestingly, McCroskey et al. (2001) have also distinguished extraversion – a sociable trait – from psychoticism – an unsociable trait – in the way they relate to responsiveness. While extraversion was positively related to responsiveness and negatively to verbal aggression, psychoticism related positively to verbal aggression and negatively to responsiveness. In sum, these results suggest a link between "easy" temperament and responsiveness, and thus possibly between easy temperament and more complex forms of communication. Therefore, while results obtained by the current study are sparse, they do suggest that at least some aspects of communication may be influenced by temperament.

4.3.4 Hypothesis 4

The fourth hypothesis argued for developmental and age related differences in temperament and communication. Firstly, it was argued that inhibitory control would increase with age, while both impulsivity and anger/frustration would decrease. The results of the current study fully confirmed this expectation by showing a developmental increase in inhibition and decrease in anger/frustration and impulsivity.

The results support previous research by Kochanska et al. (1997), Kochanska et al. (2000), and Jones et al. (2003) who documented an increase of inhibition over the toddler and pre-school years into early school age. Working with older children, Trembach et al. (2004) also found an increase in attention between the ages of seven and ten years.

Furthermore, results supported research reported by Olson et al. (1999), who found a longitudinal decrease in impulsivity, following children from the ages of six to seventeen, and results reported by Fabes (2002), who obtained a decrease in negative emotionality with age.

Secondly, the fourth hypothesis suggested that girls would show higher levels of inhibition and, due to this increased inhibition, lower levels of anger/frustration and impulsivity, than boys would. Results supported these suggestions at a trend level, showing that girls obtained a non-significantly higher inhibitory control scores and non-significantly lower anger/frustration and impulsivity scores than boys, tentatively corroborating research by Kochanska et al. (1997) and Kochanska et al. (2000), who also reported higher levels of inhibitory control in girls.

The fourth hypothesis also argued that in line with the increase in inhibition, older children would offer more complex communication. Once more, results partially supported the hypothesis, finding a significant difference in the use of justifications between four to five year old children and seven to eight year old and ten to eleven year old children. Ten to eleven year old children produced the highest proportion of complex communication.

In terms of simple communication turns, it was found that seven to eight year old children offered significantly more turns than the other age groups, a result that suggests a high level of verbosity at this age level, considering that these children also offered a large number of justifications compared to nursery children. It is interesting to note that the ten to eleven year old children offered at least as many justifications as the seven to eight year old children, but less simple communication. This finding may be linked to a decrease in impulsivity rather than an increase in inhibitory control.

In terms of communication differences between girls and boys, the fourth hypothesis predicted that girls would use less simple communication and more justification than boys would. The results showed that boys indeed used more simple communication turns than girls did, corroborating research by Howe and McWilliam (in press), who found that boys used the simple communication factor significantly more often than girls.

Furthermore, it was found that girls' popularity was positively associated with the frequency of justifications offered, popular girls offering more justifications than indifferent girls, and rejected girls showing the least number of justifications. For boys, on the other hand, results showed that popular boys gave the least number of justifications. If giving justifications is understood as an other-orientated move, it may be that these types of communications are non-preferred by tough boys, toughness being associated with popularity for boys in research by Estell et al. (2002) and Rodkin et al. (2000).

This argument would also fit in with prior research showing that boys' communication is more controlling and girls' communication more collaborative (Leaper et al., 1999; Leman et al., 1999).

The current study also obtained an age x gender interaction, which revealed that while for girls the use of justifications increased with age, seven to eight year old boys gave the highest frequency of justifications. The high proportion of justifications for boys in this age range could possibly be attributed to their general higher verbosity, while the decrease in justification at ages ten to eleven compared with the increase in complex communication for girls, might indicate that justifications are of lesser importance in boys' communication.

Thus, the fourth hypothesis received some support, documenting an age related increase in complex communication as well as age related changes in temperament. Results addressing temperamental and communicative differences between boys and girls achieved less consistent support, with age x gender interactions indicating differential use of communication for boys and girls over development.

4.4 Limitations of the cross-sectional study

Sample size

In sum, while all hypotheses received at least partial support at a trend level, most of these results failed to reach conventional levels of significance. This is hardly surprising considering the small sample size of the current study. A total of sixteen popular and twelve rejected children is almost certainly too small a sample to obtain significant results regarding communicative differences according to popularity status. Furthermore, with a sample this small, the likelihood of obtaining clear results for relatively infrequently occurring communicative turns, such as justifications or resolutions, is even lower. If the issues addressed in the current study are to be explored further, one of the main considerations should be an increase in sample size.

Observational conditions

While the associations between communication turns across contexts were deemed sufficient to collapse the observations, it should be noted that the limited toys task did not lead to sufficient frequencies of communicative turns, clearly failing to elicit discussions over toy sharing. The majority of groups were observed to share the pig, at least between two children, while the third child played with the kaleidoscope. In some cases, the children disregarded the kaleidoscope altogether, happily sharing the pig amongst the three of them.

In fact, only one out of 64 children noted the mismatch between number of toys available and number of children, asking the experimenter "and what can **I** play with?" after the other two children had taken the pig and the kaleidoscope.

It was found that the four to five year old children had difficulties with the Raven's matrices task. They frequently misunderstood the instructions given with the story sorting task and used the cards in other ways, such as sharing them out equally, even when additional instructions were given. It is unclear whether instructions were too poor or too complex for pre-school aged children, or whether the stories themselves were too complicated.

With the older age groups, the Raven's matrices task elicited relatively high usage of justification turns. However, here too, the number of justifications given largely depended on whether or not the children a) understood the instructions and b) chose to discuss their choices in depth. The following transcripts demonstrate the difference between a group of children who chose to engage with the matrices and a group of children who were not really concerned with the correctness of their choice.

Group 1: girls, P6 (ten to eleven years)

Girl 1: *I'd say it's number two (1 min. silence). No, No, wait a minute, that's not right.*

Girl 2: *It's number three, cos look, it's getting smaller there.*

Girl 3: *No, but that's only got one line, it's got to be number four, cos that goes in as well.*

Girl 2: *Aye, so it is, it's number four.*

Group 2: boys, P3 (seven to eight years)

Boy 1: *That one.*

Boy 2: *No that one.*

Boy 3: *No, no! That one, it's number four!*

Boy 1: *Aye, it's number four.*

It is interesting to note that the first extract is drawn from a group of ten to eleven year old girls, the age group that elicited the highest frequency of justifications for girls. Girls were found to use more justifications than the boys, and showed a linear relationship between popularity and justifications. The second extract on the other hand stems from a group of seven to eight year old boys. Although the boys offered more justifications at this age than at any other age, the boys in general showed (non-significantly) less complex communication than the girls, and evidenced an inverse relationship between popularity and justifications.

Again, these observations may suggest that it is more important and therefore more common for girls to give justifications, while boys may not need to justify their suggestions.

In sum, while it was deemed justifiable to collapse communication turns across contexts, the limited toys task obtained consistently low frequencies of communication. Moreover, the observation that children shared rather than discussed toys, suggests that this task should be disregarded in future investigations, unless toys could be made more "unsharable".

Age groups

As regards sample selection, the structured tasks employed in the current study were clearly inappropriate for the four to five year old nursery children, because they experienced difficulties with both the story sorting task and the Raven's matrices task. It follows that nursery children should either be excluded from follow-up studies, or the material adapted to better suit their needs. In contrast, the seven to eight year old children seem a promising group for further exploration, as they were the group that provided most verbal turns overall. This may be useful in future study, as a larger amount of communication may lead to greater power of differentiation between communication turns, and may therefore help clarify relationships between communication, temperament and peer popularity.

In addition, the current study revealed that in the sample of seven to eight year olds, popular children were higher in impulsivity than their rejected peers, with indifferent children showing the lowest mean score on this measure. It was argued above that this result may be due to socio-economic variations in accepted classroom communication styles, favouring boisterous or spontaneous behaviour over restraint. In order to verify this argument, it would be pertinent to conduct another study with the same age group, but in a different socio-economic area so that correspondences and discrepancies can be analysed.

Other limitations

The current study was unable to predict cause-and-effect relationships between communication, temperament and popularity. However, this is an important question with regards to peer popularity, and research has indicated the possibility that peer popularity may operate both as a predictor and as a consequence of social behaviour.

Coie and Kupersmidt (1983) supported the hypothesis that behaviour precedes sociometric status in their sociometric status replication study, while Miller-Johnson et al. (2002) reported that peer rejection in the first grade predicted conduct problems in grades three and four. Haselager et al. (2002) found that changes in social behaviour either co-occurred with or followed, but never preceded changes in sociometric dimensions.

The particular relevance of this question becomes apparent when applied to an example of the current study, where one rejected girl's comments were never replied to. In the structure of Howe and McWilliams (in press) coding scheme, initiations are classified as simple turns because they do not build on previous interactions. As this particular girl's comments were never followed up, she continued to initiate and therefore was identified as using mostly simple communication. This example shows a clear temporal course between rejection and communication, with the girl showing more simple communication due to her rejected status.

However, it remains open whether this girl's communication style also contributed to her rejected status, for example through a failure to engage in conversations started by other pupils, because relevant data were not available. In order to allow such an investigation, a longitudinal study would need to be conducted. In order to conduct such a study however, the measurement of sociometric status must take the form of an interval scale, as a pre-requisite to performing regression analyses. Therefore, the nominations approach that was used to categorise children as popular, rejected and indifferent should be replaced by popularity ratings, which locate the child along a continuous unpopular – popular scale.

In addition, the current study had no means of establishing whether the dialogue structures obtained in the play settings actually resembled real classroom dialogue. This is an important question, especially with regards to the finding that the communication patterns varied across the different task settings. It would therefore be prudent to ascertain that the experimental findings translate into actual classroom interaction.

Moreover, only single gender groups were considered in this cross-sectional study. In a real-life classroom however, children have to work together based on different criteria, such as different ability groups or seating plans. Therefore, children are often required to work with opposite gender classmates as well as with same gender peers. Consequently, a follow up study would need to take into account interactions of mixed gender groups. A group level analysis would also allow for disassociating individual effects from group level effects, two factors that could not be disassociated in the cross-sectional study.

Noting that girls offered more justifications and less simple communication than boys, can either mean that this is inherent to the way girls communicate - a position that would concur with a temperamental basis to communication - or that girls only communicate this way when interacting with other girls, a more group-orientated position. The latter would corroborate a (sub-) culture specific approach that is alluded to when Leman et al. (1999), Leaper et al. (1999) and Howe and McWilliam (in press), report that communication differs in same gender and mixed gender groups.

Lastly, it should be noted that coding with the Noldus Observer gave rise to a number of challenges, such as including inaudible conversations, simultaneous speech and the correct operation of the software, which of course all may have had an impact on the data obtained, despite the high level of interjudge agreement.

In the present study, interactions between children were coded in a format of *initiating child* > *communication* > *recipient child* > *response*, a structure that would presumably be successful when coding true dialogic interaction, but is somewhat clumsy as soon as a third party is involved. To clarify, this structure would be very useful at coding Thomas' conversation with John. If however, a third child – Mark – joins in, this structure would be less useful. For example it could be the case that Thomas talks to John, but Mark (rather than John) replies. Alternatively, Thomas could talk to John, and John's reply to Thomas could serve as an initiation for a response by Mark.

Another issue related to coding procedure was the coding of resolutions. While the cross-sectional study drew both on resolutions in oppositions and non-oppositions, the definition of a resolution pre-supposes that it is a non-oppositional turn, being the very method by which oppositions are turned into non-oppositions. It was therefore somewhat illogical to code the turn of oppositional resolutions. In addition, resolutions, regardless of whether they happened in opposition or not, occurred very infrequently, and did most certainly not benefit from further fragmentation. It is therefore suggested, that in future, all resolutions should be coded as non-oppositional turns.

In sum, a follow up study would need to introduce changes with regards to task settings, sample, and data coding procedure, whilst extending the cross-sectional study by taking into account both the gender composition of groups and predictive relationships between temperament, communication and popularity.

4.5 Introduction to the longitudinal study

Following the cross-sectional study, a longitudinal study was conducted with children attending P2 and P3 classes, spanning the age groups from six to seven and seven to eight years old. The longitudinal study was subjected to a number of modifications that originated from issues raised by the cross-sectional study.

Play contexts

The longitudinal study used the same contexts (free play, story sorting and Raven's matrices) as the cross-sectional study, with the exception of the limited toys context, which had been shown to be ineffective in eliciting discussions between children.

Sample

As it was argued that the cross-sectional sample was too small to reveal the presence of subtle communication effects, the sample size for the longitudinal study was increased, resulting in a total of 174 participants. Sample selection will be described in more detail in the Methods section (chapter 5).

The cross-sectional study had revealed that seven to eight year old children used more communication turns than their older or younger peers, and that popular children in that age group were more impulsive than their rejected or indifferent peers, a result that was attributed to socio-economic variations in accepted classroom communication styles. The longitudinal study used six to eight year old children only, in the hope that more frequent verbalisations might lead to better detection of subtle effects and also to further explore the relationship between impulsivity and communication in this age group. Furthermore, it is during this concrete operational period that the transition from ego-centrism to decentration takes place, and complex language that builds on other's perspective is first acquired. Investigation of this age group may therefore be particularly valuable. In addition, the schools recruited for the longitudinal study were drawn from wealthier areas than the schools that had participated in the cross sectional study.

Coding

All communication turns were coded as in the cross-sectional study, with the exception of resolutions. Resolutions had occurred very infrequently in the cross-sectional study, the distinction between resolutions in oppositions and resolutions in non-oppositions further reducing the frequency of occurrence. For the longitudinal study, it was assumed that resolutions are always non-oppositional moves. Therefore, resolutions were coded as non-oppositions only.

The Observer software was also employed slightly differently for the longitudinal study. Whereas in the previous study interactions had been coded as *initiating child > communication > recipient child > response,* in the longitudinal study interactions were coded as *child > opposition or non-opposition > communication turn > action turn*, starting a new code for every child. In the terminology of the Observer software, the child would be entered as the subject, while opposition or non-opposition, communication turns and action turns would be entered as modifiers. Table 4.5 shows the difference in coding between the cross-sectional and the longitudinal study with reference to Observer terminology.

Table 4.5 Modification in coding procedure

Observer title	Subject	Modifier 1	Modifier 1	Modifier 4
Cross-sectional	Child	Opposition or non-opposition , communication & action turn	Recipient child	Response
Longitudinal	Child	Opposition or non-opposition	Communication	Action turn

This method was thought to be more appropriate for the coding of triadic interactions, as it is not restrictive with regards to children who are initiators or responders.

Extensions of the cross-sectional study

As mentioned above, the cross-sectional study failed to take into account any predictive relationships between temperament, communication and peer popularity. In addition it did not account for communication style in different group structures, i.e. mixed and single gender groups.

The longitudinal study was designed to take account of predictive relationships, assessing peer popularity at two points in time and investigating the predictive values of temperament and communication regarding the explanation of popularity at time 2. For the purpose of obtaining the continuous data required for regression analysis, peer popularity nominations were replaced by five point scale ratings of peer popularity. Children were observed in same gender and mixed gender groups, and classroom observations for every child were obtained in order to establish whether videotaped behaviour corresponds to real-life settings.

4.6 Hypotheses

The hypotheses of the longitudinal study remained the same as those chosen for the cross-sectional study, namely:

H_1: There will be associations between temperament and popularity, "easy" temperament (low impulsivity, low negative emotionality and high inhibitory control) being related to high peer popularity.

H_2: Popular children will use more complex communication than rejected children, while rejected children will use simpler communication than popular children.

H_3: Communication will vary according to temperament. Children scoring lower on impulsivity and higher on inhibitory control will show a higher proportion of complex communication than their more impulsive and less controlled peers.

The fourth hypothesis, however, was adapted to take account of the narrower age range used. While predictions regarding gender differences were maintained, no significant developmental differences in temperament and communication were expected.

H_4: There will be gender, but no age differences, in communication and temperament, in so far as:

(1) Inhibitory control, impulsivity and anger/frustration scores will not differ significantly between six to seven year old children and seven to eight year old children

(2) Boys will show more impulsivity, more negative affectivity and less inhibition than girls.

(3) There will be no difference in the use of simple and complex communication between six to seven year old children and seven to eight year old children

(4) Boys will use simpler communication than girls.

Chapter 5: Method of the Longitudinal Study

5.1 Design

The study reported in this chapter employed a longitudinal design, taking measures of temperament, popularity and communication style at time 1 and measures of popularity at time 2. Parents of 174 children from P2 and P3 classes were asked to complete and return an abbreviated version of Rothbart's CBQ (Rothbart et al., 2001). Children rated their classmates on a Likert type popularity scale and were observed in four videotaped play conditions and in classroom interactions. Communication style was coded as frequency data with the Noldus Observer software. Data were analysed using SPSS 10 for Windows. Results were calculated to assess the concurrent relationships between temperament, communication style, and peer popularity, as well as predictive relationships with reference to the popularity measures that were taken at time 2.

5.2 Methodological differences between the cross sectional and the longitudinal study.

In comparison to the cross-sectional study, the longitudinal study was conducted in schools situated in wealthier areas. The age range was narrower, with participating children being between six and eight years of age. Further, the longitudinal study employed a peer rating rather than a peer nomination procedure. Peer popularity ratings on five point likert-scales were taken at two points in time. This was done in order to facilitate a regression analysis that would test for the longitudinal impact of

communication on peer popularity. The play conditions as well, varied in comparison to the cross-sectional study. While the overall structure of free play – structured task – free play was maintained, the toys provided for the free play setting varied, and one of the structured tasks, the limited toys task, was dropped in the longitudinal study. The story sorting task and the Raven's matrices task were retained. Consequently, the structure of the video-taped tasks for the longitudinal study took the form of free play 1, story sorting task, Raven's matrices task, free play 2. As some play sessions had to repeated due to poor video-recording quality, new stories were devised for the story sorting task and used on the occasions were children had to be called back for a second recording. In addition, the longitudinal study included a brief (5 minute) pen and pencil observation of actual classroom observation for each child. This stage was included in order to investigate whether communication patterns obtained in the video-taped settings would correspond to the real-life setting of the classroom. Assessment of childhood temperament remained the same as in the cross-sectional study. In the longitudinal study as well, Rothbart's (Rothbart et al., 2001) child behaviour questionnaire was employed.

5.3 Participants

Sample

174 children drawn from four Scottish primary schools participated in the current study. All schools were state schools located in predominantly white, middle-class suburban areas. Census statistics (Scottish Census, 2001) were available for two of the schools. In contrast to the schools used in the cross-sectional studies, both of these schools were drawn from areas that in comparison with the percentage average in the whole of Scotland, had a lower percentage of unemployment, a lower percentage of employees in the lowest occupation categories (process and plant and machine operatives and elementary occupations), a lower percentage of households with no persons in employment and dependent children and higher average age of a person with good health. The other two schools, for which no census statistics were available, were drawn from similar neighbourhoods. Three schools had a non-denominational curriculum, while the fourth school had a strong focus on Jewish religious education.

In three schools all P2 and P3 classes participated. This meant two P2 and two P3 classes in two of these schools, and one P2 and one P3 class in the third school. A fourth school contributed a mixed P2/P3 class. In other words, a total of 11 classrooms participated in the study. Total cohorts in each school and total number of valid cases are given in table 5.3.1. A case was deemed valid when the child had a complete set of data, consisting of temperament measures, observed communication, popularity at time 1, and popularity at time 2. All future statistics are calculated for valid cases only.

Table 5.3.1 Total classroom sizes and valid cases

School	School 1		School 2		School 3		School 4	
Age group	P2	P3	P2	P3	P2	P3	P2	P3
Total cohort	46	58	56	60	21	22	13	8
Opt outs	4	4	16	12	3	5	0	2
Returned CBQ's *(Percentages)*	32 *76%*	45 *83%*	32 *80%*	40 *83%*	8 *44%*	13 *76%*	13 *100%*	6 *100%*
Cases of missing data	2	1	8	1	0	2	1	0
Valid cases	30	44	24	39	8	11	12	6
Total	P2	74			P3	100		

Age range and Gender distribution

For the P2 classes ages ranged from 6 years, 2 months to 7 years, 7 months (mean age: 6 years, 8 months). For the P3 classes, ages ranged from 7 years, 2 months to eight years, 2 months (mean age: 7 years, 7 months). A total of 86 boys and 88 girls were members of the sample. Gender distribution across classrooms is given in table 5.3.2

Table 5.3.2 Gender distribution of the current sample

School	Gender	P2	P3	Total
School 1	Boy	13	18	31
	Girl	17	26	43
School 2	Boy	12	21	33
	Girl	12	18	30
School 3	Boy	4	8	12
	Girl	4	3	7
School 4	Boy	7	3	10
	Girl	5	3	8

5.4 Materials

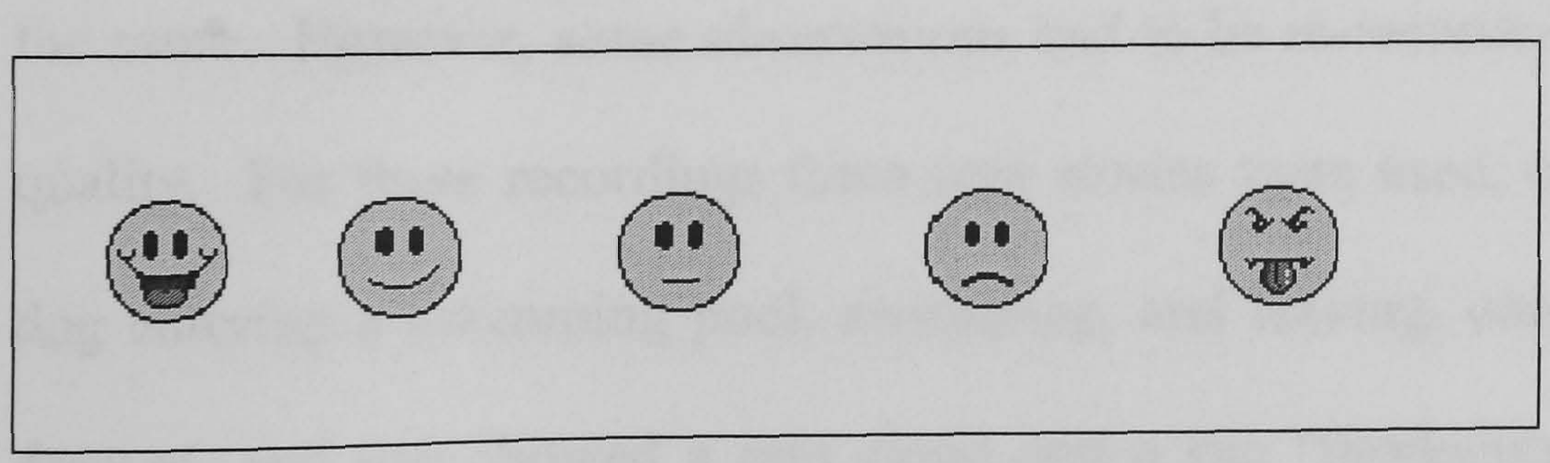
Child Behaviour Questionnaire

Parents received a questionnaire consisting of the Anger/Frustration, Impulsivity (IM), and Inhibitory Control (IC) scales of Rothbart's CBQ (Rothbart et al., 2001), as before with the Smiling and Laughter and High Pleasure subscales as fillers.

Sociometric ratings

In contrast to the previous study, which had employed a peer nomination procedure, the current study utilised a 5-point Likert scale to rate popularity of children within the classroom, so that a regression analysis could be conducted on the data. In preparation for the popularity ratings, portrait photographs of each participating child were taken. At time 1, the P2 children were presented with five sorting boxes, each decorated with one of the smiley faces shown in figure 5.4.1. They were given photographs of all the participating children in their class and were asked to sort the pictures into the boxes.

Figure 5.4.1 Smiley faces used for the peer rating procedure



The P3 children, and all children at time 2 were given a paper and pencil rating scale headed "How much would you like to play with" where the name of every participating child in the classroom was presented alongside the smiley faces. The children were asked to circle the appropriate face. A sample rating sheet is given in appendix 8.

Video-taped session

Observation of communication style involved video-recorded observation of behaviour on three set tasks and checklist recorded observations of behaviour during classroom interactions. Similar to the cross-sectional study reported previously, triads of children were observed during the set play tasks.

The tasks consisted, as in the previous study, of free play, a story sorting task, a Raven's matrices task, and a second free play session. The materials for the tasks varied slightly from the previous study. Toys for the free play tasks consisted of a 50-piece jigsaw, a basket with fruit, some play money, a tea set, a handyman's kit (consisting of nails, screws, boards, hammers, a rotating drill and a screwdriver), and a box with beads and strings. Materials for the story-sorting task remained initially the same. However, some observations had to be re-recorded due to poor recording quality. For these recordings three new stories were used, one showed a cat and a dog entering a swimming pool, swimming, and leaving, one showed a boy getting dressed, and one showed a rain cloud and a sun "producing" a rainbow. Sample pictures of these stories are displayed in appendix 9. The Raven's matrices task remained the same.

Classroom observations

Each child was observed for five consecutive minutes during classroom interaction and all communication turns produced (opposition/non-opposition, simple/extended/ justification/resolution, no action/non-aggressive action/aggressive action/ aggressive speech) were coded with a scoring sheet, which is presented in appendix 10.

5.5 Procedure

Obtaining consent

After the relevant councils had given their permission, and necessary police security checks had been passed ("enhanced disclosure"), head teachers were sent information letters with consent forms. After permission was obtained, parental information letters and consent forms were sent out. These forms were initially constructed as opting out forms, but were changed to accommodate individual school requests. Parental information and consent forms are given in appendix 11.

Child Behaviour Questionnaire

Parents received a copy of the abridged version of the CBQ (Rothbart et al., 2001) alongside their consent forms. Parents were told that they would receive a portrait of their child if they returned the completed questionnaire within a week of receipt. CBQ return rates across the schools ranged from 44% to 100%, with a mean return rate of 80.25%. As before, a single A/F, IC and IM score was calculated for each child by dividing the total of all scores for each scale by the number of items scored.

Sociometric status ratings

As before, photographs were taken of every participating child. Two copies were made of every picture, one of which was reserved as a thank-you for the parents, while the second was used to complete the popularity ratings. All ratings were taken in an empty classroom and children were reassured of confidentiality before starting the procedure. At time 1, P2 children were individually presented with the photographs of their classmates and a row of boxes with the smiley faces shown above. They were told:

"Look, here are pictures of all the other children in your class. I'd like you to put the pictures into these boxes. Can you see these boxes? Look at the faces. This one, with the big smile, is for all your **best** friends. This one, with the little smile is for all the children you like to play with, but they are not your **best** friends. This one in the middle is for all the children you don't really think about. [1] This one, with the little sad face is for all the children you don't really like, but you still play with them sometimes. And guess what this last face is for?"

The last item was included as a question in order to ascertain that children had understood the rating scale, and in order to heighten more considered choices through increased self-involvement. Children responded well to the question, for example stating that the box was "for all the ones you really really don't like", "for all the ones you hate", "you don't play with them ever".

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[1] The alternative wording: don't really care about was used as elaboration when children seemed to have difficulty with the concept of "not thinking about someone".

At times, the order was reversed, leaving the question for the happiest face. Children accurately understood that this category was to be used for their best friends only. P3 children at time 1 and all children at time 2 were given a rating sheet, talked through the instructions, and then asked to circle the appropriate face on their sheet. The smiley faces were then scored from 1 (for the most unhappy face) to 5 (for the most happy face) and mean popularity scores for each child were calculated.

The reason for employing a peer rating rather than a peer nomination procedure was primarily to facilitate a regression analysis. Advantages and disadvantages of peer nominations and peer ratings are reported in the introduction (see section 1.2.2). Peer ratings were seen as appropriate for the P2 and P3 age groups and for the purpose of this study. The mean popularity score received was calculated for every child in a given class. Mean scores were then transformed into z scores, on which all further analyses were performed.

For the peer ratings, descriptions of "being a friend" and "liking to play with" were used in combination. At the age group the two concepts are consummate, in that children would play with their friends, but not with their non-friends. At the same time, it is the period in which children make the transition from the concrete world of "playing with someone" to the more abstract world of "friendship". Thus the simultaneous use of both concepts hopefully reflected the child's reality. Here again, both of these concepts are in themselves measures of friendship rather than of popularity, and the term popularity refers to the derived average score.

Videotaped interactions

In contrast to the cross-sectional study, which only considered same gender groups, the longitudinal study looked at both same gender and mixed gender groups. 65 boys participated in pure boy groups, 65 girls were in pure girl groups and 44 children (21 boys and 23 girls) were in mixed gender groups. As before, a period of free play was followed by the structured tasks and another free play session. The story sorting task and the Raven's matrices task were retained, while the limited toys task was omitted this time, as it was shown to be of limited use.

Classroom observations

The classroom observation consisted of five consecutive minutes of paper and pencil coding per child. As time was tight children were observed at any time they talked to each other rather than the teacher – during classroom discussions, arts, computing, structured play, recess and other settings. The times at which the children were observed were selected for convenience. On a small number of occasions, where children had been interrupted by teacher instructions or other activities (going to wash hands, going to the toilet etc.) the five minute observation consisted of two shorter observations.

Coding

The videotaped observations were coded using the Noldus Observer software. As before, interactions were coded into simple, extended, justification and resolution turns. All of these could occur either in oppositional or non-oppositional contexts, with the exception of resolutions, which at this time were always coded as non-oppositional moves. Action turns were coded as no action, non-aggressive action, and aggressive action. Aggressive speech was also coded in this category. In contrast to the cross-sectional study however, all interactions were coded using the *structure child > opposition or non-oppositions> verbal turn > action turn.*

Reliability checks

10% of the data was double coded by two fellow research students who had been trained by coding one interaction with the researcher. Each of these students coded 5% of the data. The rho statistics for each student across coding categories are displayed below.

Student 1: Rho from .59-.78, mean = .78,

Student 2: Rho from .46-.94, mean = .83

No reliability checks were conducted for the classroom observations, as it was decided to utilise pen and paper coding instead of video-taping. In vivo double coding with two observers would have been ethically difficult in terms of school regulations. Hence, only the researcher coded the classroom interactions.

Chapter 6: Results of the Longitudinal Study

6.1 Overview

This chapter documents the results obtained from the longitudinal study. The first section (6.2) explores the relationships between childhood temperament and sociometric status. The next section (6.3) presents data on communication frequency, while section 6.4 displays results of the factor analyses. Section 6.5 deals with the analysis of the obtained communication factors. In section 6.6, a multiple regression analysis, that was conducted to investigate the predictive power of popularity, childhood temperament and communication style at time 1 with regard to determining popularity at time 2, is reported. Section 6.7 explores results from the classroom observations and section 6.8 presents a summary of the findings.

6.2 Temperament and sociometric status

6.2.1 Childhood Temperament

The mean anger/frustration score for the whole sample was 4.44 (SD = 1.00), the mean impulsivity score was 4.56 (SD = .87) and the mean inhibitory control score 5.14 (SD = .85). All figures lie within one standard deviation of the norms for six and seven year olds as published by Rothbart et al. (2001), who reported a mean of 4.37, SD = .79 for anger/frustration, a mean of 4.47, SD = .73 for impulsivity and a mean of 4.92, SD = .73 for inhibitory control.

As shown in table 6.2.1, a two-way (age x gender) *ANOVA* indicated that the girls achieved non-significantly higher IC scores than the boys and scored also non-significantly higher on the A/F measure. On the trait of impulsivity, the girls had a non-significantly lower mean score than the boys. In terms of age differences, Table 6.2.1 shows that while the P2 children were significantly higher in anger/frustration than their older peers, there was virtually no difference in the impulsivity and inhibitory control scores. There was no age x gender interaction on any of the temperament measures.

Table 6.2.1 Childhood temperament across age and gender

Gender	Anger/Frustration	Impulsivity	Inhibitory Control
Boy	$M = 4.40$, $SD = .89$	$M = 4.58$, $SD = .85$	$M = 5.00$, $SD = .90$
Girl	M = 4.48, $SD = 1.11$	$M = 4.54$, $SD = .89$	$M = 5.27$, $SD = .78$
F	$F_{(1, 170)} = .28$, *ns*	$F_{(1, 170)} = .007$, *ns*	$F_{(1, 170)} = .37$, *ns*

Age	Anger/Frustration	Impulsivity	Inhibitory Control
P2	$M = 4.64$, $SD = .94$	$M = 4.56$, $SD = .81$	$M = 5.14$, $SD = .83$
P3	$M = 4.29$, $SD = 1.02$	$M = 4.56$, $SD = .91$	$M = 5.13$, $SD = .87$
F	$F_{(1, 170)} = 5.21$, $p < .05$	$F_{(1, 170)} = .00$, *ns*	$F_{(1, 170)} = .002$, *ns*

Age x gender Interaction	Anger/Frustration	Impulsivity	Inhibitory Control
	$F_{(1,170)} = .005$, *ns*	$F_{(1,170)} = 3.09$, *ns*	$F_{(1,170)} = .431$, *ns*

6.2.2 Sociometric status

There were no differences between the mean popularity scores for different ages or genders. Popularity at time 1 was highly correlated with popularity at time 2 (r= .77, $p < .001$). Please see table 6.2.2 for statistical values

Table 6.2.2 Socio –metric status across age and gender

Gender	Popularity t_1	Popularity t_2
Boy	M = .02, SD = 1.07	M = .07, SD = .12
Girl	M = .03, SD = .94	M = .09, SD = .87
T	$t_{(172)}$ = .98, *ns*	$t_{(172)}$ =.86, *ns*

Age	Popularity t_1	Popularity t_2
P2	M = .05, SD = .98	M = .12, SD = .95
P3	M = .006, SD = 1 .02.	M = .04, SD = .97
T	$t_{(172)}$ =.78, *ns*	$t_{(172)}$ =.59, *ns*

6.2.3 Inter-correlations between temperamental traits and sociometric status

From table 6.2.3, it can be seen that IM correlated positively with A/F and negatively with IC. A/F and IC correlated negatively with each other. IC was positively related to popularity both at t_1 and t_2 while impulsivity was negatively correlated to sociometric scores. There was a negative, but non-significant correlation between anger/frustration and both popularity measures.

Table 6.2.3 Correlations between temperament and sociometric status

	Anger/Frustration	Inhibitory control	Impulsivity
Inhibitory Control	r = -.36, p< .01		
Impulsivity	r= .22, p< .01	r = -.41, p< .01	
Popularity at t_1	r =-.08, *ns*	r = .24, p< .01	r = -.19, p< .05
Popularity at t_2	r = -.05, *ns*	r = .26, p< .01	r = -.23, p< .01

Additional analyses were run to see how the above findings would apply to different age and gender groups. For the sake of clarity, only patterns that differ from the ones presented above will be commented on, but correlation coefficients for all factors are given in tables 6.2.4 – 6.2.11.

For boys in general, the correlation between IM and A/F failed to reach significance. This was also true for the P3 boys, whose only significant temperament association was between IM and IC. Surprisingly, for the P2 boys, this was the only association that did not reach significance. Boys overall showed no association between A/F and popularity, both at t_1 and t_2. Boys in P2, however, showed significant associations between temperament and popularity at t_2 for A/F and IM, while IC did not correlate with popularity. For the P3 boys, on the other hand, only IC correlated significantly with popularity.

Table 6.2.4 Temperament and sociometric status correlations for boys in general

	Anger/Frustration	Inhibitory control	Impulsivity
Inhibitory Control	$r = -.29, p < .01$		
Impulsivity	$r = .10$, *ns*	$r = -.38, p < .01$	
Popularity at t_1	$r = .03$, *ns*	$r = .34, p < .01$	$r = -.25, p < .05$
Popularity at t_2	$r = .03$, *ns*	$r = .35, p < .01$	$r = -.31, p < .01$

Table 6.2.5 Temperament and sociometric status correlations for P3 boys

	Anger/Frustration	Inhibitory control	Impulsivity
Inhibitory Control	$r = -.15$, *ns*		
Impulsivity	$r = .08$, *ns*	$r = -.46, p < .01$	
Popularity at t_1	$r = .02$, *ns*	$r = .49, p < .001$	$r = -.24$, *ns*
Popularity at t_2	$r = .04$, *ns*	$r = .46, p < .01$	$r = -.23$, *ns*

Table 6.2.6 Temperament and sociometric status correlations for P2 boys

	Anger/Frustration	Inhibitory control	Impulsivity
Inhibitory Control	$r = -.62, p < .01$		
Impulsivity	$r = .21, p < .05$	$r = -.19$, *ns*	
Popularity at t_1	$r = .07$, ns	$r = -.01$, *ns*	$r = -.23$, *ns*
Popularity at t_2	$r = .11, p < .05$	$r = .08$, *ns*	$r = -.46, p < .01$

All girls taken together showed the expected pattern of temperamental inter-correlations, though the younger girls showed only one significant association, which was a positive relationship between impulsivity and anger/frustration.

Furthermore, the correlations between temperamental traits and peer popularity did not reach significance for girls, although all correlation coefficients pointed in the same direction as table 6.2.3 suggests. Data for the P3 girls indicated only one significant correlation between temperament and peer popularity, namely a negative correlation between impulsivity and popularity at t_1, while the P2 girls showed only non-significant correlations, which in addition failed to indicate consistent directions.

Table 6.2.7 Temperament and sociometric status correlations for girls in general

	Anger/Frustration	Inhibitory control	Impulsivity
Inhibitory Control	$r = -.46, p < .01$		
Impulsivity	$r = .32, p < .01$	$r = -.45, p < .01$	
Popularity at t_1	$r = -.18$, *ns*	$r = .12$, *ns*	$r = -.14$, *ns*
Popularity at t_2	$r = -.13$, *ns*	$r = .15$, *ns*	$r = -.14$, *ns*

Table 6.2.8 Temperament and sociometric status correlations for P3 girls

	Anger/Frustration	Inhibitory control	Impulsivity
Inhibitory Control	$r = -.46, p < .001$		
Impulsivity	$r = .32, p < .05$	$r = -.48, p < .01$	
Popularity at t_1	$r = -.26$, *ns*	$r = .15$, *ns*	$r = -.33, p < .05$
Popularity at t_2	$r = -.26$ *ns*	$r = .24$, *ns*	$r = -.21$, *ns*

Table 6.2.9 Temperament and sociometric status correlations for P2 girls

	Anger/Frustration	Inhibitory control	Impulsivity
Inhibitory Control	$r = -.46, p < .001$		
Impulsivity	$r = .29$, *ns*	$r = -.41, p < .05$	
Popularity at t_1	$r = -.08$, *ns*	$r = .08$, *ns*	$r = .08$, *ns*
Popularity at t_2	$r = .02$, *ns*	$r = .06$, *ns*	$r = -.04$, *ns*

In terms of differences across age, the P3 children showed a pattern of associations that mirrored table 6.4.3 as can be seen from table 6.2.10. The P2 children showed similar associations between temperamental traits and popularity, but this time the values dropped below significance. The one exception was A/F at P2, which related non-significantly negatively to popularity at t_1 but non-significantly positively to popularity at t_2.

Table 6.2.10 Temperament and sociometric status correlations for P3

	Anger/Frustration	Inhibitory control	Impulsivity
Inhibitory Control	$r = -.28, p < .001$		
Impulsivity	$r = .20, p < .05$	$r = -.48, p < .01$	
Popularity at t_1	$r = -.12$, *ns*	$r = .38, p < .01$	$r = -.28, p < .01$
Popularity at t_2	$r = .-13$, *ns*	$r = .40, p < .01$	$r = -.23, p < .05$

Table 6.2.11 Temperament and sociometric status correlations for P2

	Anger/Frustration	Inhibitory control	Impulsivity
Inhibitory Control	$r = -.51, p < .001$		
Impulsivity	$r = .27, p < .05$	$r = -.30, p < .05$	
Popularity at t_1	$r = -.03$, *ns*	$r = .03$, *ns*	$r = -.06$, *ns*
Popularity at t_2	$r = .05$, *ns*	$r = .06$, *ns*	$r = -.23$, *ns*

6.2.4 Does temperament predict popularity at t_2?

Regarding the question whether temperament can predict peer popularity, a hierarchical regression analysis was performed with popularity at t_1 (entered as step 1) and childhood temperament (entered as step 2) as predictors for popularity at t_2. A significant model ($F_{(1,172)} = 254.65$, $p < .001$, *adjusted* $r^2 = .60$) emerged with popularity at time 1 as the sole significant predictor for popularity at t_2 ($\beta = .773$, $p < .001$). The regression was repeated for each age group and gender group in turn and then their interactions. It emerged that for P2 children and P2 boys, impulsivity contributed to the explanation of popularity, showing a significant negative prediction. For the other age and gender groups, however, popularity at time 1 remained the only significant predictor. For statistical values, please see table 6.2.12.

Table 6.2.12 Regression statistic for temperament and popularity at t_2

Task	*F*	Adjusted r^2	Significant predictors (β)
Boys	$F_{(1,84)} = 143.18, p < .001$	$r^2 = .63$	Popularity t_1 ($\beta = .79, p < .001$)
Girls	$F_{(1, 86)} = 107.08, p < .001$	$r^2 = .55$	Popularity t_1 ($\beta = .75, p < .001$)
P2	$F_{(4, 69)} = 19.62, p < .001$	$r^2 = .505$	Popularity t_1 ($\beta = .68, p < .001$) Impulsivity ($\beta = -.22, p < .05$)
P3	$F_{(1,98)} = 215, p < .001$	$r^2 = .68$	Popularity t_1 ($\beta = .83, p < .001$)
P2 boys	$F_{(4, 31)} = 7.59, p < .01$	$r^2 = .50$	Popularity t_1 ($\beta = .48, p < .005$) Impulsivity ($\beta = -.38, p < .01$)
P3 boys	$F_{(1, 48)} = 177{,}30, p < .001$	$r^2 = .79$	Popularity t_1 ($\beta = .87, p < .001$)
P2 girls	$F_{(1,36)} = 52.99, p < .001$	$r^2 = .58$	Popularity t_1 ($\beta = .77, p < .001$)
P3 girls	$F_{(1, 48)} = 48.85, p < .001$	$r^2 = .49$	Popularity t_1 ($\beta = .71, p < .001$)

6.2.5 Summary

Analyses of childhood temperament and peer popularity showed that the three temperamental traits of impulsivity, inhibitory control and anger/frustration correlated significantly with each other and with peer popularity, while gender and age differences were small on both factors. There were differences in associations between gender and age groups, the most persistent finding being a negative association between inhibitory control and both impulsivity and anger/frustration as well as non-significant associations between temperament and popularity, particularly at age P3 and for girls.

Despite the overall association between temperament and peer popularity, aspects of temperament only predicted popularity with P2 children and with boys in P2. In both cases, there was a significantly negative prediction of impulsivity with regard to popularity at t_2.

6.3 Communication frequencies

6.3.1 Overall Communication frequencies

Table 6.3.1 shows that overall, the sample produced more non-oppositional turns than oppositions. Simple turns occurred more frequently than extended turns, followed by justifications and resolutions. There were more turns with non-aggressive action than with no action. Aggressive action occurred very infrequently and aggressive speech was even rarer.

Table 6.3.1 sample communication statistics

Turns	*M*	*SD*	%
Oppositions	5.49	2.43	20.56
Non-oppositions	20.42	7.52	79.44
Simple turns	10.62	4.93	42.81
Extended turns	9.77	3.60	39.38
Justifications	4.11	3.55	16.57
Resolutions	.31	.53	1.25
Non-aggressive action	13.66	5.75	54.97
No action	11.13	5.67	44.79
Aggressive action	.05	.15	.20
Aggressive speech	.009	.06	.04

6.3.2 Relative occurrence of turns in oppositional and non-oppositional contexts

Table 6.3.2 reports the relative occurrence of turns in oppositional and non-oppositional contexts. It was found that the relative frequency of extensions and no actions was higher in non-oppositions than in oppositions, while the relative frequency of non-aggressive action, aggressive action and aggressive speech was higher in oppositions than in non-oppositional contexts. There was no significant difference in the use of simple turns or justifications across oppositions and non-oppositions. It will be remembered that all resolutions were treated as non-oppositional.

Table 6.3.2 Relative occurrence of communication turns in oppositional and non-oppositional contexts

	Opposition	Non-opposition	Paired samples *t*
	M, SD	*M, SD*	$t_{(173)}$
Simple turns	*M*= .42, *SD* = .16	*M* = .43, *SD* =.20	*t* = -.23, *ns*
Extended turns	*M* = .36, *SD* = .16	*M* = .39, *SD* = .09	*t* =-2.21, *p*<.05
Justifications	*M* = .154, *SD* = .11	*M* = .150, *SD* = .14	*t* = .25, *ns*
Non-aggressive action	*M* = .62, *SD* = .15	*M* = .52, *SD* = .22	*t* =5.05, *p*<.001
No action	*M* = .31, *SD* = .13	*M* = .46, *SD* = .20	*t* = -8.11, *p*<.001
Aggressive action	*M* = .06, *SD* = .08	*M* = .02, *SD* = .07	*t* =5.15, *p*<.001
Aggressive speech	*M* = .002, *SD* = .008	*M* = .001, *SD* = .003	*t* = 2.37, *p*<.05

6.3.3 Summary

Analyses of communication frequencies revealed that simple turns occurred more frequently than extended turns, followed by justifications and resolutions. There were more turns with non-aggressive action than with no action, aggressive action and aggressive speech occurring very infrequently. Overall, the sample produced more non-oppositional turns than oppositions. Extensions and no action occurred more frequently in non-oppositions, while the relative frequency of non-aggressive action, aggressive action and aggressive speech was higher in oppositions. Simple turns and justifications did not differ across oppositions and non-oppositions.

6.4 Factor Analyses

6.4.1 Item inter-correlations

Factor analyses were run to determine whether Howe and McWilliams' (in press) factor structure would emerge for the current sample. In preparation, the correlations between communication turns across contexts (free play 1, story, Raven's, free play 2, classroom behaviour) were obtained. Correlation coefficients are given in appendix 12.

Turns in the classroom setting, with the exception of aggressive action, did not correlate with any of the videotaped tasks. Therefore, classroom behaviour was taken out of the following analyses and will be investigated separately at a later point.

The item inter-correlations revealed that simple oppositions were associated across all contexts. This was also true for simple non-oppositions, with the exception that simple non-oppositions in free play 1 correlated with simple non-oppositions in free play 2 only. Extended turns showed a two-fold pattern. Here, extended oppositions correlated between free play 1 and the story task and between the Ravens's task and free play 2, whereas extended non-oppositions showed an association between free play 1 and free play 2 and between the story task and the Raven's task. In addition, extended non-oppositions also showed associations between Raven's matrices and free play 2. While all turns were associated in the case of non-oppositional justifications, oppositional justification turns showed a clear split between the two free play settings on the one hand and the Raven's and story tasks on the other, giving rise to significant negative correlations between the two groupings. There were no significant correlations for resolutions across play contexts.

For action turns, the correlation coefficients showed that all no-action turns were associated with each other. Turns of non-aggressive action were also correlated, with the exception of the free play 2 setting, which showed no significant correlations to the other video-contexts. Aggressive action during the story task was correlated with aggressive action during the Raven's matrices task and free play 2. Interestingly, aggression during the classroom observations correlated positively with aggressive action during free play 1. Aggressive speech, which did not occur at all with the story task, was correlated across free play 2 and Raven's matrices tasks.

6.4.2 Factor analyses

Taking the patterns of association into account, it seemed unlikely that Howe and McWilliam's factor structure would emerge for all play contexts. As justification turns revealed a strong and consistent split between the free play (free play 1 and free play 2) and the task (story sorting and Raven's matrices) contexts, and as a distinction between free play and task settings seemed the most reasonable distinction considering the type of activities involved, two rotated factor analyses were performed on the data, one for free play turns only, and one for task turns only. As before, varimax rotation was used and principal components with eigenvalues greater than 1 were extracted. Due to low occurrence, aggressive action and aggressive speech were not included in the factor analyses. As indicated earlier, the classroom observations are also disregarded for the moment, but will be addressed at a later stage in this analysis.

6.4.2.1 Factor analysis on the free play settings

The factor analysis for the free play tasks showed a pattern that resembled Howe and McWilliam's (in press) solution, with the exception that oppositional extensions loaded onto the complex factor with a near negligible loading on the simple factor. In addition, it was the no action turns, rather than the non-aggressive actions that were associated with the justificatory cluster. The factor analysis explained 63 % of the variance. Factor loadings are given in table 6.4.1.

Table 6.4.1 Factor loadings for the free play settings

	Factor loadings	
	1 (complex)	2 (simple)
Simple oppositions	.01	**.46**
Simple non-opposition	.00	**.85**
Extended opposition	**.53**	.31
Extended non-opposition	-.23	**.83**
Oppositional justification	**.83**	-.00
Non-oppositional justification	**.90**	-.11
Resolution	**.57**	-.16
No action	**.90**	.22
Non-aggressive action	.00	**.95**

6.4.2.2 Factor analysis on the task settings

The factor analysis for the task settings, explaining 61% of the variance revealed a different factor structure, in that non-oppositional extensions loaded on a common factor with non-oppositional justifications, resolutions, and no action (a complex non-oppositional factor), while simple turns, extended oppositions, oppositional justifications, resolutions and non-aggressive action loaded on a second (mixed) factor. For factor loadings see table 6.4.2.

Table 6.4.2 Factor loadings for task settings

	Factor loadings	
	1 (complex non-oppositions)	2 (mixed)
Simple oppositions	-.005	**.75**
Simple non-opposition	**-.72**	**.53**
Extended opposition	.20	**.71**
Extended non-opposition	**.87**	.14
Oppositional justification	**-.51**	**.58**
Non-oppositional justification	**.87**	.006
Resolution	.15	**.41**
No action	**.93**	.24
Non-aggressive action	**-.58**	**.74**

Subsequent analyses will be performed on the factors that emerged above. For the free play contexts, factor 1, the "complex" factor, will consist of extended oppositions, justifications in oppositional and non-oppositional contexts, resolutions and no action, whereas factor 2, the "simple" factor, will consist of simple turns, extended non-oppositions and non-aggressive action. For the task setting, factor 1, the "complex non-oppositional" factor, will consist of extended non oppositions and justifications together with no action, while factor 2, the "mixed" factor, will incorporate all simple turns, oppositional extensions and justifications, resolutions and non-aggressive action.

6.4.3 Summary

Item inter-correlations between communication turns across settings, showed that observed classroom behaviour was distinct from videotaped behaviour. Inspections of correlations in videotaped settings showed non-systematic variations in communication mainly between the task settings and the free play settings. A factor analysis revealed that only communication in the videotaped free play settings resembled Howe and McWilliam's structure of complex and simple communication. The factor analysis for the task settings revealed a complex non-oppositional and a mixed factor. Variables were combined into the factors obtained, and these will be used for further analysis.

6.5 Use of communication factors across context, age and gender

6.5.1 Communication factors across contexts

The task settings produced more turns (M = 14.56, SD = 4.48) than the free-play settings (M = 10.32, SD = 3.98, $t_{(173)}$ = 14.19, $p < .001$). Unsurprisingly, in free play settings, the complex factor was used significantly less often than the simple factor. The same was found for the complex non-oppositional factor in the task setting, although differences were less extreme. See table 6.5.1 for statistical values.

Table 6.5.1 Frequency of complex versus simple factors

Setting	Factor	*M*	*SD*	*t*
Free play	Complex	2.26	2.49	$t_{(137)} = 17.38$, $p < .001$
	Simple	8.12	3.42	
Task settings	Complex non-oppositional	13.24	7.66	$t_{(137)} = 3.12$, $p < .005$
	Mixed	16.36	8.20	

6.5.2 Communication factors: age and gender effects

Table 6.5.2 suggests that, in the free play setting, the P3 children scored higher on the complex communication factor than the P2 children, and the girls used the complex pattern more often than the boys did. However, the P3 children also showed more simple communication turns than their younger peers. Overall though, mean differences between the age and gender groups were small.

Table 6.5.2 Means of simple and complex communication in free play taken across age and gender

Factor	P2 *M (SD)*	P3 *M (SD)*	Boy *M (SD)*	Girl *M (SD)*
Complex	2.16 (2.49)	2.33 (2.52)	2.14 (2.60)	2.37 (2.39)
Simple	7.80 (3.04)	8.36 (3.66)	8.14 (3.47)	8.11 (3.39)

As the small mean differences given above indicate, but contrary to the fourth hypothesis, there were no significant gender or age effects in the use of complex and simple turns in free play. Boys and girls did not differ significantly on either of the communication factors, nor did children in the different age groups. See table 6.5.3 for statistical values.

Table 6.5.3 Descriptive and inferential statistics for the free play setting

Factor	Gender	Age	*M (SD)*
Complex	Boy	P2	1.95 (2.61)
		P3	2.28 (2.61)
	Girl	P2	2.36 (2.35)
		P3	2.39 (2.44)
F	$F_{(1, 170)} = .21$, *ns*	$F_{(1, 170)} = 1.12$, *ns*	Interaction: $F_{(1, 170)} = .15$, *ns*
Simple	Boy	P2	7.80 (3.23)
		P3	8.38 (3.64)
	Girl	P2	7.80 (2.90)
		P3	8.34 (3.73)
F	$F_{(1, 170)} = .001$, *ns*	$F_{(1, 170)} = 1.12$, *ns*	Interaction: $F_{(1, 170)} = .001$,*ns*

Table 6.5.4 shows that, in the task setting, the P3 children produced more of both types of communication than the P2 children. The girls produced a higher mean on the complex non-oppositional factor, while the boys produced a slightly higher mean for the mixed factor. However, once more, all mean differences were small.

Table 6.5.4 means of complex non-oppositions and mixed communication across age and gender

Factor	P2 *M (SD)*	P3 *M (SD)*	Boy *M (SD)*	Girl *M (SD)*
Complex non-opposition	12.66 (7.61)	13.67 (7.70)	13.18 (7.78)	13.24 (7.64)
Mixed	16.01 (8.29)	16.61 (8.16)	16.39 (8.16)	16.32 (8.20)

The 2-way (gender x age) *ANOVA* reported in table 6.5.5 confirmed that, in the task setting as well, age and gender differences in communication did not reach significance.

Table 6.5.5 Descriptive and inferential statistics for the task setting

Factor	Gender	Age	*M (SD)*
Non oppositional complex	Boy	P2	12.05 (7.65)
		P3	13.99 (7.86)
	Girl	P2	13. 24 (7.64)
		P3	13.34 (7.60)
F	$F_{(1, 170)} = .05$ $p = ns$	$F_{(1, 170)} = .75$ $p = ns$	Interaction: $F_{(1, 170)} = .61$ $p = ns$
Mixed	Boy	P2	15.47 (8.91)
		P3	17.05 (7.60)
	Girl	P2	16.51 (7.75)
		P3	16.18 (8.28)
F	$F_{(1,170)} = .004$ $p = ns$	$F_{(1, 170)} = .24$ $p = ns$	Interaction: $F_{(1, 170)} = .58$ $p = ns$

6.5.3 Communication frequencies: The role of group structure

While gender itself – as seen above – did not make any contribution to differences in communication style, table 6.5.6 demonstrates that group structure as defined by gender composition did show a significant effect on the two communication factors.

Bonferroni post-hoc analyses showed that children who participated in mixed groups revealed significantly less complex communication in free play, also showing a non-significant trend to less complex communication in the task setting. They also showed significantly more mixed (as opposed to complex non-oppositional) communication in the task settings, than children who participated in single gender groups. Trend level results also showed that girl groups showed more complex and less simple communication than boys in free play, while boys used more of all communication turns in the task setting

Table 6.5.6 Frequency comparison of communication task across single sex and mixed sex groups

Group	Free play		Task	
	Complex *M (SD)*	Simple *M (SD)*	Complex non- oppositional *M (SD)*	Mixed *M (SD)*
Boy	2.54 (2.74)	8.46 (3.60)	14.10 (8.20)	15.36 (8.29)
Girl	2.66 (2.45)	7.93 (3.21)	13.79 (7.42)	14.52 (7.27)
Mixed	1.25 (1.85)	7.90 (3.46)	11.25 (6.93)	20.54 (8.04)
F	$F_{(2,171)} = 5.12$ $p < .01$	$F_{(2,171)} = .51$ $p = ns$	$F_{(2,171)} = 2.25$ $p = ns$	$F_{(2,171)} = 8.52$ $p < .001$
Post Hoc	Mixed/ boy: $p < .05$ Mixed/girl: $p = .01$	*ns*	*ns*	Mixed / boy: $p < .005$ Mixed/girl $p < .001$

6.5.4 Summary

Analysis of communication frequencies showed that the complex patterns of communication were employed less frequently than the simple or mixed patterns. While there were no significant differences in usage as a function of age or gender, analysis of the gender composition of groups showed that the mixed groups produced fewer complex turns and more simple and mixed turns than the single gender groups.

6.6 Regression analysis

A regression analysis was performed to investigate the predictive power of popularity at time 1 (entered as step 1), childhood temperament (entered as step 2), communication style (entered as step 3), and interactions between temperament and communication style (entered as step 4) with regards to popularity at time 2. Prior to commencing the analysis, correlations between temperament, communication and peer popularity were calculated.

6.6.1 Preparatory correlation analyses

Complex communication in free play was positively associated with complex non-oppositional communication in the task setting ($r = .76$, $p < .001$), while simple communication in free play correlated positively with mixed communication in the task setting ($r = .59$, $p < .001$). For significant correlation coefficients of communication factors in relation to the temperament and peer popularity, please consult figure 6.6.1a) and 6.6.1 b). For a full correlation table see Appendix 12.

Figure 6.6.1a) Significant correlations between childhood temperament, communication style in free play, and peer popularity

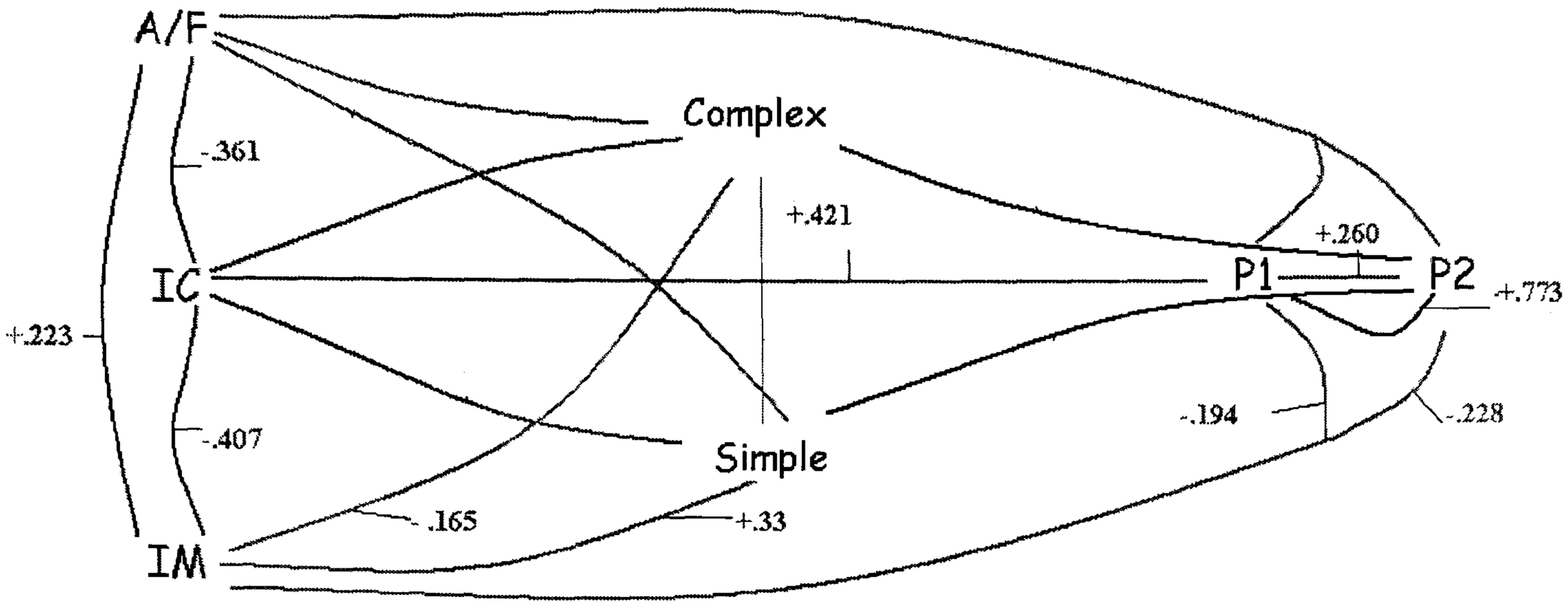
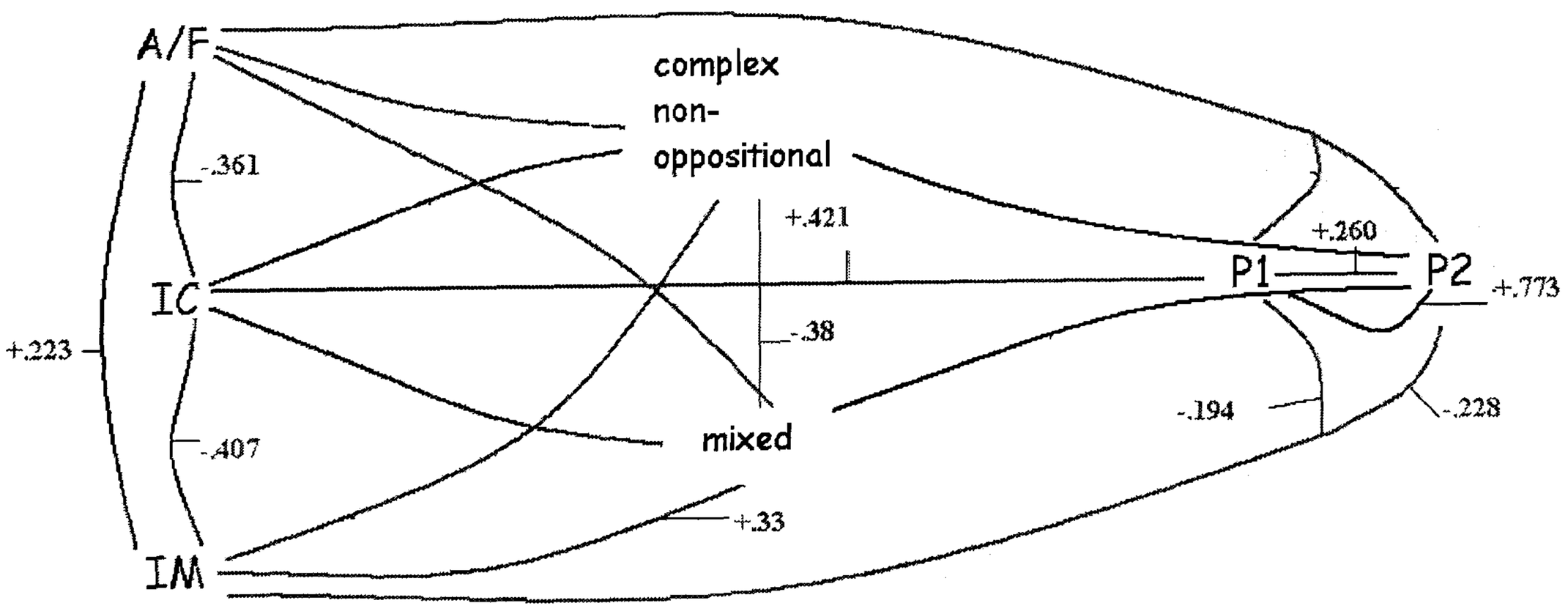


Figure 6.6.1 b) Significant correlations between childhood temperament, communication style in the task setting, and peer popularity



As can be seen above, complex and simple communication were not significantly correlated in the free play setting, while the complex non-oppositional and mixed turns in the task setting showed a negative association. A relationship between childhood temperament and communication style was only found for impulsivity, which correlated negatively with complex communication and positively with simple communication in the free play setting. Communication style was only non-significantly related to peer popularity. This model suggests that while there seems to be at least some relationship between temperament and communication, there is little association between communication and peer popularity. Table 6.6.1a) and 6.6.1b) show temperament-communication and communication-popularity associations as a function of age and gender taken separately. Correlation coefficients show a consistent association between impulsivity and simple and mixed communication.

Table 6.6.1 a) Gender and age effects: Correlations between temperament, communication style and sociometric status in free play setting

	Gender		Age	
Correlations	Girls	Boys	P2	P3
Complex & simple	-.11	-.06	.03	-.20*
Complex & IC	.10	.01	.16	.06
Complex & A/F	.00	-.05	.09	-.05
Complex & IM	-.17*	-.14	-.20	-.15
Complex & Popularity $_2$	.06	.08	.15	-.01
Simple& IC	.01	.12	.12	-.05
Simple& A/F	.10	.02	.03	.17
Simple& IM	.33*	.23*	.29*	.35 *
Simple & Popularity $_2$	-.04	-.07	.03	-.07

Table 6.6.1 b) Gender and age effects: Correlations between temperament, communication style and sociometric status in task setting

	Gender		Age	
Correlations	Girls	Boys	P2	P3
Complex non-oppositional & mixed	-.36**	-.40**	-.33**	-.42**
Complex non-oppositional & IC	.08	-.11	.06	-.07
Complex non-oppositional & A/F	.10	-.05	.05	.03
Complex non-oppositional & IM	-.03	-.06	-.12	.01
Complex non-oppositional & Popularity t_2	.03	-.04	.08	-.06
Mixed & IC	-.17	.14	-.10	.06
Mixed & A/F	.16	.09	.19	.10
Mixed & IM	.22**	.23*	.34**	.32**
Mixed & Popularity t_2	-.003	.09	.01	.08

6.6.2 Regression analyses

Regression analyses were performed on both settings (free play and task) and for both age and gender groups. Popularity at time 1 was entered at step 1, childhood temperament at step 2, communication style at step 3 and the interactions between temperament and communication style at step 4. Tables 6.6.2 – 6.6.5 display all significant predictors of peer popularity obtained. It should be noted that all predictors are presented here regardless of whether the adjusted r^2 changed significantly with their inclusion. The full regression statistics can be found in appendix 13.

Table 6.6.2 Groups for which popularity at time 1 was the sole significant predictor for popularity at time 2

Group	Predictor: Popularity t_1		ANOVA		Adjusted r^2
	beta	*p*	*F*	*p*	
Whole sample: all settings	.773	$p<.001$	$F_{(1, 172)} = 254.65$	$p<.001$	.60
Girls: all settings	.75	$p<.001$	$F_{(1, 86)} = 107.08$	$p<.001$	.55
P2 girls: all settings	.77	$p<.001$	$F_{(1, 36)} = 52.99$	$p<.001$	.58
P3 girls: all settings	.71	$p<.001$	$F_{(1, 48)} = 48.85$	$p<.001$	.49
P3 boys: task setting	.89	$p<.001$	$F_{(1, 48)} = 177.30$	$p<.001$	.78
P3: task setting	.83	$p<.001$	$F_{(1, 98)} = 215.52$	$p<.001$	.69

Table 6.6.3 Groups for which popularity at time1 and impulsivity predicted popularity at time 2

Group		P2: all settings		P2 boys: free play	
		beta	*p*	beta	*p*
Predictor	Popularity t_1	.68	$p<.001$	.48	$p<.001$
	IM	-.22	$p<.05$	-.38	$p<.01$
ANOVA	*F*	$F_{(4, 69)} = 19.62$		$F_{(4, 31)} = 7.59$	
	p	$p < .001$		$p < .001$	
Adjusted r^2		.51		.43	

Table 6.6.4 Groups for which popularity at time1 and simple communication predicted popularity at time 2

Group		P3 - free play setting		P3 boys - free play setting	
		beta	*p*	beta	*p*
Predictor	Popularity t_1	.81	$p<.001$	.89	$p<.001$
	Simple communication	-.12	$p<.05$	-.16	$p<.05$
ANOVA	*F*	$F_{(6, 93)} = 38.37$		$F_{(6, 43)} = 30.71$	
	p	$p<.001$		$p<.001$	
Adjusted r^2		.69		.78	

Table 6.6.5 Other predictive results

P2 boys - task setting

Model 4: $F_{(12, 23)} = 3.86$, $p<.005$, adjusted $r^2 = .50$

Predictor	beta	*p*
Popularity t_1	.73	$p<.001$
IM	-.48	$p<.01$
A/F	.08	*ns*
Mixed	.21	*ns*
A/F*Mixed	-.35	$p=.05$

Boys - task setting

Model 4: $F_{(12, 73)} = 13.78$, $p<.001$, adjusted $r^2 = .64$

Predictor	beta	*p*
Popularity t_1	.80	$p<.001$
A/F	.02	*ns*
Mixed communication	.05	*ns*
A/F* Mixed	-.17	$p<.05$

Table 6.6.5 continued

Boys – free play setting

Model 4 : $F_{(12, 73)} = 13.49$, $p < .001$, adjusted $r^2 = .64$

Predictor	beta	*p*
Popularity t_1	.58	$p<.001$
IM	-.13	*ns*
Complex communication	.000	*ns*
Complex*IM	.19	$p<.05$

In the overall sample, the first model emerged as the best predictor, as popularity at time 1 was the only significant predictor for popularity at time 2, both in the free play and the task setting. The same result was obtained for all girl groups and for the task setting in P3 groups. At P2, the second model was the best predictor as impulsivity showed a significant negative contribution in the prediction of popularity, a result that was also obtained for P2 boys.

In the task setting, P2 boys also showed a significant negative contribution of impulsivity in the prediction of popularity. In addition, the interaction between anger/frustration and mixed communication also contributed negatively to popularity at time 2, despite an absence of main effects for both anger/frustration and mixed communication. The negative prediction of the combination of anger/frustration and mixed communication was also obtained for the whole group of boys in the task setting, who, however, did not show a predictive relationship between impulsivity and popularity.

The free play setting differed from the task setting, in that simple communication emerged as a significant negative predictor of popularity for P3 children and P3 boys. Additionally, the regression for the whole boys sample in free play showed a positive contribution from the interaction between complex communication and impulsivity, again in the absence of contributions from either main effect.

6.6.3 Summary

In preparation for multiple regression analyses, correlations between temperament, communication style and peer popularity were obtained. Temperament showed significant associations to communication style in the case of impulsivity only and communication style was not related to peer popularity at all. Multiple regression analyses largely bore out this result. IM negatively predicted peer popularity for P2 boys, while only P3 children – P3 boys in particular - showed an association between communication style and popularity, namely a negative predictive relationship between simple communication and popularity.

6.7. Classroom behaviour

As noted earlier, classroom communication did not correlate with communication in any of the videotaped interactions. There are a variety of possible reasons for these findings, which will be addressed in the discussion. The following paragraphs display the results obtained from the classroom observations.

6.7.1 Frequency comparison to other settings

In terms of frequency of communication turns, children showed fewer interactions in the classroom than in the videotaped settings. See table 6.7.1 for means and standard deviations (means corrected for time).

Table 6.7.1 Communication frequencies of videotaped settings and classroom observations

	Videotaped settings		Classroom observation	
Turns	*M*	*SD*	*M*	*SD*
Oppositions	5.11	2.37	2.54	1.95
Non-oppositions	19.74	5.95	12.62	3.81
Simple turns	10.62	4.93	5.72	2.48
Extended turns	9.77	3.60	8.34	3.45
Justifications	4.11	3.55	1.06	1.27
Resolutions	.31	39	.04	.18
Non-aggressive action	13.66	5.75	10.24	4.58
No action	11.13	5.67	9.83	5.91

6.7.2 Factor Analysis

A factor analysis, performed on classroom turns only, showed a lack of correspondence within the setting, in that the solution, which accounted for 64% of the variance, consisted of 4 separate factors, which are displayed in Table 6.7.2. Factor 1 was loaded positively with no action and negatively with non-aggressive action, Factor 2 consisted out of all opposition factors, Factor 3 contained non-oppositional justifications and factor 4 simple non-oppositions.

Extended non-oppositions loaded on factors 1 and 3, while resolution loaded weakly negative on Factor 4, and ever weaker on factor 2. It will be remembered that both aggressive action and aggressive speech were previously discarded due to low occurrence.

Table 6.7.2 Factor Analysis of classroom communication

Turns	Factor 1	Factor 2	Factor 3	Factor 4
Simple oppositions	-.08	**.64**	**-.42**	.08
Simple non-opposition	-.07	.01	-.06	**.92**
Extended opposition	.19	**.78**	.13	.02
Extended non-opposition	**.50**	.13	**.41**	-.02
Oppositional justification	.16	**.57**	.21	-.30
Non-oppositional justification	-.05	.04	**.85**	.02
Resolution	-.227	**.26**	-.17	**-.32**
No action	**.85**	.35	.08	.27
Non-aggressive action	**-.88**	.05	.15	.18

As the opposition factor – including resolutions – seems to be the most conceptually coherent factor, contributing turns will be grouped together for further analysis, while the action turns, simple non-oppositions, extended non-opposition and non-oppositional justifications will treated separately.

6.7.3 Occurrence of the factors

Opposition only occurred in roughly 20% of all classroom interactions, the majority of turns being non-oppositional extensions, occurring in 47% of interactions. No action and non-aggressive action occurred with equal frequency. See table 6.7.3 for frequencies.

Table 6.7.3 Occurrence of communication factors in the classroom observation

Turn	*M*	*SD*	*%*
Oppositions/resolutions	.65	.49	17.15
Simple non -oppositions	1.22	.58	32.19
Non-oppositional extensions	1.80	.78	47.49
Non-oppositional justifications	.12	.22	3.17
No action	2.46	1.48	49.80
Non-aggressive action	2.56	1.14	51.20

6.7.4 Age and gender differences in classroom communication

There were no differences between gender and age groups in classroom communication. See table 6.7.4 for descriptive and inferential statistics.

Table 6.7.4 Classroom communication across age and gender

Factor	Age/ Gender	*M (SD)*	*F, p*	*Interaction*
Oppositions/ resolutions	Boy	.66 (.52)	$F_{(1, 170)} = .47, ns$	$F_{(1, 170)} = .12, ns$
	Girl	.63 (.46)		
	P3	.61 (.46)	$F_{(1, 170)} = 1.48, ns$	
	P2	.70 (.53)		
Simple non - oppositions	Boy	1.22 (.60)	$F_{(1, 170)} = .08, ns$	$F_{(1, 170)} = 2.36, ns$
	Girl	1.23 (.55)		
	P3	1.22 (.57)	$F_{(1, 170)} = .003, ns$	
	P2	1.23 (.59)		

Table 6.7.4 continued

Non-oppositional extensions	Boy	1.77 (.77)	$F_{(1, 170)} = .09$ $p = ns$	$F_{(1, 170)} = .61$ $p = ns$
	Girl	1.82 (.79)		
	P3	1.88 (.81)	$F_{(1, 170)} = 2.88$ $p = ns$	
	P2	1.68 (.72)		
Non-oppositional justifications	Boy	.15 (.26)	$F_{(1, 170)} = 1.75$ $p = ns$	$F_{(1, 170)} = .12$ $p = ns$
	Girl	.10 (.16)		
	P3	.13 (.24)	$F_{(1, 170)} = .38$ $p = ns$	
	P2	.11 (.19)		
No action	Boy	2.37 (1.34)	$F_{(1, 170)} = .57$ $p = ns$	$F_{(1, 170)} = .00$ $p = ns$
	Girl	2.54 (1.60)		
	P3	2.65 (1.41)	$F_{(1, 170)} = 4.16$ $p < .05$	
	P2	2.19 (1.54)		
Non-aggressive action	Boy	2.61(1.12)	$F_{(1, 170)} = .54$ $p = ns$	$F_{(1, 170)} = .84$ $p = ns$
	Girl	2.51(1.18)		
	P3	2.53 (1.18)	$F_{(1, 170)} = .17$ $p = ns$	
	P2	2.60 (1.10)		

6.7.5 Correlational relationships involving classroom communication

With the exception of a positive correlation between non-oppositional justifications and inhibitory control for boys ($r = .21$, $p < .05$), there were no significant correlations between communication turns in the classroom setting, childhood temperament and sociometric status. The only significant correlations obtained were based on the no action and non-aggressive action turns.

They indicated a positive relationship between non-aggressive action and popularity, and - for boys only - impulsivity was positively related to no action turns and negatively to non-aggressive action turns. The correlation tables for the action turns are given below in tables 6.7.5 and 6.7.6, for correlations regarding verbal turns, please refer to appendix 14.

Table 6.7.5 Correlations between temperament, no action and sociometric status in classroom observations

	Total	Gender		Age	
Correlations		Boys	Girls	P2	P3
No action & IC	.02	-.11	.12	.10	-.04
No action & A/F	.02	.01	.03	.01	.08
No action & IM	.07	.22*	-.04	.09	.07
No action & Popularity at t1	-.18*	-.21	-.17	-.20	-.17
No action & Popularity at t2	-.09	-.12	-.08	-.08	-.09

Table 6.7.6 Correlations between temperament, non-aggressive action and sociometric status in classroom observations

	Total	Gender		Age	
Correlations		Boys	Girls	P2	P3
Non-aggressive action & IC	-.02	.09	-.11	-.10	.04
Non-aggressive action & A/F	-.15	-.11	-.17	-.13	-.17
Non-aggressive action & IM	-.09	-.23*	.04	-.06	-.10
Non-aggressive action & Popularity at t1	.23*	.26*	.21	.33**	.17
Non-aggressive action & Popularity at t2	.16*	.20	.11	.24*	.10

6.7.6 Regression analysis

As before, a regression analysis was performed to investigate the predictive power of popularity at time 1, temperament and communication with regards to popularity at time 2. Popularity at time 1 was entered at step 1, childhood temperament at step 2, communication style at step 3 and the interactions between temperament and communication style at step 4. The regression revealed that the best fitting model comprised popularity at time 1 as only significant predictor of popularity at time 2. $F_{(1,172)} = 254.65$, $p < .001$, adjusted $r^2 = .60$. For full regression statistics, please refer to appendix 13.

6.7.7 Summary

Analysis of the classroom observation showed that communication turns were more heterogeneous than in the video-observations. The factor analysis indicated the absence of a clear structure, only one factor – consisting of oppositions and resolution turns – being conceptually coherent. There were no gender or age differences in communication during the classroom observations, and relations to temperament or popularity were confined to action turns. The regression analysis on the classroom observations showed that popularity at time 1 emerged as the sole predictor of popularity at time 2.

6.8 Overall Summary

Analysis of data obtained in the longitudinal study confirmed significant inter-correlations of temperamental traits, and showed associations between temperament and popularity. However, only impulsivity was able, sporadically, to predict popularity at time 2. Gender and Age differences were small on these measures.

Factor analyses of communication turns revealed different structures for free play, task and classroom settings. Free play factors, which resembled Howe and McWilliam's (in press) structure, were termed "simple" and "complex" communication, while turns in the task setting were grouped into "complex non-oppositional" and "mixed" factors. Classroom communication turns failed to converge into a coherent factor structure. Analysis of frequency showed that most turns were simple or mixed rather than complex. There were few age and gender differences, but analysis of group structure showed that mixed gender groups used significantly less complex communication than single gender groups.

Communication did not predict peer popularity overall, but P3 children showed a negative predictive relationship between simple communication in free play and popularity at time 2. For the classroom observation, associations between communication and popularity were non-existent.

These results lead to an acceptance of hypothesis 1 (association between temperament and popularity), specifically with regards to impulsivity. Hypothesis 2, suggested that popular children would use complex communication patterns more frequently than rejected children and that rejected children would use simpler forms of communication. This hypothesis was only partially supported. In correlational analyses, communication style was only non-significantly related to peer popularity, while predictive relationships were limited to a negative association between simple communication and popularity in P3 boys and P3 children.

Hypothesis 3 was supported in the light that impulsivity was positively related to mixed communication in the task setting and to simple communication in the free play setting. In addition, the only significant association between temperament and communication in the classroom setting showed a positive association between non-oppositional justifications and inhibitory control for boys. Hypothesis 4, postulating that there will be gender, but no age differences in temperament and communication, was supported with regards to age differences. However, no gender differences were found in temperament and the use of communication.

Group level analyses revealed that children who participated in mixed gender groups used significantly less complex communication than children participating in single gender groups. In addition, children in mixed gender groups also showed significantly more mixed (as opposed to complex non-oppositional) communication in the task settings than children who participated in single gender groups.

Trend level results showed that girl groups showed more complex and less simple communication than boy groups in free play, while boy groups used a higher frequency of all communication turns in the task setting.

Chapter 7: Discussion of the Longitudinal Study

7.1 Overview

This chapter presents the discussion of the longitudinal study. After reporting results of communication frequencies and factor analyses (7.2), the discussion will relate the results obtained to the hypotheses formulated in the introduction (7.3). Limitations of the study are addressed in section 7.4.

7.2 Communication frequencies and factor analyses

Analyses of the communication structure revealed that the relative frequency of extensions and no actions was higher in non-oppositions than in oppositions, while the relative frequency of non-aggressive action and aggressive action was higher in oppositions than in non-oppositional contexts.

No significant differences were obtained for simple turns and justifications, unlike results reported by Howe and McWilliam (in press), which showed that justifications occurred more frequently in oppositions than in non-oppositions. This result might have occurred because the longitudinal sample only consisted of six to eight year old children. The cross-sectional study reported that seven to eight year old children showed significantly higher frequencies of justifications than four to five year old children, while their use of justification did not differ significantly from their ten to eleven year old peers.

Seven to eight year old children also showed more simple communication than both their younger and older peers, suggesting frequent use of all communication factors. Thus, it is possible that children's use of justifications in the longitudinal study extended beyond the conflict settings - conflictual interactions occurring less frequently than harmonious interactions - and thus failed to distinguish between oppositions and non-oppositions. Interestingly, there was also more aggressive speech in non-oppositional than in oppositional contexts, a results that may be related to a joking or even colloquial use of swearwords or insults.

After preparatory correlation analyses had alerted to a lack of association between the videotaped settings, it was decided to analyse communication turns in the free play settings and the task settings separately. The decision, to group the analyses according to task and free play settings, was made because the two task settings were structurally similar, both requiring discovery of a correct solution to a problem. In addition, analyses of item inter-correlations showed disassociations between task and free play settings for simple non-oppositions, extended non-oppositions, and oppositional justifications. The disassociation within oppositional justification turns was particularly clear. Justifications were significantly positively associated within contexts (i.e. free play 1 and free play 2; story sorting and Raven's) and significantly negatively associated between contexts (i.e. free play and task settings.)

The factor analysis conducted on the free play settings, revealed a "complex" factor that consisted of extended oppositions, all justifications, resolutions and no action, and a "simple" factor consisting of all simple turns, non-oppositional extensions and non-aggressive actions. Resolutions were not sub-divided in this study.

It is interesting to note that this time, oppositional rather than non-oppositional extensions loaded on the complex factor. This result contradicts the assertion, made in the discussion of the cross-sectional study, that the loading of extensions on the simple factor in Howe and McWilliams' (in press) study was due to their focus on oppositional interaction. Nonetheless, again, an extended turn loaded on the complex rather than the simple factor, showing once more that extensions may be less clearly associated with specific types of communication.

The task settings revealed a different factor structure, namely a "complex non-oppositional" factor, which consisted of extended non-oppositions, non-oppositional justifications and no action, and a "mixed" factor containing all simple turns, opppositional extensions, oppositional justifications, resolutions and non-aggressive actions. Compared to the free play setting - in which there seems to be a conceptual distinction between simple and complex turns - the task setting seems to show a stronger distinction between oppositions and non-oppositions in the use of extensions and justifications. Simple turns did not, however, reveal this distinction.

Contrary to the free play setting, which suggested a more global difference of complexity in communication regardless of oppositional context, the task setting suggested that communication in oppositions and non-oppositional contexts may be significantly different. Although these two results seem hard to reconcile, a possible explanation is that children may vary their communication when playing or when performing a task, due to different perceptions of oppositions. Oppositions are possibly more approved in free play than when asked to perform a task. Entering into opposition and "being right" may mean something very different to "wanting different things" which, presumably, gives rise to most opposition in free play. Therefore, a stronger disassociation between oppositions and non-oppositions in the task setting may reflect the greater importance of non-oppositional communication.

Observations of classroom interaction showed that communication in the classroom was clearly disassociated from communication in the videotaped sessions. In addition, no clear factor structure emerged here. Instead, the factor analyses revealed the presence of four factors. The first factor consisted of all oppositions, the second factor of non-oppositional justifications and, partly, non – oppositional extensions, which also loaded on a separate third factor, together with no actions (positively) and non-aggressive action (negatively). Simple non-oppositions also loaded on a separate factor. It is more than likely that statistical effects contributed to this result, given the low frequency with which interaction occurred in the classroom.

Nevertheless, it is interesting to note the split between oppositions and non-oppositions which, when related to the factor structure obtained in the task setting, might suggest that oppositions in academic settings differ from oppositions during play. While factor loadings obtained in the longitudinal study contradict results reported in the cross-sectional study, where non-oppositions loaded on both the simple and the complex factor, and extended oppositions loaded on the simple factor only, they suggest that the place of extensions in children's communication is less clear cut than those of simple turns or justifications.

7.3 Hypotheses

7.3.1 Hypothesis 1

Just like in the cross-sectional study, hypothesis 1 argued for popularity differences according to childhood temperament, expecting high scores of inhibitory control and low scores of anger/frustration and impulsivity to be positively related to peer sociometric status. Furthermore, it was predicted that these temperamental characteristics were not only associated with, but also predictive of sociometric status.

Whole sample correlations obtained supported the hypothesis, finding that IC was significantly positively related to popularity, IM significantly negatively related to popularity and A/F non-significantly, but negatively related to popularity.

Once more, these findings support the previously reported relations between temperament and popularity obtained by Eisenberg et al. (1993; 2001), Fabes and Eisenberg (1992), Fabes et al. (1999), Jensen-Campbell et al. (2003), Jones et al. (2003), Kochanska et al. (1998), Lengua (2003), Matthys et al. (1998), Murphy et al. (2004), and Newcomb and Bukowski (1984), who give evidence for the detrimental effects of high irritability and high impulsivity and highlight the beneficial effects of high inhibition in relation to social functioning.

It is interesting to note that, when the age groups were considered separately, associations that were significant at for the six to seven year old children fell below significance for the seven to eight year old children, perhaps indicating that factors other than temperament become more important for peer popularity when children grow older, or that popularity at this stage is so well established that not many factors can influence it. Despite the clear concurrent associations between temperament and popularity, predictive relationships between temperament and popularity were less convincing. With the six to seven year old children as a whole and the six to seven year old boys, impulsivity made a significant negative contribution to the prediction of popularity. It is interesting to note that the relation between impulsivity and popularity was confined to boys. Six to seven year old boys, but not girls, showed a negative prediction between impulsivity and popularity at time 2 both in the free play and the task settings.

Inhibitory control contributed positively to the prediction of popularity for the seven to eight year old children in P3. However, no other significant relations were obtained. As stated above, these results may be due to the fact that, by the time children enter P3, popularity may be firmly established in the classroom and other factors, such as temperament and communication may affect popularity status very little.

The significant temperament-popularity correlations and the predictive link between IM and peer rejection concur with results obtained by Eisenberg et al. (2004) who found that over a two year period, impulsivity was predictive of social problem behaviours, such as aggression, while effortful control was negatively linked to aggression. The results are also consistent with Eisenberg et al. (1997) who showed that high quality social functioning at ten years of age was predicted by high regulation at age four, with Shoda et al. (1990), who found that inhibition at age four was predictive of the ability to cope with frustration and stress at ages fifteen to nineteen, and with Caspi and Silva (1995) who found that lack of control at age three predicted danger seeking, aggression and interpersonal aggression at age eighteen. Needless to say, the timescale of these studies was far in excess of the present research.

It is pertinent to note that it was impulsivity, and not irritability, that negatively predicted peer popularity. This supports research by Pope et al. (1989) who obtained concurrent negative association between both aggression and impulsivity and low peer sociometric status, but found that it was only impulsivity that predicted social adjustment. Moreover, the gender specific association between impulsivity and rejection for boys supports research by Snyder et al. (2004) who found that the relation between impulsiveness-inattention and conduct problems was mediated through peer rejection for boys, while the effects of rejection and impulsiveness-inattention were additive for girls, suggesting the absence of a relationship between impulsivity and rejection for girls but not for boys.

Interestingly, the longitudinal study did not support results obtained in the cross-sectional study that showed a *positive* relationship between impulsivity and peer popularity in seven to eight year old children. This supports the notion, first advanced in the discussion of the cross-sectional study that the latter results may have been due to socio-economic variations in accepted classroom communication styles rather than to a true temperament-popularity association. It will be remembered that the cross-sectional study used two P3 classes only, while the longitudinal study used five, thus increasing the validity of the results.

The current study obtained only sporadic associations between impulsivity and popularity (negative) and between inhibition and popularity (positive), while the strongest and, most frequently, the only predictor of popularity at time 2, was popularity at time 1. This result may be due to the short time span covered in this study, where assessment of popularity at time 1 and time 2 took place in the space of approximately six months.

Interestingly, all longitudinal studies reported in the introduction have utilised a time span of two years or longer, a scale at which, according to Frederikson and Furnham (1998), the stability of peer status decreases, and thus may become a weaker predictor. In the current study, peer popularity was highly stable over the six month period, popularity at time 1 correlating with popularity at time 2 with $r = .77$.

In sum, hypothesis 1, stating that IM and A/F would relate negatively to peer popularity, while IC would show positive associations to sociometric status, was fully accepted on the grounds of concurrent rather than longitudinal results. Longitudinal relations did, however, highlight a possible contribution of high impulsivity to low peer sociometric status for boys.

7.3.2 Hypothesis 2

As regards hypothesis 2, which suggested that popular children would use complex communication patterns more frequently than rejected children, with rejected children showing simpler forms of communication, results only partially concur with the expectations. In concurrent correlational analyses, communication style was only non-significantly related to peer popularity, while predictive relationships were limited to an association between simple communication and popularity. Seven to eight year old boys and seven to eight year old children in free play showed a negative predictive relationship between simple communication and peer popularity. This negative predictive relationship supports results by Black (1992), Hazen and Black (1989) and Murphy and Faulkner (2000), who argue for less elaboration and explanation in unpopular children.

In addition, two interaction effects between temperament and communication style were obtained, both of which occurred in the absence of relevant main effects. More precisely, for the prediction of peer popularity at time 2, the study found a positive contribution of the interaction between complex communication and impulsivity for boys in the free play setting. In the task setting, the interaction between anger/frustration and mixed communication contributed negatively to the prediction of popularity for boys in general and for six to seven year old boys.

The latter interaction makes theoretical sense in that it is the combination of irritability and use of simple language that negatively predicted peer popularity, rather than any factor alone. Nevertheless, it is puzzling that complex communication and impulsivity positively predicted peer popularity, when the main effects were non-predictive, and the non-significant beta for IM was negative. The absence of main effects and the discrepancy to IM casts doubt over the validity of this interaction.

In the classroom observations which, as noted above, did not relate to any of the videotaped settings, popularity related positively to non-aggressive action only. This finding is surprising, given that non-aggressive action loaded on the simple communication factors for both task and free play setting, simple communication being negatively predictive of peer popularity for seven to eight year old children and seven to eight year old boys.

This result may indicate that different sets of competencies are required in the classroom, although the potential similarity between classroom tasks, such as working on sums, and the two structured tasks suggests that it would be unlikely that the competencies involved are completely different. Rather, the result may highlight the particular classroom situations observed in this study. As time was limited, classroom interactions were recorded wherever possible, which led to a somewhat eclectic mix of observations taken during free group discussion, during more structured discussions led by the teacher, at the beginning and at the end of each class, and during rainy intervals.

As the classroom observations constituted such a wide array of different settings, it is hardly surprising that the factor structure of communication was less unified than in the videotaped observations. This is particularly the case when the free play versus task dichotomy already suggests a strong effect of context.

In sum, the second hypothesis, arguing for a relationship between communication and peer popularity was partially supported by a negative predictive relationship between simple communication and peer sociometric status for seven to eight year old boys. While other results remained non-significant and the presence of two interaction effects without any main effects is questionable, the longitudinal study offers at least some indication that communication may contribute to a child's social standing in the classroom.

7.3.3 Hypothesis 3

The third hypothesis, postulating that children with high inhibitory control scores would show more complex forms of communication, while more impulsive children would use simpler forms, found limited support in the result that impulsivity was positively linked with mixed communication in the task setting and with simple communication in the free play setting. In addition, the only significant association between temperament and communication in the classroom setting showed a positive association between non-oppositional justifications and inhibitory control for boys.

Thus, while consistent support was not obtained, there is some concurrence with McCroskey and colleagues' (e.g. Cole and McCroskey, 2000; McCoskey et al., 2001) assertion that communication style is associated with temperament. In particular, it seems that highly impulsive children may have a tendency to offer simpler forms of communication, perhaps indicating an inability to inhibit a fast, simple response in order to produce a more considered complex response.

7.3.4 Hypothesis 4

The first suggestion of the fourth hypothesis, arguing that there would be no age differences in inhibitory control, impulsivity and anger/frustration in such a narrow age range, was confirmed with regard to impulsivity and inhibitory control scores. These were virtually identical for the two age groups. However, results also showed that six to seven year old children were significantly higher in anger/frustration than their older peers. While this result contradicts the fourth hypothesis, it is in line with the argument that irritability decreases with development and increasing inhibition (e.g. Fabes, 2002; Fabes et al., 1999; Kochanska et al., 2000; Kochanska et al., 1998) and highlights the personality development children undergo even in this narrow time span.

In the introduction, it was argued that A/F would decrease with age primarily through the development of control mechanisms. Interestingly, in the current study, changes in inhibitory control were non-significant, supporting Derryberry and Rothbart's (1988) assertion that while temperamental processes may work in conjunction with each other, they are independent entities.

Secondly, the fourth hypothesis argued that girls would show higher levels of inhibition and, due to this increased inhibition, lower levels of anger/frustration and impulsivity than boys. This hypothesis was rejected, as all gender differences in childhood temperament remained non-significant, thus disagreeing with results reported by Kochanska et al. (1997) and Kochanska et al. (2000), who reported higher levels of inhibitory control in girls.

The next prediction of the fourth hypothesis stated that due to the narrow age range, no significant age differences in the use of the communication factors were expected. Concurrent with the expectations, there were no significant age differences in the use of the communication factors, seven to eight year old children showing only a non-significantly higher frequency on all communication factors.

However, there was one significant result in the classroom setting, indicating that seven to eight year old children showed significantly more turns with no action than six to seven year old children did. While this result agrees with an increase of no action with age, as reported by Howe and McWilliam (in press), it may also be due to context effects. As the settings of classroom observations varied considerably, it is possible that observations in the P2 classes included more opportunities for the children to accompany their verbal turns with actions, while children in P3 classes were denied that choice. More thorough and methodologically stricter investigations would be needed to clarify these possibilities.

Lastly, the fourth hypothesis predicted that girls would use fewer turns of simple communication and more justification turns than boys. However, here again, all differences remained non-significant, being of negligible size. This contradicts French et al.'s (1993) and Black's (1992) results that girls offered more explanations.

Although no individual gender differences in communication were obtained, group level analyses revealed that gender grouping played an important part, in that children who participated in a mixed gender group used significantly less complex communication in free play, also showing a non-significant trend to less complex communication in the task setting, than children who participated in single gender groups. In addition, children in mixed gender groups also showed significantly more mixed (as opposed to complex non-oppositional) communication in the task settings than children who participated in single gender groups. While single gender groups did not differ significantly from each other in their use of communication factors, trend level results showed that girl groups showed more complex and less simple communication than boy groups in free play, while boy groups used more of all communication turns in the task setting.

These results support research by Howe and McWilliam (in press) who found that children participating in single gender groups used the what they called 'justificatory cluster' more frequently than children participating in mixed gender groups. Leman et al.'s (1999) results also showed more collaboration and more assertion in single gender groups.

In sum, the fourth hypothesis receives partial support, finding that age differences in children's communication and temperament were minimal, six to seven year old children only showing a higher degree of anger/frustration than seven to eight year old children. While no support was obtained for communicative or temperamental differences between boys and girls, results indicated a significant contribution of group composition. Single gender groups showed more complex and less simple communication than mixed gender groups.

7.4 Limitations of the longitudinal study

The longitudinal study extended the cross-sectional study by taking into account the predictive qualities of temperament and communication in the explanation of sociometric status, as well as the role of gender group composition. However, the study also suffered from a number of methodological limitations.

Firstly, while factor analyses of the videotaped settings showed different factor structures for free play and task settings, indicating that each setting gave rise to different forms of interaction, the classroom observations that were taken to assess the real-life validity of the videotaped sessions, lacked coherence.

Due to time pressures, it was not possible to select observation times and topics appropriately, especially since real group interaction still happens infrequently in the classroom. As a consequence, children were observed during group work and teacher led discussions - contexts that may resemble the task setting. However, they were also observed during the start or the end of the class, or during rainy intervals, where interaction may resemble the videotaped free play settings. Therefore, the proposition that observations of classroom interaction could serve as a comparison to the videotaped settings is not feasible, and results obtained from the classroom observations should not be readily accepted.

Secondly, the study aimed to assess the predictive power of childhood temperament and communication with regard to peer popularity. To achieve this, measures of popularity, temperament and communication style were obtained at time 1, child sociometric status being assessed again at time 2. However, the time-span between the two assessments covered only around six months. Frederickson and Furnham (1998) note that, during such a short time, peer popularity is highly stable. Therefore, it comes as no surprise that popularity at time 1 was frequently the strongest predictor of popularity at time 2.

If the study had covered a longer time period, previous popularity status would possibly have emerged as being less important, while communication style may or may not have been able to explain more variance of peer popularity at time 2. Moreover, considering the age groups in question, it is possible that popularity is already well established in the classroom and that other factors would have little influence on a change in sociometric status.

Furthermore, it should be noted that the longitudinal study was solely concerned with the predictive qualities of temperament and communication style with regards to popularity at time 2, disregarding the possibility that peer rejection in itself may be a predictor of communication style. Children who are ignored or rejected by others may develop different styles of communication from children who are popular. It could also have been investigated whether temperament was not only concurrently but also longitudinally related to children's communication. However, as the current study collected sociometric data only at time 2, other longitudinal predictions were not possible. Thus, the longitudinal study may present a somewhat limited picture of what may be much more complex relationships.

Another issue that could have been addressed is variations in children's communication according to the sociometric status of their peers. The current study found that while gender differences in communication style were non-significant, there were differences in communication according to the gender composition of the group, showing that children take into account the gender of their peers in their choice of communication. However, they may also take into account popularity status and temperament. Murphy and Faulkner (2000) found that popular children adapt their communication to peers with different popularity status, producing more elaborated disagreements when playing with rejected rather than popular children.

7.5 Conclusion

In sum, the longitudinal study provides further support for a relation between temperament and popularity, while support for a relation between temperament and communication, and communication and popularity remains tentative. The only significant associations reported by the study were a significant relation between impulsivity and simple communication, and a relation between simple communication and low sociometric status. Both asociations were found primarily for boys. The association between impulsivity and rejection was confined to six to seven year old boys, while the association between simple communication and rejection was obtained for seven to eight year old boys only. While few significant age differences were obtained over the narrow age range, the longitudinal study highlighted the role of group gender composition with regard to children's use of communication.

Chapter 8: General Discussion

8.1 Overview

The general discussion draws on the results obtained by both the cross-sectional and the longitudinal study. After summarising methodological differences between the two studies (8.2), combined results with regards to communication frequencies and factor analyses are considered (8.3). Section 8.4 discusses the hypotheses. Lastly, limitations of the research presented and avenues for further research are stated in section 8.5.

8.2 Differences between the cross-sectional and the longitudinal study

Both the cross-sectional and the longitudinal study aimed to explore relationships between childhood temperament, communication style and peer popularity. The cross-sectional study worked with children in nursery class (four to five year olds) , P3 (seven to eight year olds) and P6 (ten to eleven year olds), assessing child temperament, taking whole class sociometric nominations, and coding communication in free play and task settings. The longitudinal study, focusing on students in P2 (six to seven year olds) and P3 (seven to eight year olds), used popularity ratings instead of nominations, and discarded one of the task conditions. It also extended the analyses of the cross-sectional study by taking into account real-life classroom interactions. Longitudinal relations between temperament, communication and popularity, and communication characteristics of single gender and mixed gender groups were also assessed.

8.3 Communication frequencies and factor analyses

In both studies, communication was coded according to Howe and McWilliams (in press) coding scheme, where turns are classified as oppositional or non oppositional, simple, extended, justificatory or resolving, accompanied by no action, non-aggressive action, aggressive action or aggressive speech. Both the cross-sectional and the longitudinal study found that extensions occurred more frequently in non-oppositions, while contradictory results were obtained with regards to simple turns and justifications. The cross-sectional study reported that simple turns were more frequently used in non-oppositions, and that justifications occurred more frequently in oppositions than in non-oppositions, while the longitudinal study found no such distinctions.

It may be the case that the discrepancy between the studies with regards to simple turns and justifications are related to age effects. While the cross-sectional study did not explore relative occurrence of turns in oppositions and non-oppositions across age groups, it may be that while seven to eight year old children do not differentiate their turns according to contexts, ten to eleven year old children may do so. The latter, for example, due to increasing inhibition (e.g. Kochanska et al., 1997; Trembach et al., 2004) may able to "de-select" simple answers in oppositions, using a greater frequency of justifications when needed.

However, while Howe and McWilliam (in press), who also worked with children in P3, found no differences in the use of simple turns across oppositions and non-oppositions, they reported that justifications occurred more frequently in oppositions than in non-oppositions. Thus, an age-effect explanation per se is insufficient to explain results obtained by the current research.

Investigating methodological differences between the current research and Howe and McWilliam's (in press) study, it may be that the play contexts used by Howe and McWilliam tied justifications more closely to oppositions than to non-oppositions, while the play contexts in the current study may not have produced this association. Specifically, Howe and McWilliam did not use a Raven's matrices task. Analyses of communication frequencies in the cross-sectional study showed that the Raven's matrices task elicited the highest frequency of non-oppositional justifications compared to the other tasks, suggesting that the high occurrence of justifications in non-oppositions may be due to the tasks selected. However, this explanation by itself is not sufficient either, because the cross-sectional study also used a Raven's matrices task, but showed that children used more justifications in oppositions than in non-oppositions.

It is therefore proposed, that the equal distribution of justifications across oppositions and non-oppositions in the longitudinal study may have arisen from an interaction between age group and activity context. The play contexts elicited more justifications in non-oppositions six to eight year old children, than the contexts used by Howe and McWilliam (in press).

Factor analyses of communication turns also showed some discordant results. In the cross-sectional study, communication turns were collapsed across all conditions and factor analysed in one analysis, while three analyses were performed in the longitudinal study. Free play observations, task setting observations and classroom observations were analysed separately. As the classroom observations did not correspond to any of the videotaped settings, the following paragraphs compare results obtained by the cross-sectional study to results obtained during the videotaped sessions of the longitudinal study.

Across the studies, simple turns and non-aggressive action consistently loaded on the "simple" factors. Justifications and no actions, with the exception of oppositional justifications in the task setting, consistently loaded on "complex" factors. However, the picture was less consistent with regards to extensions. In the cross-sectional study oppositional extensions loaded on the simple factor only, while non-oppositional extensions loaded on both the simple and the complex factor, although its loading on the simple factor was stronger.

In the task setting of the longitudinal study, non-oppositional extensions loaded on the complex non-oppositional factor, with non-oppositional justifications and no action. Here, oppositional extensions loaded with simple turns, non-aggressive action and oppositional justifications on the mixed factor. In the free play settings of the longitudinal study on the other hand, it was the oppositional extensions that loaded on the complex factor, while non-oppositional extensions loaded on the simple factor, with simple turns and non-aggressive action.

The result that non-oppositional extensions loaded on complex factors, paired with the observation that extensions are more frequently used in non-opposition could be used to reconcile findings by Black (e.g. Black and Hazen, 1990; Black and Logan, 1995), who argues for the importance of contingency to children's interactions, and Howe and McWilliam's (in press) results, which showed that extensions loaded on a simple factor during conflict communication. It may be that extensions are required in non-oppositional encounters, while the display of extensions, rather than justifications, in oppositions may be less appropriate.

This argument however, does not explain why the factor analysis of the free play settings in the longitudinal study revealed a loading of oppositional extensions on the complex factor, while non-oppositional extensions loaded on the simple factor. In order to explain this result, it is worth noting that the cross-sectional study, which factor analysed communication turns across all contexts, found that extended non-oppositions loaded on both the complex and the simple factor.

The longitudinal study on the other hand analysed task and free play settings separately. In the task setting, non-oppositional extensions loaded on the complex factor and oppositional extensions on the mixed factor, while the reverse was found for the free play setting.

Considering these relations, an effect of context seems the most probable explanation for this result. As mentioned in the discussion of the longitudinal study, children may vary in their use of communication when playing or when performing a task, oppositions perhaps being more acceptable in free play. Therefore, while non-oppositional extensions may be more appropriate for task performance, oppositional extensions may be perfectly acceptable in social play. In sum, the studies highlight that the role of extensions in children's communication is less than clear cut, and may depend on contextual parameters. Further research is needed to clarify the functions of extensions across contexts.

It is also interesting to note that turns with no action consistently loaded on complex factors, while non-aggressive actions loaded on the simple factors. Howe and McWilliam (in press) report the opposite result, namely that no action was associated with the simpler "aggressive" cluster and non-aggressive action with the more complex "justificatory" cluster.

This discrepancy may again point to differences in the play contexts of the two studies. While both Howe and McWilliam's study and the current research incorporated free play conditions and a story sorting task, Howe and McWilliam's study also incorporated a limited toys condition and a robot task. In the robot task, children had to "feed" the robot the correct "food", in order to elicit a reaction.

The current research on the other hand did not use a robot task, but instead employed a Raven's matrices task, which is more verbal than action based. In addition, the limited toys task was used in the cross-sectional study, but not in the longitudinal study, leading to a possible further reduction of "action play". Therefore, the tasks employed in the current research may have been more talk and less action based than the tasks employed by Howe and McWilliam (in press). The loadings of non-aggressive action and no action were thus reflecting context appropriate communication.

In both studies, turns containing resolutions, aggressive action and aggressive speech were inconsistently associated and also occurred very infrequently, a result that led them to be excluded from further analyses. Much longer observations would be needed to obtain reliable measures of these infrequently occurring turns, and therefore full understanding of their social significance.

8.4. Hypotheses

8.4.1 Hypothesis 1

The first hypothesis argued for popularity differences according to childhood temperament, expecting high scores of inhibitory control and low scores of anger/frustration and impulsivity to be positively related to peer sociometric status. This hypothesis was supported in both studies.

In the cross-sectional study, rejected children achieved higher anger/frustration scores than indifferent children, popular children receiving the lowest anger/frustration score, although differences here were non-significant. In the longitudinal study, a non-significant negative relationship between anger/frustration and popularity was obtained. However, anger/frustration scores failed to predict sociometric status. This indicates that while angry emotions may contribute to peer rejection at the time, they may be - when considered independently from impulsivity and inhibition - not a long term risk factor for children.

This result supports research by Pope et al. (1989), who found impulsivity but not aggression to be predictive of poor peer popularity, but challenges Fabes (2002) growth curve analysis, which showed that children scoring high on negative affectivity showed increasing rates of solitary play.

However, it should be noted that the majority of studies associating irritability with negative long-term outcomes, assess a combination of irritability and regulation (e.g. Eisenberg et al., 2001; Murphy and Eisenberg, 1997; Murphy et al., 2004). Typically, they report negative consequences for children who are both high in irritability **and** low in regulation, rather than for children who are high in irritability only. In fact, it is the ability to manage one's anger, rather than the absence of anger, that had been associated with popularity by Fabes and Eisenberg (1992), and Fabes et al. (1999).

The cross-sectional study also found that rejected children had higher levels of impulsivity than popular children, indifferent children showing the lowest mean scores on impulsivity. Here the difference between rejected and indifferent children was significant. Moreover, the cross-sectional study indicated non-significantly that indifferent children achieved higher inhibitory control scores than popular children, rejected children scoring lowest on this measure. By comparison, the longitudinal study found that impulsivity was significantly negatively associated with popularity, and that inhibition was significantly positively associated with popularity. In addition, impulsivity negatively predicted sociometric status for the sample of six to seven year old children and six to seven year old boys. Here, the stronger results from the longitudinal study almost certainly reflect the larger sample.

In combination, the two studies indicated the same "direction" of results, namely a negative relationship between anger/frustration and popularity, a negative relationship between impulsivity and popularity, and a positive relationship between inhibition and popularity. Results thus concurred with findings reported by Eisenberg et al. (1993; 2001), Fabes and Eisenberg (1992), Fabes et al. (1999), Jensen-Campbell et al. (2003), Jones et al. (2003), Kochanska et al. (1998), Lengua (2003), Matthys et al. (1998), Murphy et al. (2004), and Newcomb and Bukowski (1984), all of whom give evidence for the detrimental effect of high irritability and high impulsivity and highlight the beneficial effect of high inhibition in relation to social functioning.

However, the cross-sectional study also revealed that indifferent children showed even more inhibition and even less impulsivity than popular children, a finding that may be related to Asendorpf's (1990) observation that overly inhibited children are neglected by their peers.

In addition, the cross-sectional study obtained a positive relationship between impulsivity and popularity for seven to eight children, a result that was not corroborated by the longitudinal study. In the discussion of the cross-sectional study it was suggested that the relation between impulsivity and popularity found for these children might be related to socio-economic variations in accepted classroom communication styles, which favour boisterous spontaneous behaviour over restraint.

The possibility that school environments can determine whether certain characteristics are related to peer popularity, was explored by Stormshak et al. (1999), who found that while highly aggressive girls were disliked across all classrooms, highly aggressive boys were unpopular in low aggression classrooms but popular in high aggression classrooms. The fact that the longitudinal study obtained negative relations between impulsivity and popularity that were at times predictive, strengthens the possibility that cross-sectional result may indeed be due to social environmental influences. The two studies in combination thus obtained consistent support for an association between temperament and popularity.

8.4.2 Hypothesis 2

Hypothesis 2 suggested that popular children would use complex communication patterns more frequently than rejected children, rejected children showing simpler forms of communication. The cross-sectional study found supportive trend-level results, indicating that the rejected children used the simple factor more frequently than popular children and that the popular children used the complex factor more often than rejected children. However, the longitudinal study only found a negatively predictive relationship between simple communication and peer popularity for P3 boys in free play settings.

Therefore, the current research offers only tentative support for Black's result that liked children provided more explanations than rejected children and for Howe et al.'s (2001) trend indications that the proportion of simple conflict language to complex conflict communication was greater for rejected children, than for their popular or indifferent peers.

The cross sectional study also showed that girls' popularity was positively associated with the amount of justifications offered, popular girls offering more justifications than average girls, rejected girls showing the least amount of justifications. Conversely, results suggested that popular boys actually gave the least amount of justifications. This gender effect merits attention, not the least because it can be easily related to previously reported results on gender specific communication (e.g. Leaper et al., 1999; Leman et al., 2005). If girls or girl groups do indeed use more complex patterns of communication, it would make sense that those girls who are better at fulfilling the communication requirements would be more popular with their peers. Boys, using more "competitive" discourse, should not experience the same requirements. For boys, popularity may be less or even inversely related to "girly" communication practices.

Furthermore, predictive analyses in the longitudinal study showed the presence of two interaction effects between temperament and communication style. The first effect indicated a positive contribution of the interaction between complex communication and impulsivity to popularity at time 2 for boys in the free play setting.

The second effect was found in the task setting. Here, the interaction between anger/frustration and mixed communication showed a negative contribution to popularity at time 2 for boys in general and for six to seven year old boys. While these interaction effects are interesting, and a negative prediction of popularity through the interaction between anger/frustration and mixed communication seems a theoretically meaningful result, both interactions occurred without the presence of any relevant main effect. Non-significant betas also showed inconsistent directions, giving rise to further doubts about their soundness. The relationship between simple communication and peer rejection however, seems a more promising result, thus far the only support for Hypothesis 2.

In sum, there is some evidence of a relationship between communication and popularity, especially with regards to a link between simple communication and peer rejection for boys

8.4.3 Hypothesis 3

The third hypothesis, postulating that children with high inhibitory control scores would show more complex forms of communication, while more impulsive children would use simpler forms, was only very sporadically supported in the cross-sectional study. Here, girls showed a positive relationship between inhibitory control and justifications, and seven to eight year old children showed a negative association between inhibitory control and simple communication.

For the overall sample, the only statistically significant result was a positive relationship between anger/frustration and the justification factor. Children who scored high on anger/frustration showed more justifications than children who scored low on anger/frustration. Although Howe and McWilliam (in press) found that anger/frustration was positively related to both communication factors, an exclusive association between anger/frustration and justifications makes sense, when taking into account that justifications occur more frequently in oppositions, and angry children are more likely to experience oppositional exchanges.

The longitudinal study obtained a positive association between impulsivity and mixed communication in the task setting, and between impulsivity and simple communication in the free play setting. In addition, the longitudinal study obtained a significant association between non-oppositional justifications and inhibitory control for boys in the classroom setting. The association between impulsivity and simple communication is noteworthy, particularly as both impulsivity and simple communication have been linked to peer rejection for boys.

This time, the results obtained in the cross-sectional and in the longitudinal study complemented each other, rather than showing discrepancies. However, even though results obtained gave support to an association between impulsivity and simple communication, and an association between inhibition and more complex patterns of communication, significant results were few and far between. More consistent evidence is needed to fully support the hypothesis.

Nonetheless, as the relationship between childhood temperament and communication style has not so far been extensively explored, and as results by McCroskey and colleagues (e.g. Cole and McCroskey, 2000; McCroskey et al., 2001) suggest associations between adult personality and various communication measures, the results obtained in this research may open further avenues of investigation. Overall, Hypothesis 3 is partially supported by the result that simple communication is associated with impulsivity, and a tentative suggestion that complex communication may be associated with inhibitory control.

8.4.4 Hypothesis 4

The fourth hypothesis argued for developmental and age differences in temperament and communication. It was argued that inhibitory control would increase over the six-year span assessed in the cross-sectional study, while both impulsivity and anger/frustration would decrease. Differences were not expected across the one year age difference covered in the longitudinal study. Results supported the hypothesis, thus corroborating research by Kochanska et al. (2000) and Trembach et al. (2004).

The cross-sectional study documented a significant developmental increase in inhibition and a decrease in anger/frustration and impulsivity. The longitudinal study showed virtually identical impulsivity and inhibitory control scores for the two age groups.

However, longitudinal results also showed that six to seven year old children were significantly higher in anger/frustration than their older peers, indicating that, even across this narrow age range, changes in temperament may be substantial.

Secondly, the fourth hypothesis argued that girls would show higher levels of inhibition and, due to this increased inhibition, lower levels of anger/frustration and impulsivity than boys. However, the cross-sectional study obtained only trend results showing that girls received higher inhibitory control scores and lower anger/frustration and impulsivity scores than boys did. Moreover, the results remained non-significant in the longitudinal study, leading to the rejection of this aspect of the fourth hypothesis.

Furthermore, the fourth hypothesis argued that in line with an increase in inhibition, older children would offer more complex communication over the six year span covered in the cross-sectional study, while no significant differences were expected in the longitudinal study. Cross-sectional results revealed a significant difference in the use of the complex communication factor between the four to five year olds and their older peers , the ten to eleven year old children showing the highest proportion of complex communication.

In terms of simple communication turns, it was found that seven to eight year old children offered significantly more turns than the other age groups. Ten to eleven year old children offered as many justifications as the seven to eight year olds, but a lesser amount of simple communication. As expected, the longitudinal study obtained no significant age differences in the use of the communication factors, although again, seven to eight year old children showed a non-significantly higher frequency in the use of all communication factors.

In addition to these expected differences, a significant result in the classroom setting indicated that the seven to eight year old children produced significantly more turns with no action than the six to seven year old children did. This result makes sense considering that no action turns loaded on complex rather than simple communication factors during free play and task settings. Although no actions in the classroom observations loaded positively on a factor that was also loaded with non-oppositional extensions and negatively with non-aggressive action, rather than a more unified complex factor, this was thought to be due to the fragmentation of classroom observations rather than underlying differences in communication. Moreover, this factor showed partial resemblance to the complex communication, because non-aggressive action – which loaded negatively here – was elsewhere associated with simple turns.

In addition, non-oppositional extensions loaded on the complex communication factor in the cross-sectional study and in the task setting of the longitudinal study. As Howe and McWilliam (in press) also found an increase of no-action with age, it may be argued that with age, actions become less important.

With regards to communication differences between girls and boys, where the fourth hypothesis predicted that girls would use fewer turns of simple communication and more justification turns than boys, the cross-sectional study showed that the boys indeed used more simple communication turns than the girls. However, the longitudinal study contradicted these results, finding only negligible communication differences between the girls and the boys.

Here however, group level analyses revealed that gender grouping played an important part. Children who participated in a mixed gender group used significantly less complex communication in free play and non-significantly less complex communication in the task setting, than children who participated in single gender groups. Children who participated in a mixed gender group also showed significantly more mixed (as opposed to complex non-oppositional) communication in the task settings than children who participated in single gender groups.

In addition, trend level results showed that girl groups showed more complex and less simple communication in free play than boy groups, and boy groups showed a higher frequency of all communication turns in the task setting.

As the cross-sectional study employed only same gender groups, while the longitudinal study included mixed gender groups, it is possible that the results obtained in the cross-sectional study were due to gender composition rather than gender of children. Taking both studies in conjunction, it seems that rather than being inherently predisposed to a specific kind of communication, children adapt their communication style to their peers, as previously noted by Leman et al. (1999) and Howe and McWilliam (in press). Rather than producing more controlling discourse, as found by Leaper et al. (1999), boys in single gender groups used more complex communication patterns, as indicated by Howe and McWilliam (in press).

The cross-sectional study also revealed an age x gender interaction, which showed that for girls the use of justifications increased with age. For boys, seven to eight year old children gave the largest numbers of justifications, a result which possibly be attributed to a higher verbosity at this age. The decrease in justification for the ten to eleven year old boys, compared with the increase in justifications for girls, might indicate the lesser importance of justifications in boys' communication.

In sum, the fourth hypothesis was supported with regard to age differences in temperament, which were evident across the six-year age span covered in the cross-sectional study, but not across the one-year age span covered in the longitudinal study. Support for age differences in communication remained somewhat limited, the only result corresponding to the predictions was a linear developmental increase in justifications for girls. On the whole, no significant gender differences were obtained with regards to temperament and communication, gender groupings rather than gender itself being associated with differential use of communication.

It is interesting to note that the impulsivity-rejection link as well as the simple communication-rejection link was mostly confined to the boys. To reiterate, the longitudinal study showed that the predictive power of impulsivity with regards to popularity at time 2, was found for six to seven year old boys but not for girls. The association between simple communication in the task setting and popularity was confined to seven to eight year old boys. Furthermore, boys showed the only significant popularity-temperament association in classroom communication, namely a positive concurrent relationship between inhibitory control and popularity. These results support research by Pope et al. (1989), which suggests independence of impulsivity and peer rejection in the prediction of acting out behaviours for girls, but not for boys. While no research has explicitly addressed this point, reasons as to why impulsivity and simple communication may be more closely related to rejection for boys may include the nature of gender-specific peer relationships.

While girls tend to have intimate friendships with one or two other girls, boys tend to have larger, but less close friendship groups. It may be the case that impulsive temperament is more detrimental in larger group settings, where the goals of multiple others have to be taken into account.

In addition, as girls' interactions are more intimate, it could be theorised that girls do not base their liking of other girls on impulsivity, but on trustworthiness and helpfulness. This suggestion concurs with Pakaslahti and Keltikangas-Järvinen's (2001) research on prosocial behaviour, which indicated that different aspects of prosocial behaviour are important for boys and girls. Pakaslahti and Keltikangas-Järvinen's results showed that for girls, trustworthiness and helpfulness are important, while for boys, leadership and trustworthiness are important prosocial characteristics. Relating these aspects to impulsivity, it could be argued that while impulsive children may be helpful, impulsivity would certainly get in the way of good leadership.

Furthermore, as boys have been shown to use more aggressive interactions and girls' interactions are considered more collaborative (Leaper 1991; Leaper et al. 1999; Leman et al., 2005), there is a possibility that impulsivity paired with aggression is more detrimental than impulsivity paired with collaboration. However, here again, more systematic research is needed to explore the reasons why the impulsivity-simple communication-popularity link was obtained for boys but not for girls.

Interestingly, the association between IM and rejection applied to six to seven year old boys in only. For seven to eight year old boys, it was simple communication that predicted peer rejection. Considering that the longitudinal found a correlation between IM and simple communication, results may indicate that while temperament determines popularity at younger ages, with development, communication abilities may increasingly determine rejection.

The current research repeatedly obtained context effects. Context effects were found in the disassociation between free play, task and classroom settings, in the way children adapt to peers of different gender, and in the way these factors interact. For instance, the longitudinal study found that mixed gender groups showed simpler forms of communication than single gender groups in the task but not in the free play setting. Concurring with results obtained by Howe and McWilliam (in press), single gender groups used more complex turns in both settings.

Moreover, discrepancies between the current research and research reported in the introduction are most likely due to context effects, such as the nature of the task settings. Thus, while the present research focused on systematic differences in communication regardless of context, results obtained show a great potential for variation across contexts.

Explanations as to why context seems to have such an impact on communication - and this consideration not only pertains to the different tasks, but also to the context effects obtained in schools of varying socioeconomic status - are most likely found in the consideration that language is used as a tool (cf. Speech act theory, Austin, 1962) to successfully operate in different environments. Different environments may present different sets of problems or different social situations that have to be negotiated using different communicative repertoires. As such, communication style might not be solely the characteristic of a given individual, but rather the characteristic of an individual with a certain context. While some intercultural studies (e.g. Chen, Rubin and Li, 1995; Chen et al., 2005) have pointed to communication differences within groups of different cultures, thus investigating macrosystem-microsystem influences (Bronfenbrenner, 1979), research on variation in mesosystem –micro system influences is sparse. One possibility of examining variations in the mesosystem within the school setting might be to look at children or adolescents during the transition from one stage of schooling to the next or at children who participate in extracurricular activities, where communication in one setting is systematically compared to communication in the other setting.

8.5 Limitations of the current research - avenues for future research

Limitations of the research presented here have previously been mentioned in the discussions of the cross-sectional and the longitudinal study. One shortcoming of the longitudinal study was the fact that the classroom observations were not conducted systematically enough and that peer popularity was the only measure obtained at time 2. Neither the cross-sectional study nor the longitudinal study analysed group combinations of popularity status. In addition, both studies used whole class rather than same gender sociometric measures. This procedure may have affected the popularity status of the participants, because school children show marked gender preferences (Hayden-Thomson et al., 1987, Maccoby and Jacklin, 1987).

A further weakness of the current research is that it addressed the associations between popularity, temperament and communication style in separated analyses, failing to take into account possible three-way relationships between these factors. However, analysis of these three-way relationships is needed in order to account for the complexity of human behaviour.

In terms of future research, the most pervasive result highlighted by the two studies was a relationship between impulsivity, simple communication and peer rejection for boys. This relationship deserves deeper exploration, especially as the links between impulsivity, simple communication and peer rejection may operate in a bi-directional fashion.

For example, research presented in the introduction indicated that impulsive behaviour is linked to peer rejection and that peer rejection may further contribute to impulsive behaviour (Baumeister et al., 2005). Likewise, bi-directional influences between communication style and popularity need to be explored. It might be the case that communication style predicts rejection and/or that rejection predicts communication style. In addition, three-way relationships addressing moderating or mediating influences of any one of these factors in relation to the third factor need to be taken into account.

Another avenue to explore is children's ability to adapt to play groups and situations. The current research indicated that children adapt to the gender of their peers and analyses of observational settings showed variability of communication in different contexts. The longitudinal study in particular showed that children communicated very differently in free play settings, task settings and classroom settings. While the current studies aimed at investigating stable relationships across situations, results warn that future research should not assume that obtained communicative characteristics are to be expected beyond the setting in which they were obtained. Rather, it would be pertinent to take account of variability, assessing children's adaption to peers with different sociometric status, peers with different temperament and situations with different task demands.

In addition, further research could investigate the predictive relationships obtained in the longitudinal study, using longer time lags between time 1 and time 2, in order to better assess the relative contributions of previous popularity, temperament and communication to the explanation of popularity at time 2. Alternatively, age groups with less acquired popularity status could be used, for example young children, children just after a school transition, or children otherwise unknown to each other.

8.6 Conclusion

The present research presented two studies that explored relationships between childhood temperament (anger/frustration, impulsivity and inhibitory control), communication style ("simple" or "complex" communication) and child popularity. It was hypothesised that difficult temperament would be associated with peer rejection, that popular children would use more complex forms of communication, that communication would vary with regards to temperament, and that both temperament and communication would vary across gender. Variations in temperament and communication across age were expected in the cross-sectional study, spanning three age groups across six years, but not in the longitudinal study following two age groups over six months.

Results showed that difficult temperamental traits were indeed associated with peer rejection, while simple communication was predictive of peer rejection in seven to eight year old boy's free play interactions. Furthermore, impulsivity was consistently associated with simple communication. Age differences in temperament were evident across the six-year difference in age but not the one year difference in age, while support for age differences in communication was limited. While no significant main effects of gender were obtained, the link between impulsivity, simple communication and peer rejection was mainly applicable to boys. Moreover, gender grouping rather than gender itself was associated with differential use of communication.

It is suggested that future research should investigate three-way relationships between impulsive behaviour, simple communication and peer rejection in boys. In addition, children's ability to adapt their communication to peers of different gender, peers of different popularity and different interaction contexts needs to be explored.

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Appendix 1

CHILDREN'S BEHAVIOUR QUESTIONNAIRE

Please complete the following and then read the instructions below:

Child's Name _____

Sex of Child _____

Today's Date _____

Date of Child's Birth _____

On the next pages you will see a set of statements that describe children's reactions to a number of situations. We would like you to tell us what <u>your</u> child's reaction is likely to be in those situations. There are of course no "correct" ways of reacting; children differ widely in their reactions, and it is these differences we are trying to learn about. Please read each statement and decide whether it is a "<u>true</u>" or "<u>untrue</u>" description of your child's reaction <u>within the past six months</u>. Use the following scale to indicate how well a statement describes your child:

Circle:	If the statement is:
1	extremely untrue of your child
2	quite untrue of your child
3	slightly untrue of your child
4	neither true nor false of your child
5	slightly true of your child
6	quite true of your child
7	extremely true of your child

If you cannot answer one of the items because you have never seen the child in that situation, for example, if the statement is about the child's reaction to your singing and you have never sung to your child, then circle <u>NA</u> (not applicable).

Please be sure to circle a number or NA for <u>every</u> item.

1 extremely untrue	2 quite untrue	3 slightly untrue	4 neither true nor untrue	5 slightly true	6 quite true	7 extremely true	N/A (not applicable)

My child:

1. Gets angry when told s/he has to go to bed.

1 2 3 4 5 6 7 NA

2. Can lower his/her voice when asked to do so.

1 2 3 4 5 6 7 NA

3. Likes going down high slides or other adventurous activities.

1 2 3 4 5 6 7 NA

4. Laughs a lot at jokes and silly happenings.

1 2 3 4 5 6 7 NA

5. Usually rushes into an activity without thinking about it.

1 2 3 4 5 6 7 NA

6. Rarely gets irritated when s/he makes a mistake.

1 2 3 4 5 6 7 NA

7. Is good at games like "Simon Says".

1 2 3 4 5 6 7 NA

8. Likes to play so wild and recklessly that s/he might get hurt.

1 2 3 4 5 6 7 NA

9. Sometimes interrupts others when they are speaking.

1 2 3 4 5 6 7 NA

10. Doesn't care for rough and rowdy games.

1 2 3 4 5 6 7 NA

11. Has a hard time following instructions.

1 2 3 4 5 6 7 NA

12. Has temper tantrums when s/he doesn't get what s/he wants.

1 2 3 4 5 6 7 NA

13. Enjoys funny stories but usually doesn't laugh at them.

1 2 3 4 5 6 7 NA

1	2	3	4	5	6	7	NA
extremely untrue	quite untrue	slightly untrue	neither true nor untrue	slightly true	quite true	extremely true	(not applicable)

14. Decides what s/he wants very quickly and goes after it.

1 2 3 4 5 6 7 NA

15. Does not like to take chances for the fun and excitement of it.

1 2 3 4 5 6 7 NA

16. Smiles and laughs during play with parents.

1 2 3 4 5 6 7 NA

17. Often rushes into new situations.

1 2 3 4 5 6 7 NA

18. Doesn't like to go down high slides at the amusement park or playground.

1 2 3 4 5 6 7 NA

19. Gets quite frustrated when prevented from doing something s/he wants to do.

1 2 3 4 5 6 7 NA

20. Prepares for trips and outings by planning things s/he will need.

1 2 3 4 5 6 7 NA

21. Enjoys activities such as being chased, spun around by the arms, etc.

1 2 3 4 5 6 7 NA

22. Takes a long time in approaching new situations.

1 2 3 4 5 6 7 NA

23. Gets angry when even mildly criticised.

1 2 3 4 5 6 7 NA

24. Can wait before entering into new activities if s/he is asked to.

1 2 3 4 5 6 7 NA

25. Enjoys being in crowds of people.

1 2 3 4 5 6 7 NA

26. Gets angry when s/he can't find something s/he wants to play with.

1 2 3 4 5 6 7 NA

27. Usually stops and thinks things over before deciding to do something.

1 2 3 4 5 6 7 NA

1	2	3	4	5	6	7	NA
extremely untrue	quite untrue	slightly untrue	neither true nor untrue	slightly true	quite true	extremely true	(not applicable)

28. Usually has a serious expression, even during play.

1 2 3 4 5 6 7 NA

29. Is slow and unhurried in deciding what to do next.

1 2 3 4 5 6 7 NA

30. Has difficulty waiting in a queue for something.

1 2 3 4 5 6 7 NA

31. Hardly ever laughs out loud during play with other children.

1 2 3 4 5 6 7 NA

32. Enjoys exciting and suspenseful TV programmes.

1 2 3 4 5 6 7 NA

33. Tends to say the first thing that comes to mind, without stopping to think about it.

1 2 3 4 5 6 7 NA

34. Enjoys meeting Santa Claus or other strangers in costumes.

1 2 3 4 5 6 7 NA

35. Has trouble sitting still when s/he is told to (at films, church, etc.).

1 2 3 4 5 6 7 NA

36. Sometimes smiles or giggles when playing by her/himself.

1 2 3 4 5 6 7 NA

37. When eager to go outside, sometimes rushes out without putting on the right clothes.

1 2 3 4 5 6 7 NA

38. Is able to resist laughing or smiling when it isn't appropriate.

1 2 3 4 5 6 7 NA

39. Rarely gets upset when told s/he has to go to bed.

1 2 3 4 5 6 7 NA

40. Rarely smiles and laughs when playing with pets.

1 2 3 4 5 6 7 NA

41. Enjoys exploring new places.

1 2 3 4 5 6 7 NA

1 extremely untrue	2 quite untrue	3 slightly untrue	4 neither true nor untrue	5 slightly true	6 quite true	7 extremely true	NA (not applicable)

42. Becomes easily frustrated when tired.

1 2 3 4 5 6 7 NA

43. Doesn't often giggle or act "silly".

1 2 3 4 5 6 7 NA

44. Is good at following instructions.

1 2 3 4 5 6 7 NA

45. Approaches slowly places where s/he might hurt her/himself.

1 2 3 4 5 6 7 NA

46. Likes to go high and fast when pushed on a swing.

1 2 3 4 5 6 7 NA

47. Gets irritable about having to eat food s/he doesn't like.

1 2 3 4 5 6 7 NA

48. Approaches places s/he has been told are dangerous slowly and cautiously.

1 2 3 4 5 6 7 NA

49. Smiles a lot at people s/he likes.

1 2 3 4 5 6 7 NA

50. When s/he sees a toy or game s/he wants, is eager to have it right then.

1 2 3 4 5 6 7 NA

51. Rarely protests when another child takes his/her toy away.

1 2 3 4 5 6 7 NA

52. Likes rough and rowdy games.

1 2 3 4 5 6 7 NA

53. Is not very careful and cautious in crossing streets.

1 2 3 4 5 6 7 NA

54. Often laughs out loud in play with other children.

1 2 3 4 5 6 7 NA

55. Rarely laughs aloud while watching TV or film comedies.

1 2 3 4 5 6 7 NA

1	2	3	4	5	6	7	NA
extremely untrue	quite untrue	slightly untrue	neither true nor untrue	slightly true	quite true	extremely true	(not applicable)

56. Can easily stop an activity when s/he is told "no".

1 2 3 4 5 6 7 NA

57. Is among the last children to try out a new activity.

1 2 3 4 5 6 7 NA

58. Easily gets irritated when s/he has trouble with some task (e.g. building, drawing, dressing).

1 2 3 4 5 6 7 NA

59. Smiles at friendly strangers.

1 2 3 4 5 6 7 NA

60. Gets angry when called in from play before s/he is ready to leave.

1 2 3 4 5 6 7 NA

61. Enjoys riding a tricycle or bicycle fast and recklessly.

1 2 3 4 5 6 7 NA

62. Is "slow to warm up" to others.

1 2 3 4 5 6 7 NA

63. Is usually able to resist temptation when told s/he is not supposed to do something.

1 2 3 4 5 6 7 NA

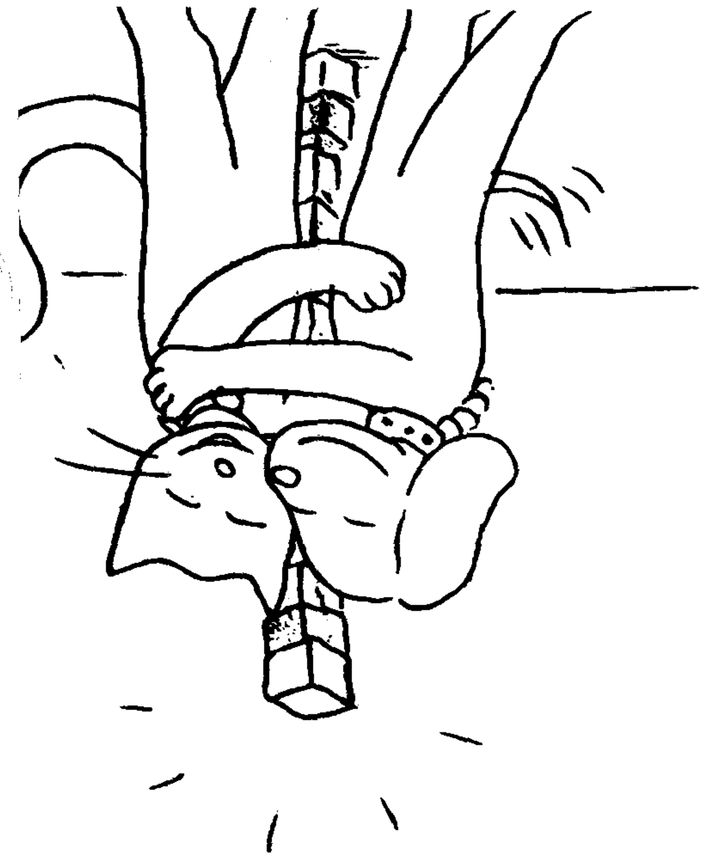
64. Gets angry when provoked by other children.

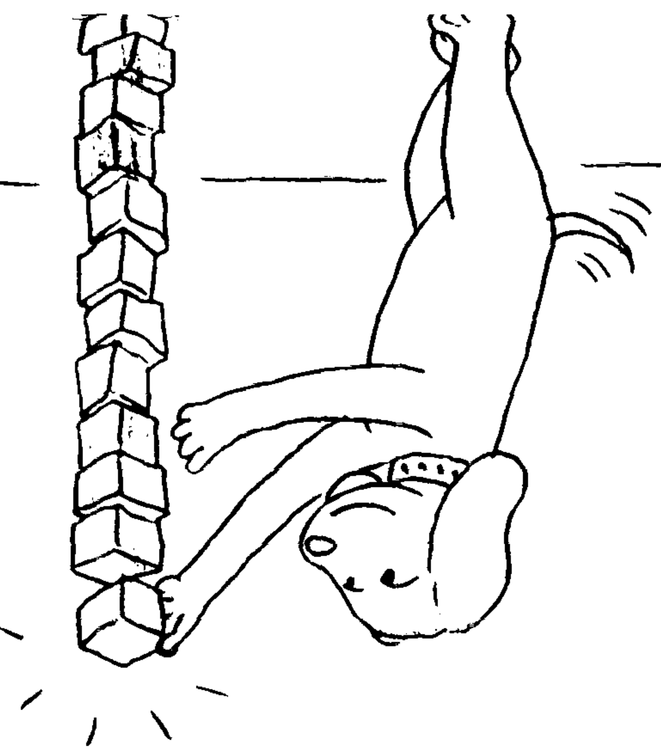
1 2 3 4 5 6 7 NA

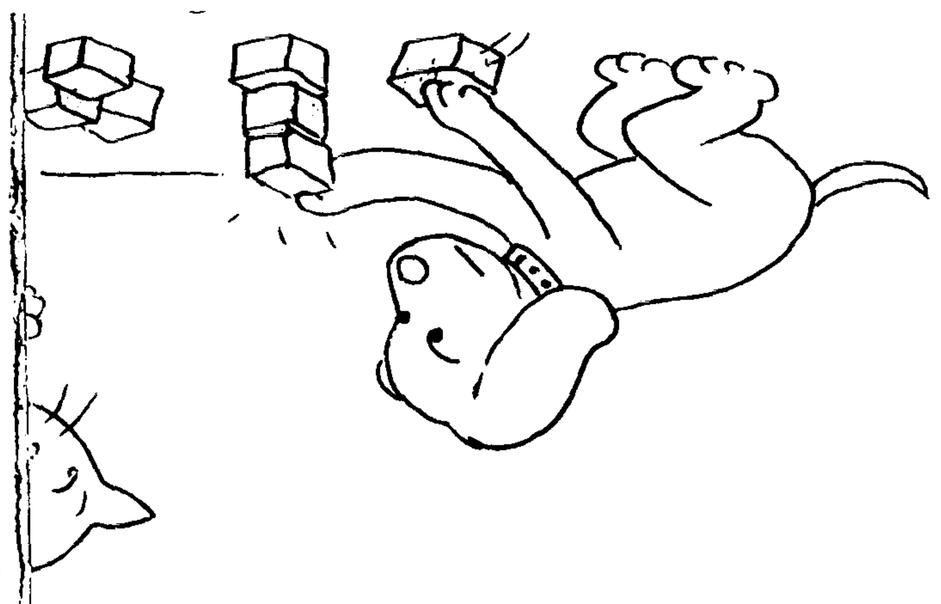
65. Smiles when looking at a picture book.

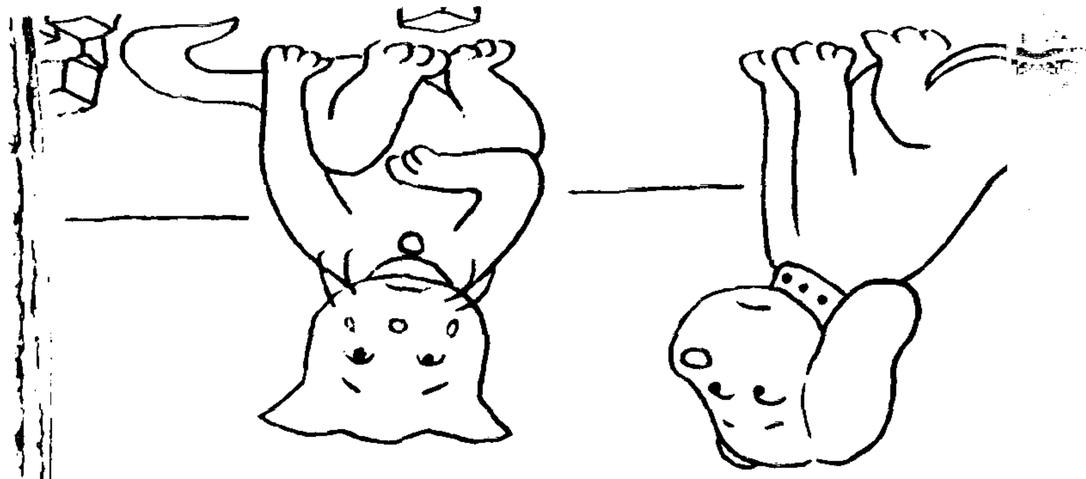
1 2 3 4 5 6 7 NA

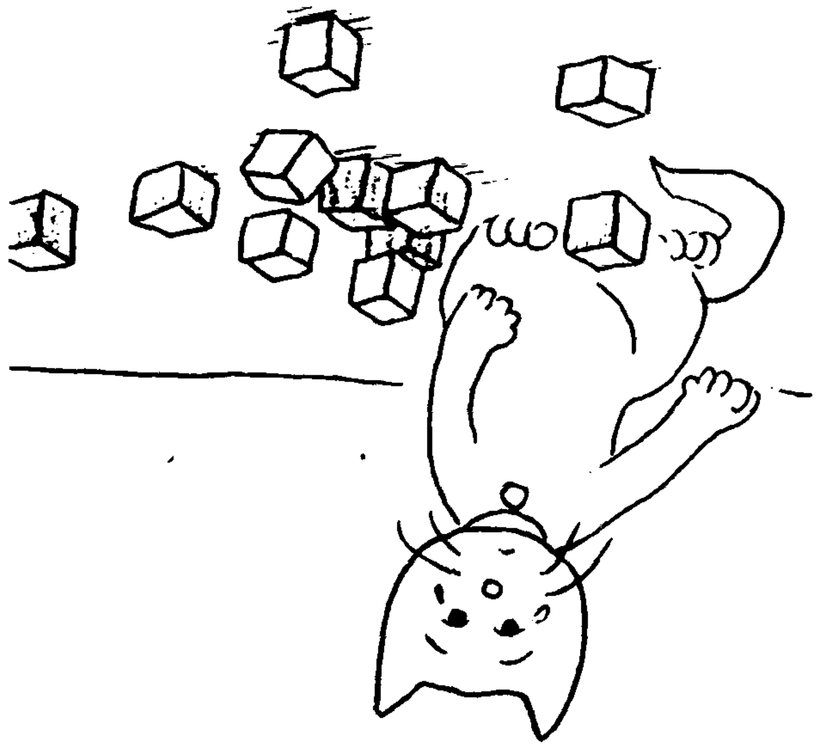
Appendix 2

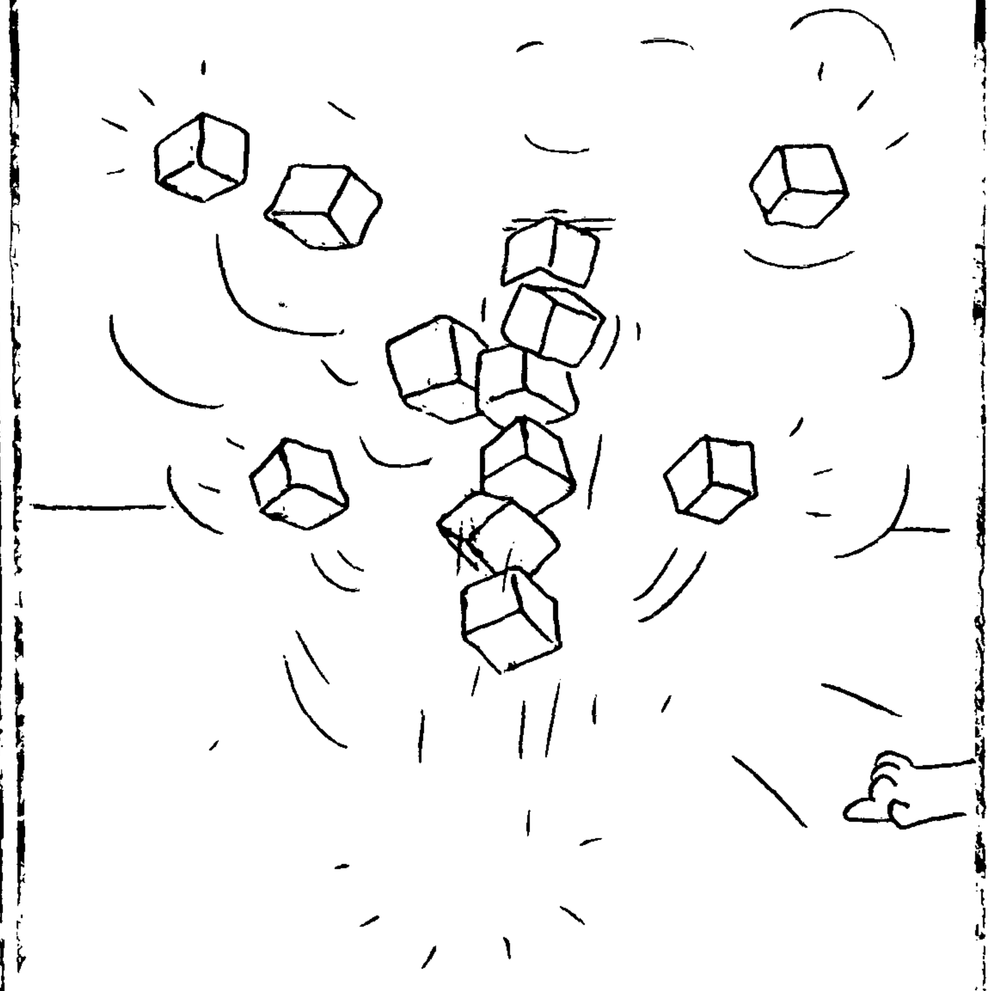


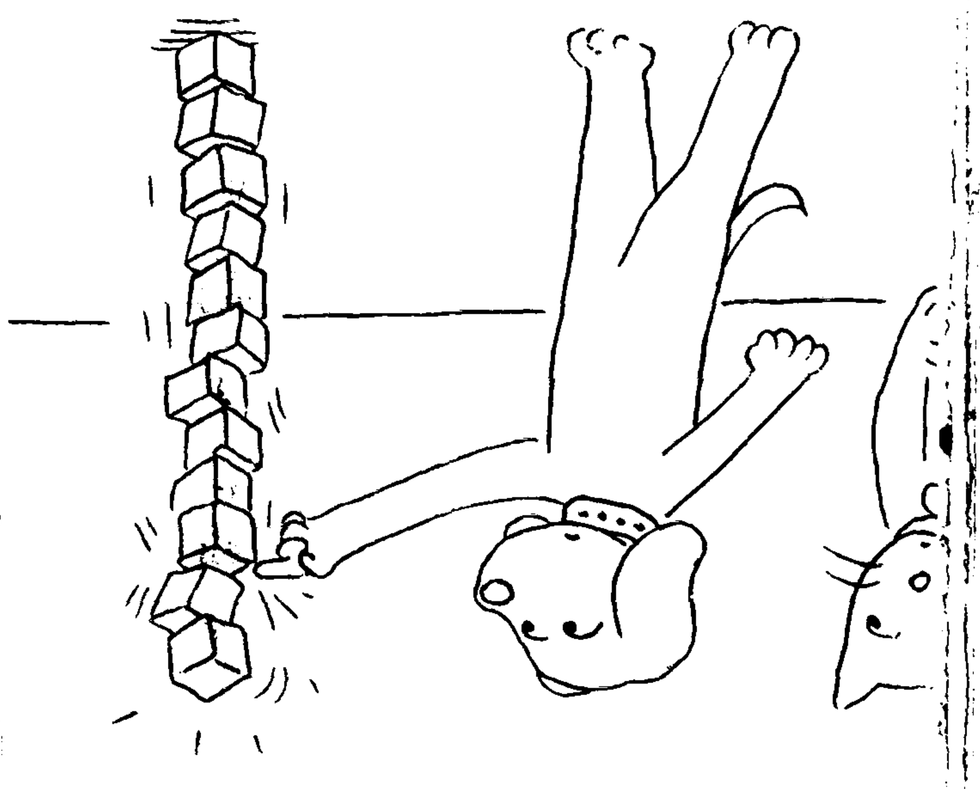


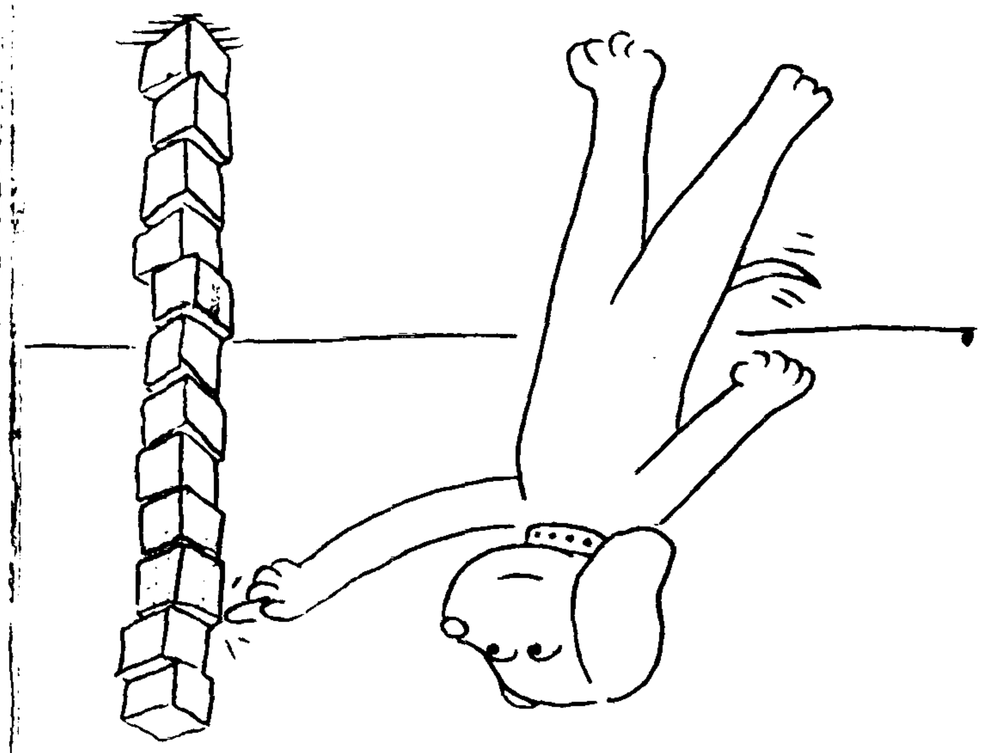


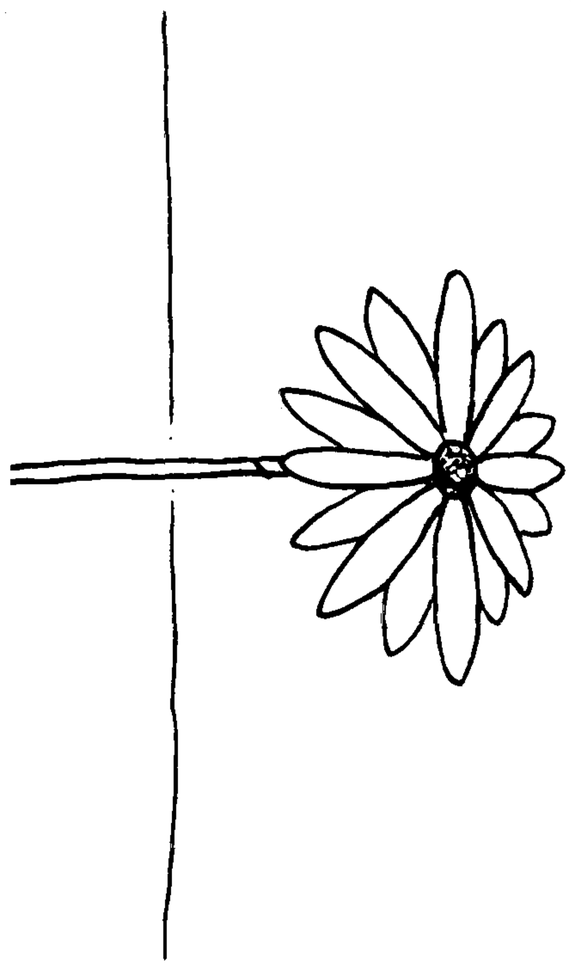


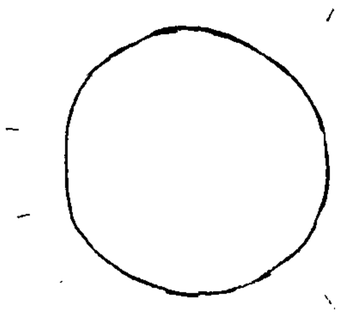


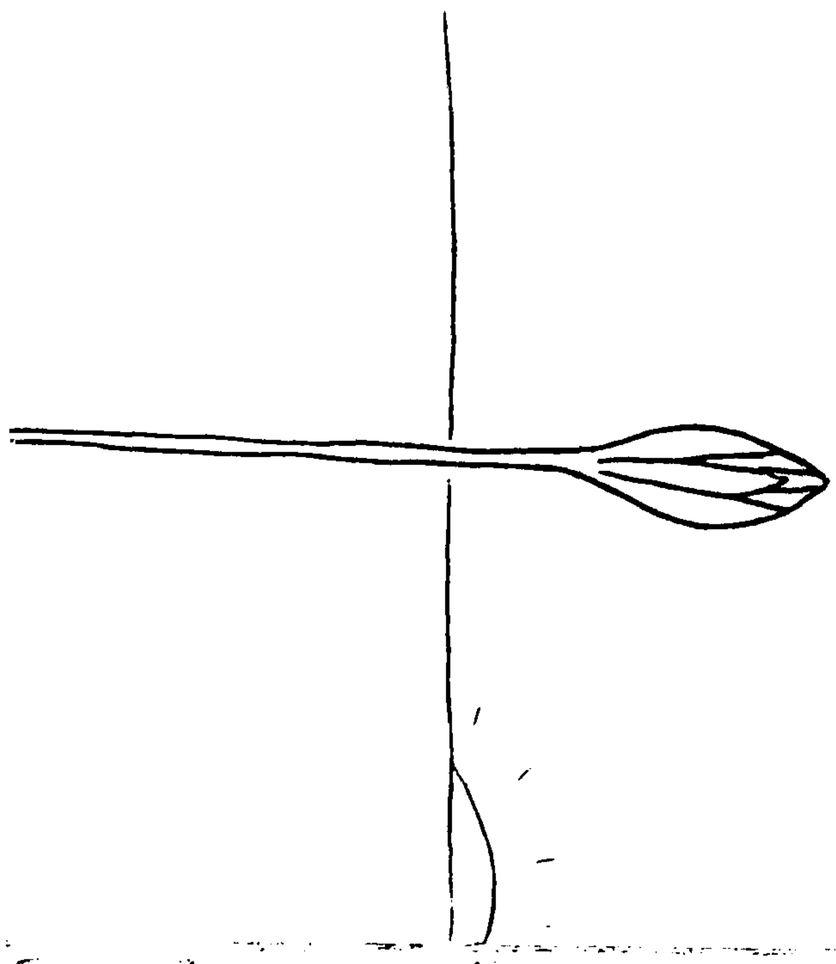


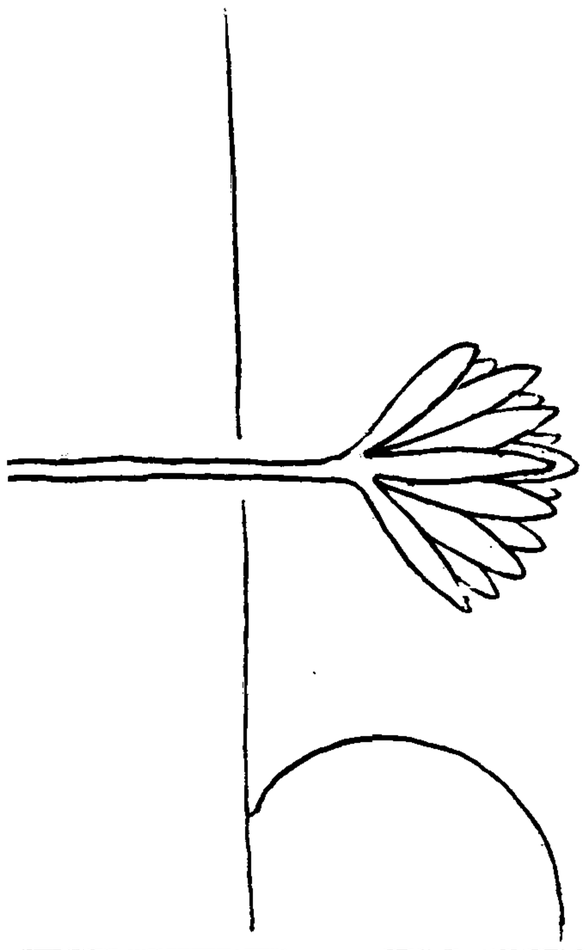


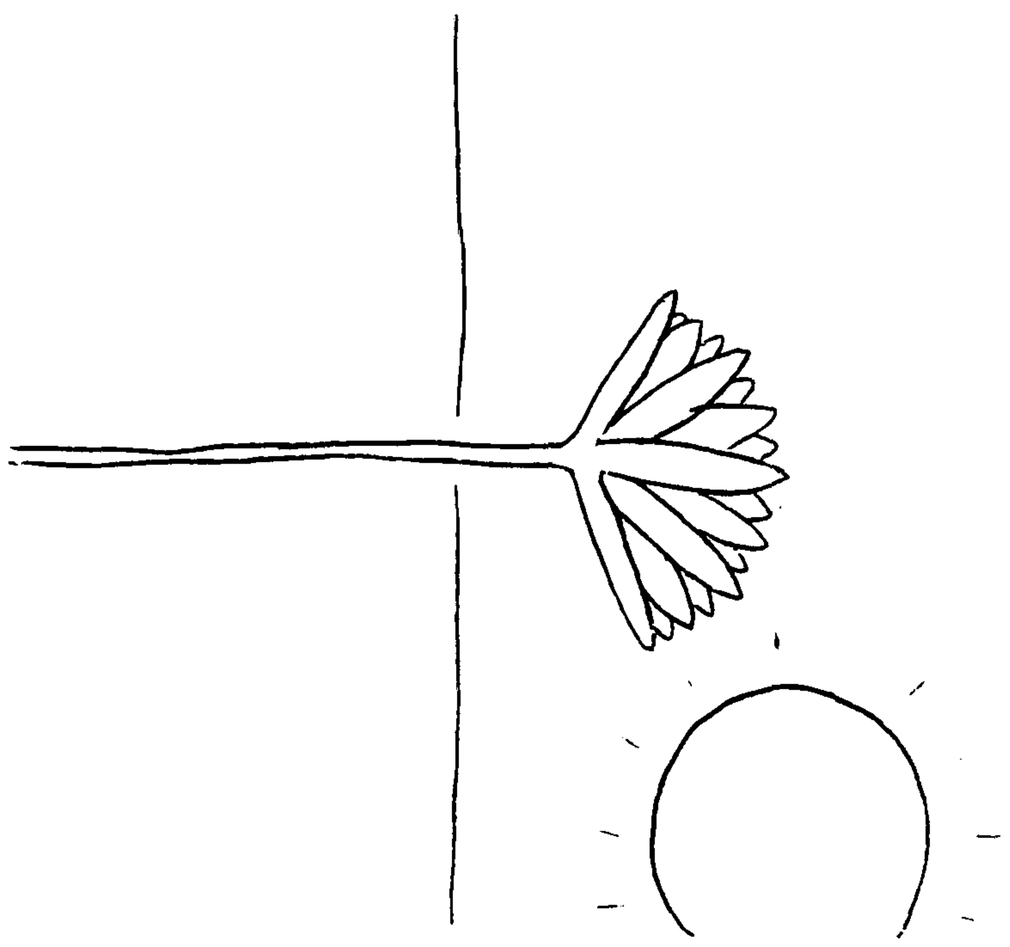


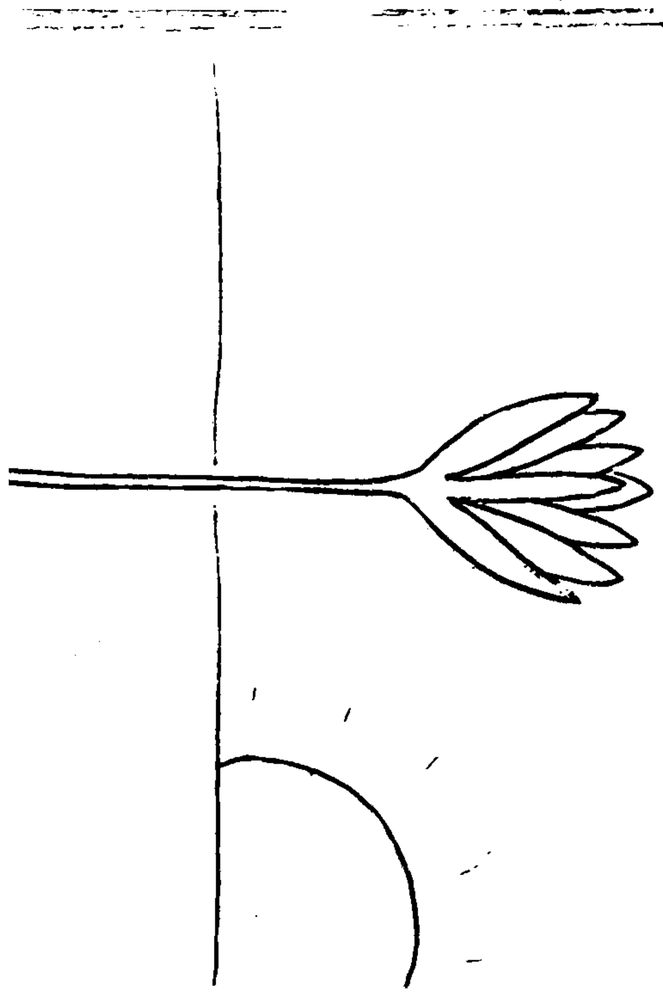


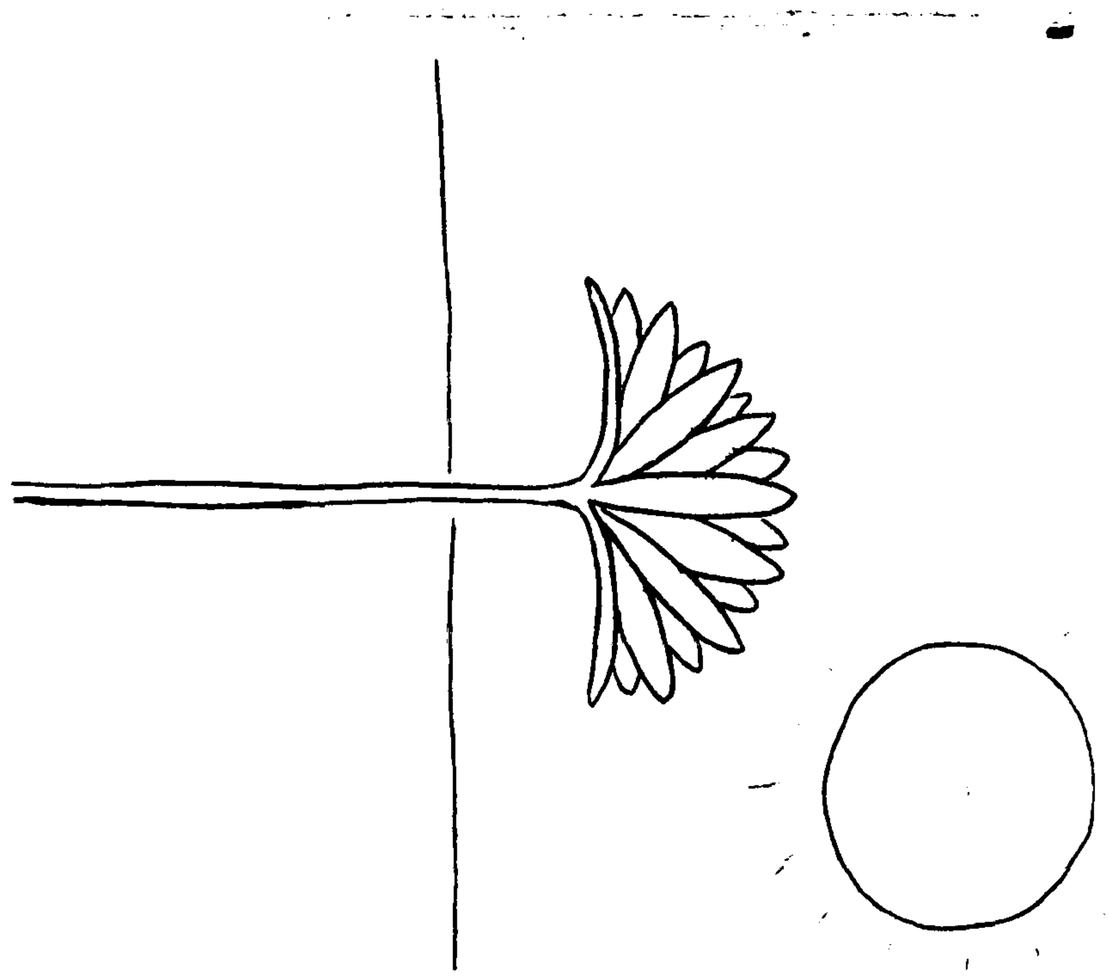


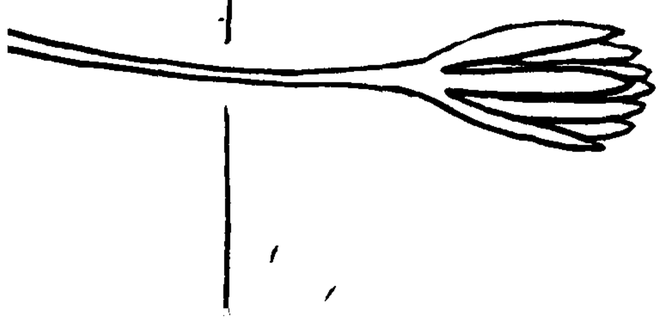


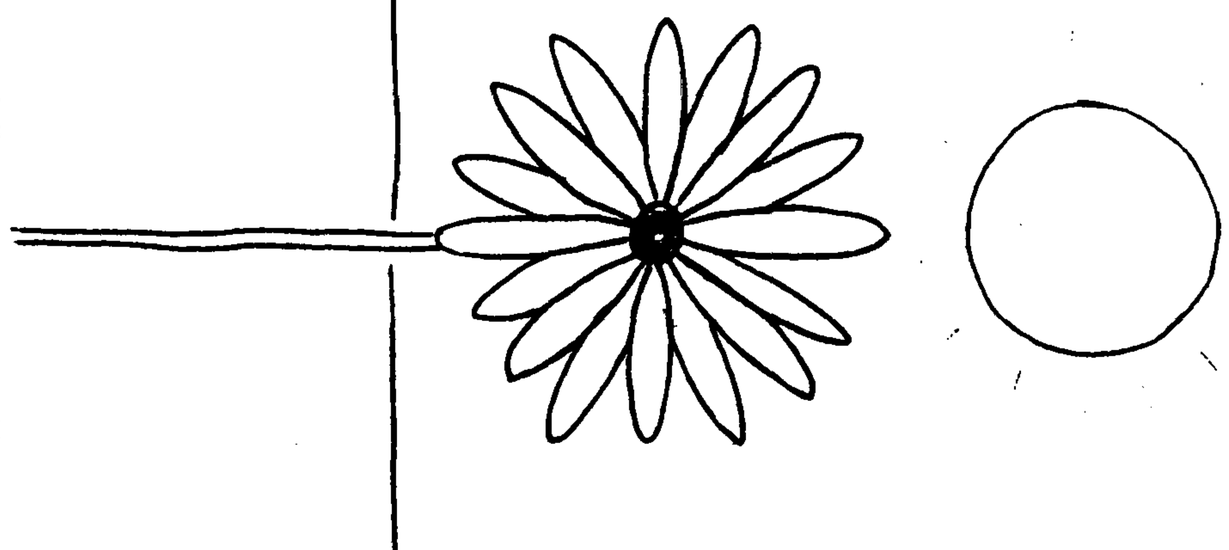


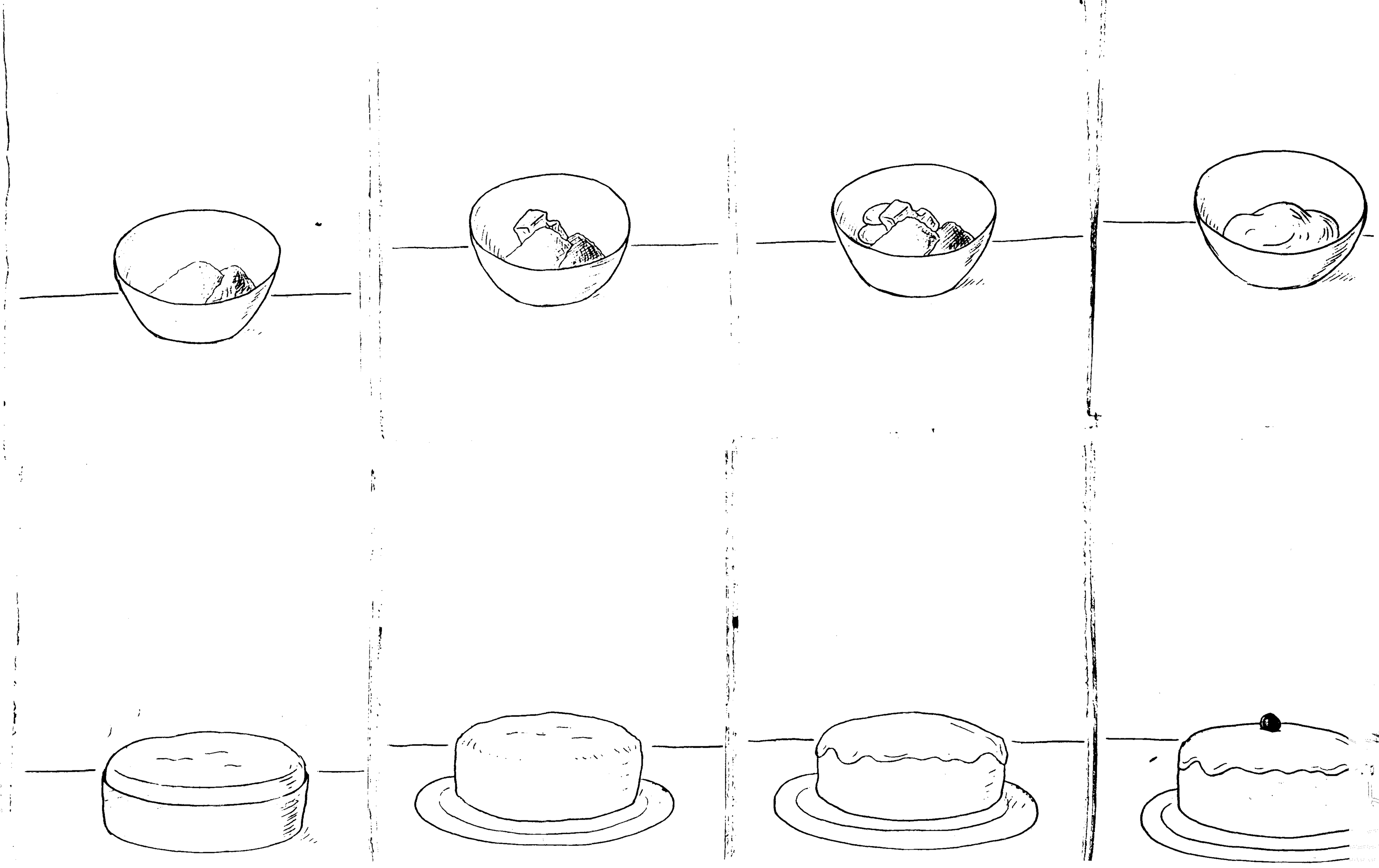






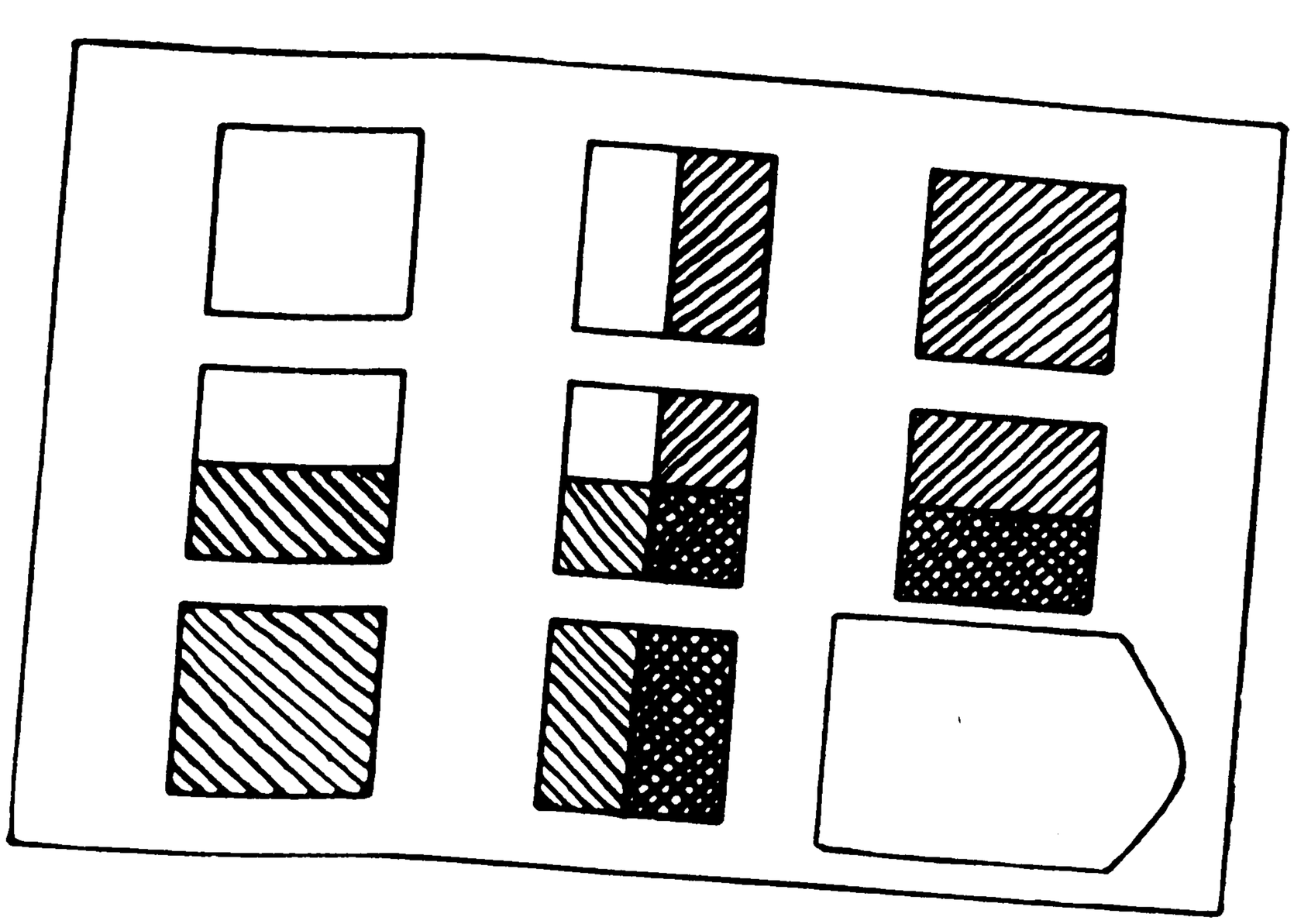


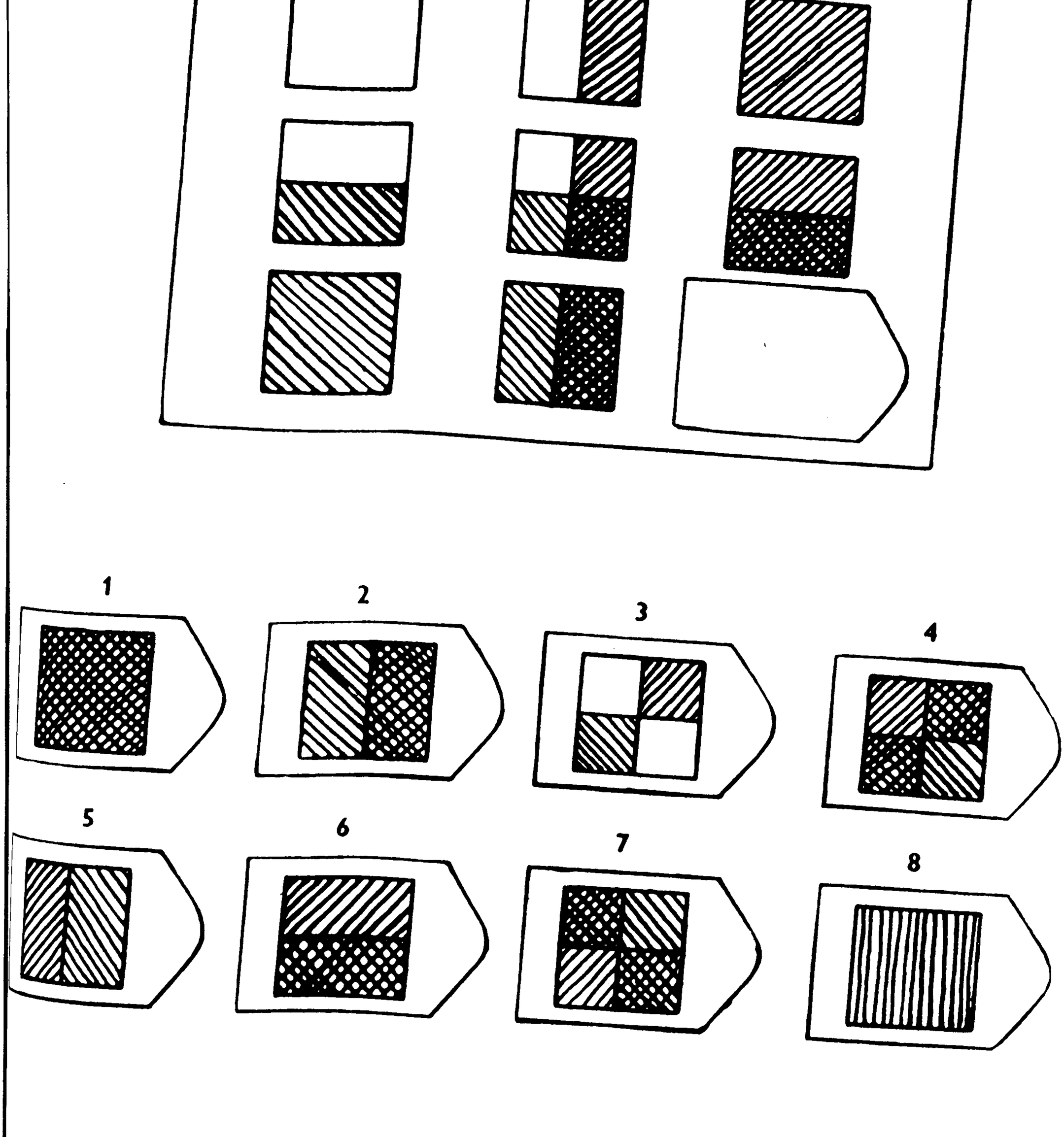




Appendix 3

C 8





Appendix 4

Birgit Schröter
Postgraduate Student
Department of Psychology
Graham Hills Building
40, George Street
Glasgow
G1 1QE
0141-548 4757
birgit.schroeter@strath.ac.uk

01.05. 2002

Study on children's reasoning skills in discussions

Dear Parent,

I am writing to inform you about a study, which will be conducted at your child's school during May and June 2002.

The study, which will be conducted by myself, a postgraduate student in developmental psychology, under the supervision of Professor Christine Howe, Head of Department, Department of Psychology at the University of Strathclyde in Glasgow, focuses on children's reasoning skills during discussion with their peers.

Discussions between children are an important component of the 5-14 national guidelines. They have been shown to be beneficial for both social and cognitive development, and psychologists aiming to understand children's language and social development are very interested in investigating these topics in greater depth.

NORTH

EDUCATION DEPARTMENT

CONSENT FORM

FOR PERMISSION FOR A SCHOOL AGE CHILD TO PARTICIPATE IN A RESEARCH

To be completed by the child's parent or guardian

Please read the following notes carefully before completing the form

This form must be attached to covering letter (which you may detach and keep), and should only be completed and returned IF YOU ARE UNWILLING to have your child participate in the research described in the research study described in the attached letter.

If you do not complete and return the form this will be taken as implying that you wish your child to participate in the study.

ONLY COMPLETE AND RETURN THIS FORM IF YOU **DO NOT** WISH YOUR CHILD TO PARTICIPATE IN THE RESEARCH STUDY

PLEASE USE BLOCK CAPITALS

I, (insert your name) _____

BEING THE (insert your relationship to the child, e.g. mother/father/guardian) _____

OF (insert class or form) _____

OF (insert name of school) _____

DO NOT GIVE PERMISSION FOR MY CHILD TO PARTICIPATE IN THE RESEARCH STUDY DESCRIBED IN THE LETTER ATTACHED.

SIGNATURE: _____ DATE: _____

Appendix 5

Simple oppositions

		Limited toys	Story	Ravens	Free play
Limited toys	Pearson Correlation		.262	.262	.166
	Sig.		.019	.019	.141
Story	Pearson Correlation	.262		.360	.546
	Sig.	.019		.001	.000
Ravens	Pearson Correlation	.262	.360		.393
	Sig.	.019	.001		.000
Free play	Pearson Correlation	.166	.546	.393	
	Sig.	.141	.000	.000	

Extended oppositions

		Limited toys	Story	Ravens	Free play
Limited toys	Pearson Correlation		.108	.056	.184
	Sig.		.339	.622	.102
Story	Pearson Correlation	.108		.333	.556
	Sig.	.339		.003	.000
Ravens	Pearson Correlation	.056	.333		.381
	Sig.	.622	.003		.000
Free play	Pearson Correlation	.184	.556	.381	
	Sig.	.102	.000	.000	

Oppositional justifications

		Limited toys	Story	Ravens	Free play
Limited toys	Pearson Correlation		.058	-.034	-.104
	Sig.		.610	.763	.358
Story	Pearson Correlation	.058		.186	-.019
	Sig.	.610		.098	.870
Ravens	Pearson Correlation	-.034	.186		.254
	Sig.	.763	.098		.023
Free play	Pearson Correlation	-.104	-.019	.254	
	Sig.	.358	.870	.023	

Oppositional resolutions

		Limited toys	Story	Ravens	Free play
Limited toys	Pearson Correlation		.191	-.037	.082
	Sig.		.089	.744	.468
Story	Pearson Correlation	.191		-.041	.019
	Sig.	.089		.720	.866
Ravens	Pearson Correlation	-.037	-.041		-.043
	Sig.	.744	.720		.705
Free play	Pearson Correlation	.082	.019	-.043	
	Sig.	.468	.866	.705	

Simple non-oppositions

		Limited toys	Story	Ravens	Free play
Limited toys	Pearson Correlation		.401	.384	.531
	Sig.		.000	.000	.000
Story	Pearson Correlation	.401		.353	.427
	Sig.	.000		.001	.000
Ravens	Pearson Correlation	.384	.353		.190
	Sig.	.000	.001		.092
Free play	Pearson Correlation	.531	.427	.190	
	Sig.	.000	.000	.092	

Extended non-oppositions

		Limited toys	Story	Ravens	Free play
Limited toys	Pearson Correlation		.358	.527	.421
	Sig.		.001	.000	.000
Story	Pearson Correlation	.358		.305	.315
	Sig.	.001		.006	.004
Ravens	Pearson Correlation	.527	.305		.452
	Sig.	.000	.006		.000
Free play	Pearson Correlation	.421	.315	.452	
	Sig.	.000	.004	.000	

Non-oppositional justifications

		Limited toys	Story	Ravens	Free play
Limited toys	Pearson Correlation		.241	-.085	.242
	Sig.		.031	.455	.031
Story	Pearson Correlation	.241		.118	.109
	Sig.	.031		.296	.337
Ravens	Pearson Correlation	-.085	.118		.154
	Sig.	.455	.296		.171
Free play	Pearson Correlation	.242	.109	.154	
	Sig.	.031	.337	.171	

Non-oppositional resolutions

		Limited toys	Story	Ravens	Free pla
Limited toys	Pearson Correlation		-.018	-.036	-.0
	Sig.		.874	.749	.7
Story	Pearson Correlation	-.018		-.052	.2
	Sig.	.874		.648	.0
Ravens	Pearson Correlation	-.036	-.052		.0
	Sig.	.749	.648		.4
Free play	Pearson Correlation	-.033	.215	.081	
	Sig.	.774	.056	.474	

Non-aggressive action

		Limited toys	Story	Ravens	Free play
Limited toys	Pearson Correlation		.384	.174	.320
	Sig.		.000	.123	.004
Story	Pearson Correlation	.384		.360	.365
	Sig.	.000		.001	.001
Ravens	Pearson Correlation	.174	.360		.138
	Sig.	.123	.001		.222
Free play	Pearson Correlation	.320	.365	.138	
	Sig.	.004	.001	.222	

Aggressive action

		Limited toys	Story	Ravens	Free play
Limited toys	Pearson Correlation		.084	-.067	.239
	Sig.		.457	.554	.033
Story	Pearson Correlation	.084		-.028	.224
	Sig.	.457		.803	.046
Ravens	Pearson Correlation	-.067	-.028		.203
	Sig.	.554	.803		.071
Free play	Pearson Correlation	.239	.224	.203	
	Sig.	.033	.046	.071	

Appendix 6

Total Sample

		A/F	IM	IC	Justifications	Simple Communication
A/F	Pearson Correlation		.223	-.434	.223	-.048
	Sig.		.046	.000	.047	.669
IM	Pearson Correlation	.223		-.418	-.216	-.015
	Sig.	.046		.000	.054	.896
IC	Pearson Correlation	-.434	-.418		.143	-.041
	Sig.	.000	.000		.205	.718
Justifications	Pearson Correlation	.223	-.216	.143		.268
	Sig.	.047	.054	.205		.016
Simple Communication	Pearson Correlation	-.048	-.015	-.041	.268	
	Sig.	.669	.896	.718	.016	

Boys

		A/F	IM	IC	Justifications	Simple Communication
A/F	Pearson Correlation		.176	-.381	.410	-.024
	Sig.		.311	.024	.015	.890
IM	Pearson Correlation	.176		-.335	-.243	.042
	Sig.	.311		.049	.159	.809
IC	Pearson Correlation	-.381	-.335		-.020	-.115
	Sig.	.024	.049		.909	.512
Justifications	Pearson Correlation	.410	-.243	-.020		.286
	Sig.	.015	.159	.909		.096
Simple Communication	Pearson Correlation	-.024	.042	-.115	.286	
	Sig.	.890	.809	.512	.096	

Girls

		A/F	IM	IC	Justifications	Simple Communication
A/F	Pearson Correlation		.280	-.515	-.084	-.139
	Sig.		.063	.000	.585	.363
IM	Pearson Correlation	.280		-.458	-.197	-.161
	Sig.	.063		.002	.194	.291
IC	Pearson Correlation	-.515	-.458		.329	.143
	Sig.	.000	.002		.027	.347
Justifications	Pearson Correlation	-.084	-.197	.329		.253
	Sig.	.585	.194	.027		.093
Simple Communication	Pearson Correlation	-.139	-.161	.143	.253	
	Sig.	.363	.291	.347	.093	

Nursery

		A/F	IM	IC	Justifications	Simple Communication
A/F	Pearson Correlation		.292	-.450	.254	.090
	Sig.		.080	.005	.130	.595
IM	Pearson Correlation	.292		-.239	-.118	-.076
	Sig.	.080		.154	.485	.653
IC	Pearson Correlation	-.450	-.239		.109	.339
	Sig.	.005	.154		.519	.040
Justifications	Pearson Correlation	.254	-.118	.109		.526
	Sig.	.130	.485	.519		.001
Simple Communication	Pearson Correlation	.090	-.076	.339	.526	
	Sig.	.595	.653	.040	.001	

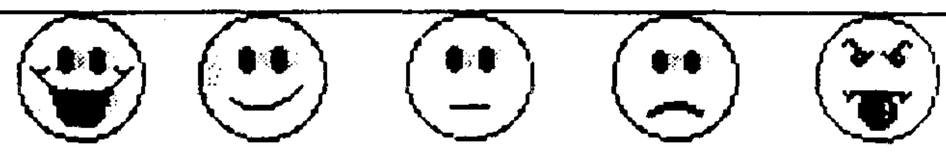
Primary 3

		A/F	IM	IC	Justifications	Simple Communication
A/F	Pearson Correlation		.033	-.370	.683	-.088
	Sig.		.882	.090	.000	.697
IM	Pearson Correlation	.033		-.500	-.041	.123
	Sig.	.882		.018	.856	.587
IC	Pearson Correlation	-.370	-.500		-.129	-.406
	Sig.	.090	.018		.567	.061
Justifications	Pearson Correlation	.683	-.041	-.129		.117
	Sig.	.000	.856	.567		.605
Simple Communication	Pearson Correlation	-.088	.123	-.406	.117	
	Sig.	.697	.587	.061	.605	

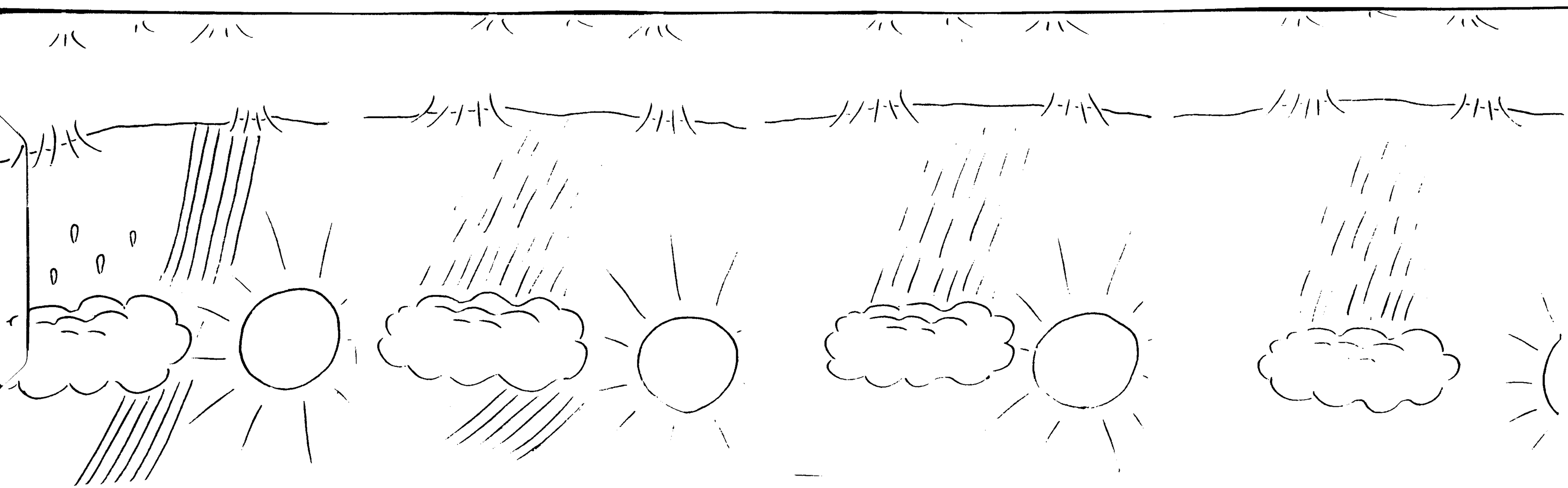
Primary 6

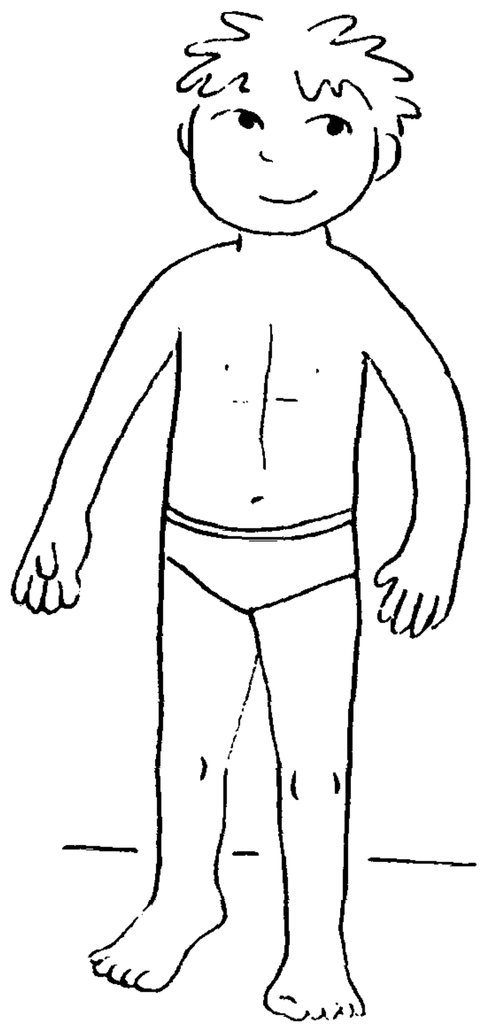
		A/F	IM	IC	Justifications	Simple Communication
A/F	Pearson Correlation		.389	-.499	-.169	.026
	Sig.		.081	.021	.465	.912
IM	Pearson Correlation	.389		-.462	-.062	-.092
	Sig.	.081		.035	.790	.690
IC	Pearson Correlation	-.499	-.462		.071	-.148
	Sig.	.021	.035		.760	.523
Justifications	Pearson Correlation	-.169	-.062	.071		.215
	Sig.	.465	.790	.760		.349
Simple Communication	Pearson Correlation	.026	-.092	-.148	.215	
	Sig.	.912	.690	.523	.349	

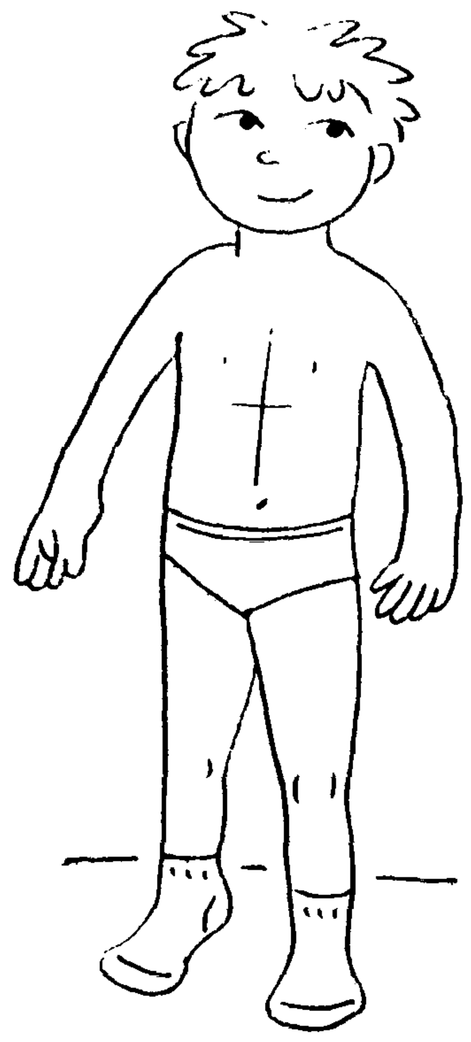
Appendix 7

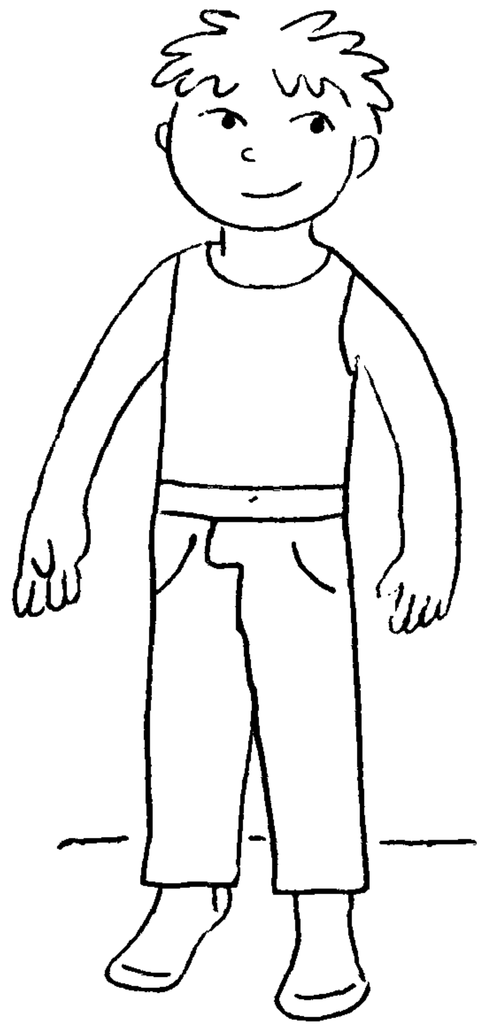
How much do you like to play with	
	
	
	
	
	
	
	
	
	
	
	
	
	

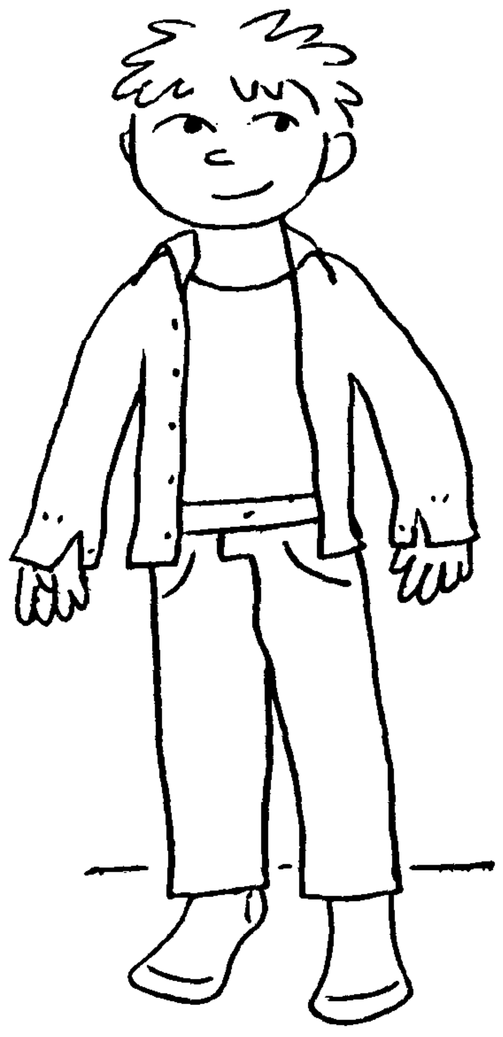
Appendix 8

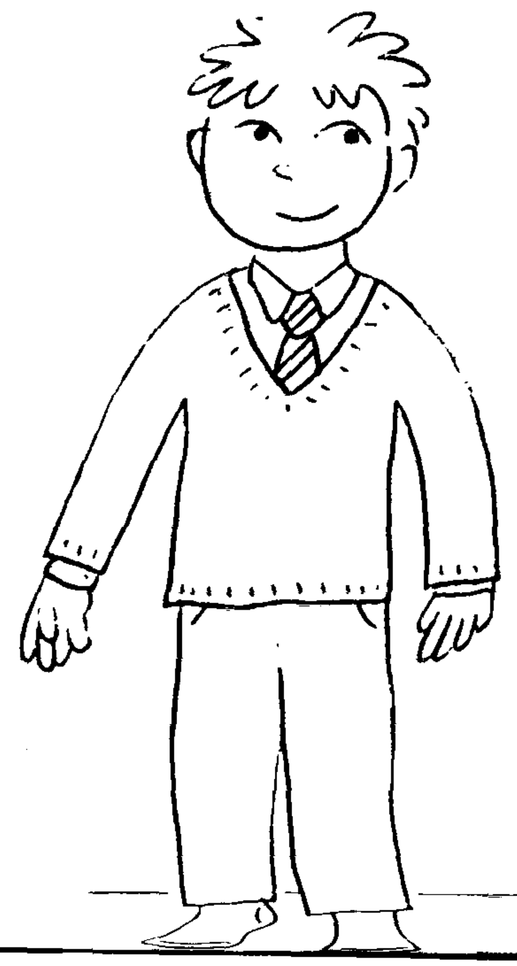


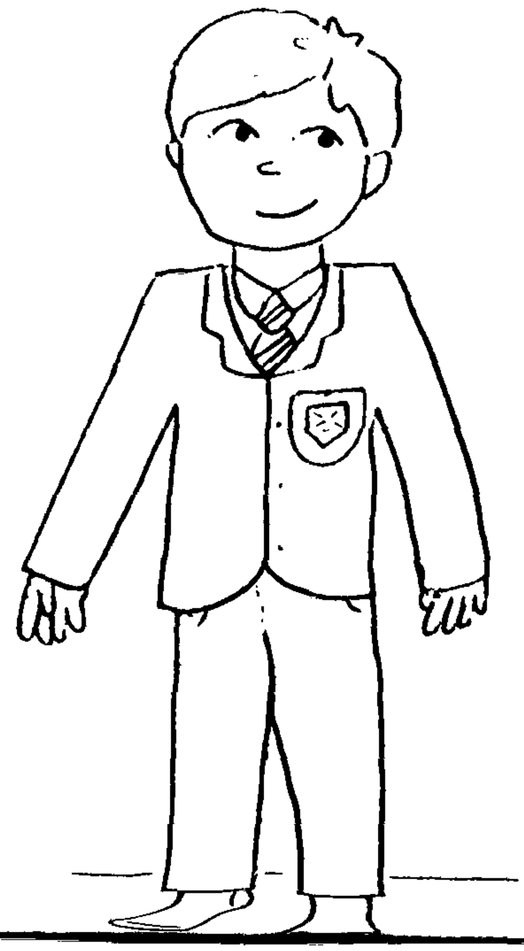


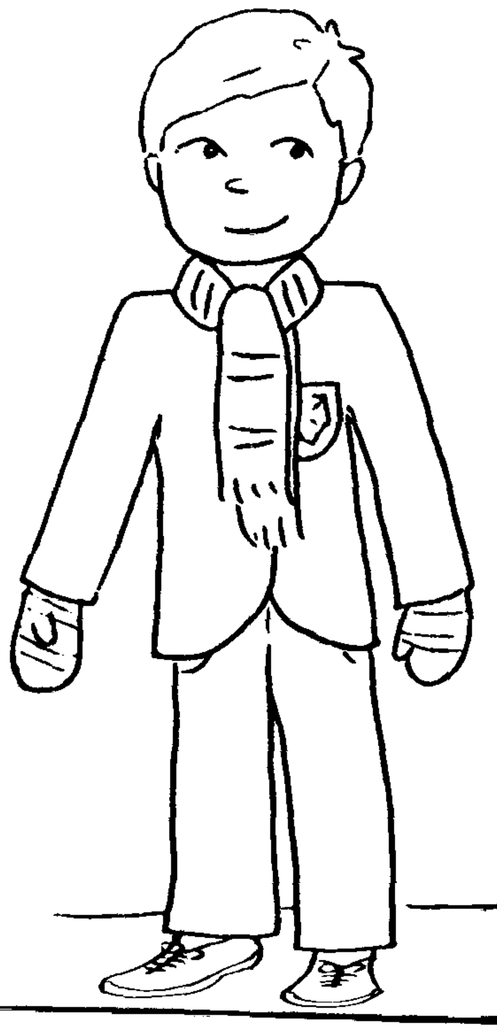


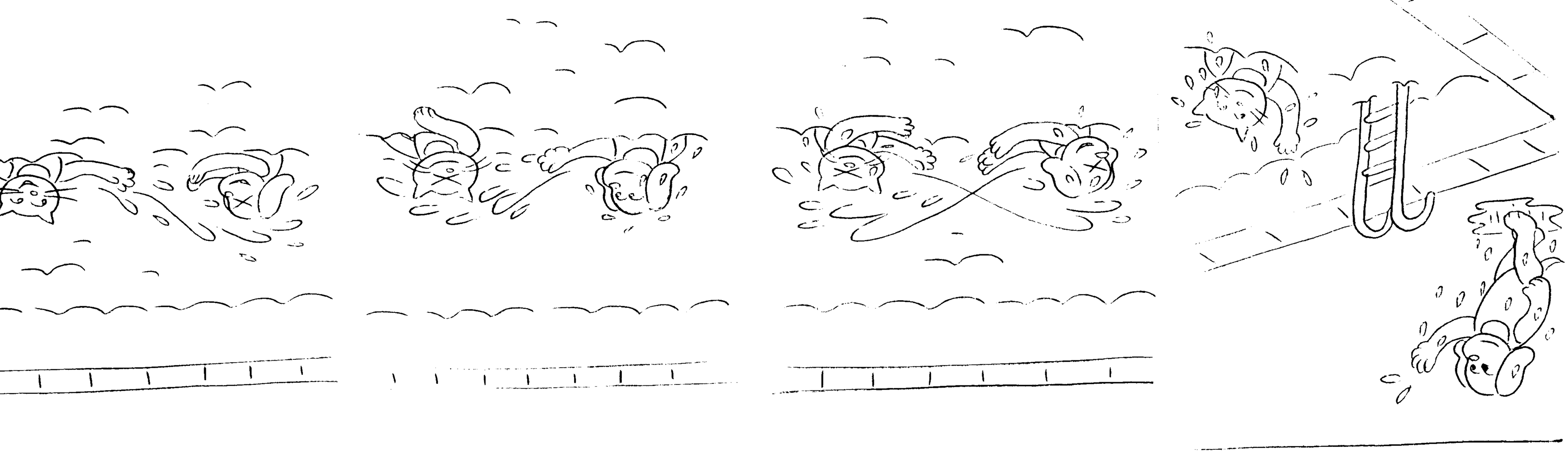












Appendix 9

Child:

• Oppose (O) • Or Not (N)	• Simple (S), • Extended (E), • Justification (J) • Or Resolution (R)	• Aggressive action (AA), • Aggressive speech (AS), • Non-aggressive action (NA) • Or no action (X)

Appendix 10

Information letter for parents

Birgit Schröter
Postgraduate Student
Department of Psychology
The University of Strathclyde
Graham Hills Building
40, George Street
Glasgow
G1 1QE
0141-548 4756
birgit.schroeter@strath.ac.uk

Study on children's reasoning skills in discussions

Dear Parent,

I am writing to inform you about a study, which will be conducted at your child's school during the course of 2003. The study will be conducted in two stages, the first stage commencing in May 2003, the second stage following in October/November 2003.

The study, which will be conducted by myself, a doctoral student in Developmental Psychology, under the supervision of Professor Christine Howe, Department of Psychology at the University of Strathclyde in Glasgow, focuses on children's reasoning skills during discussion with their peers.

Discussions between children are an important component of the 5-14 national guidelines. They have been shown to be beneficial for both social and cognitive development, and psychologists aiming to understand children's language and social development are very interested in investigating these topics in greater depth

The study will examine the relationship between temperament, social relations and discussion skills, and look at how the form of discussion varies according to different group contexts. The study will involve interviewing the children and videotaping them while they undertake simple tasks such as sorting a picture story into the right order, in groups of three. The time spent with each child will be ca. 30 minutes maximum. The same procedure will be followed for the second stage of the study.

The study is approved by the school and the local authority. All information obtained from the study will be treated with absolute confidentiality. The identity of the children will only be revealed to my supervisor and myself. Furthermore, you have the right to withdraw your child from the study at any given time. Department of Psychology and British Psychological Society ethical guidelines and procedures will be followed during all phases of the research.

If you do **not** wish for your child to participate in the study, please indicate this choice on the attached consent form.

As part of the study, I need to gain some understanding of your child's temperament. **I would therefore be very grateful if you could complete the attached Child Behaviour Questionnaire (CBQ).** The CBQ is a standardised tool developed by psychologists in order to assess varying aspects of child behaviour. The completion of the questionnaire should take no longer than 10 minutes. I would be very grateful if you could complete the questionnaire and post it back within a week of receipt in the stamped self-addressed envelope attached. As a thank you for completing and returning the questionnaire, you will receive a portrait photograph of your child.

I do hope that you will be willing for your child to participate in the research. If you have any queries, please to not hesitate to call either myself, Birgit Schröter, on 0141-548 4756 or my supervisor, Professor Christine Howe on 0141 548 2575 (Fax: 0141 548 4001)

Yours Sincerely

CONSENT FORM

To be completed by the child's parent or guardian

This form should only be completed and returned if you are **UNWILLING** to have your child participate in the research described in the attached letter. If you do not complete and return the form this will be taken as implying that you wish your child to participate in the study.

Only complete and return this form if you **DO NOT** whish your child to participate in the research study

I (insert your name).....

Being the (insert your relationship to the child, e.g. mother/father/guardian).....

Of (insert the name of child).....

Attending (insert class).....

Of (insert name of school).....

Do not give permission for my child to participate in the research study described in the letter attached.

Signature: Date:

Consent Form (16.5.03)

To be completed by the child's parent or guardian.

I (insert your name) _____

Being the (insert your relationship to child) _____

Of (insert name of child) _____

Attending (insert class) _____

Of (insert name of school) _____

* I Do/Do not give permission for my * son/daughter to take part in the research study described in previously received literature.

* Please delete as appropriate.

Signature _____ Date _____

Appendix 11

Simple oppositions

		Ravens	Story	Free play 1	Free play 2	Classroom
Ravens	Pearson Correlation		.316	.291	.197	-.019
	Sig.		.000	.000	.009	.804
Story	Pearson Correlation	.316		.186	.043	.006
	Sig.	.000		.014	.572	.939
Free play 1	Pearson Correlation	.291	.186		.268	-.015
	Sig.	.000	.014		.000	.845
Free play 2	Pearson Correlation	.197	.043	.268		.078
	Sig.	.009	.572	.000		.309
Classroom	Pearson Correlation	-.019	.006	-.015	.078	
	Sig.	.804	.939	.845	.309	

Simple non-oppositions

		Classroom	Story	Ravens	Free play 1	Free play 2
Classroom	Pearson Correlation		.042	-.021	.064	-.047
	Sig.		.585	.787	.403	.542
Story	Pearson Correlation	.042		.278	.361	.114
	Sig.	.585		.000	.000	.133
Ravens	Pearson Correlation	-.021	.278		.475	.108
	Sig.	.787	.000		.000	.158
Free play 1	Pearson Correlation	.064	.361	.475		.293
	Sig.	.403	.000	.000		.000
Free play 2	Pearson Correlation	-.047	.114	.108	.293	
	Sig.	.542	.133	.158	.000	

Extended oppositions

		Classroom	Story	Ravens	Free play 1	Free play 2
Classroom	Pearson Correlation		-.031	.027	.106	.078
	Sig.		.684	.726	.166	.308
Story	Pearson Correlation	-.031		.090	.232	-.138
	Sig.	.684		.240	.002	.070
Ravens	Pearson Correlation	.027	.090		.046	.338
	Sig.	.726	.240		.549	.000
Free play 1	Pearson Correlation	.106	.232	.046		.100
	Sig.	.166	.002	.549		.189
Free play 2	Pearson Correlation	.078	-.138	.338	.100	
	Sig.	.308	.070	.000	.189	

Extended non-oppositions

		Classroom	Story	Ravens	Free play 1	Free play 2
Classroom	Pearson Correlation		.064	.046	-.019	.022
	Sig.		.404	.550	.805	.769
Story	Pearson Correlation	.064		.477	.052	-.217
	Sig.	.404		.000	.498	.004
Ravens	Pearson Correlation	.046	.477		.063	-.286
	Sig.	.550	.000		.410	.000
Free play 1	Pearson Correlation	-.019	.052	.063		.371
	Sig.	.805	.498	.410		.000
Free play 2	Pearson Correlation	.022	-.217	-.286	.371	
	Sig.	.769	.004	.000	.000	

Oppositional justifications

		Classroom	Story	Ravens	Free play 1	Free play 2
Classroom	Pearson Correlation		.057	.181	-.040	.014
	Sig.		.452	.017	.601	.857
Story	Pearson Correlation	.057		.396	-.206	-.152
	Sig.	.452		.000	.007	.046
Ravens	Pearson Correlation	.181	.396		-.247	-.143
	Sig.	.017	.000		.001	.060
Free play 1	Pearson Correlation	-.040	-.206	-.247		.306
	Sig.	.601	.007	.001		.000
Free play 2	Pearson Correlation	.014	-.152	-.143	.306	
	Sig.	.857	.046	.060	.000	

Non- oppositional justifications

		Classroom	Free play 1	Free play 2	Story	Ravens
Classroom	Pearson Correlation		-.094	.020	.010	-.054
	Sig.		.217	.795	.899	.478
Free play 1	Pearson Correlation	-.094		.663	.575	.418
	Sig.	.217		.000	.000	.000
Free play 2	Pearson Correlation	.020	.663		.651	.470
	Sig.	.795	.000		.000	.000
Story	Pearson Correlation	.010	.575	.651		.585
	Sig.	.899	.000	.000		.000
Ravens	Pearson Correlation	-.054	.418	.470	.585	
	Sig.	.478	.000	.000	.000	

Resolutions

		Classroom	Free play 1	Free play 2	Story	Ravens
Classroom	Pearson Correlation		.002	-.086	-.066	.003
	Sig.		.983	.262	.390	.964
Free play 1	Pearson Correlation	.002		.157	.146	.942
	Sig.	.983		.039	.054	.000
Free play 2	Pearson Correlation	-.086	.157		.035	.172
	Sig.	.262	.039		.649	.023
Story	Pearson Correlation	-.066	.146	.035		.158
	Sig.	.390	.054	.649		.037
Ravens	Pearson Correlation	.003	.942	.172	.158	
	Sig.	.964	.000	.023	.037	

Non-aggressive action

Correlations

		Free play 1	Story	Ravens	Free play 2	Classroom
Free play1	Pearson Correlation		.593	.606	.248	-.033
	Sig.		.000	.000	.001	.670
Story	Pearson Correlation	.593		.561	.055	-.074
	Sig.	.000		.000	.473	.335
Ravens	Pearson Correlation	.606	.561		.123	-.027
	Sig.	.000	.000		.106	.721
Free play 2	Pearson Correlation	.248	.055	.123		.009
	Sig.	.001	.473	.106		.905
Classroom	Pearson Correlation	-.033	-.074	-.027	.009	
	Sig.	.670	.335	.721	.905	

No action

Correlations

		Free play 1	Story	Ravens	Free play 2	Classroom
Free play1	Pearson Correlation		.620	.370	.457	-.105
	Sig.		.000	.000	.000	.168
Story	Pearson Correlation	.620		.415	.467	-.094
	Sig.	.000		.000	.000	.217
Ravens	Pearson Correlation	.370	.415		.384	-.083
	Sig.	.000	.000		.000	.274
Free play 2	Pearson Correlation	.457	.467	.384		-.034
	Sig.	.000	.000	.000		.657
Classroom	Pearson Correlation	-.105	-.094	-.083	-.034	
	Sig.	.168	.217	.274	.657	

Aggressive action

		Free play 1	Story	Ravens	Free play 2	Classroom
Free play1	Pearson Correlation		.006	.024	.178	.238
	Sig.		.938	.749	.019	.002
Story	Pearson Correlation	.006		.574	.260	.056
	Sig.	.938		.000	.001	.460
Ravens	Pearson Correlation	.024	.574		.111	.081
	Sig.	.749	.000		.144	.289
Free play 2	Pearson Correlation	.178	.260	.111		.008
	Sig.	.019	.001	.144		.918
Classroom	Pearson Correlation	.238	.056	.081	.008	
	Sig.	.002	.460	.289	.918	

Aggressive speech

		Free play 1	Ravens	Free play 2	Classroom
Free play1	Pearson Correlation		-.014	-.008	-.012
	Sig.		.859	.914	.879
Ravens	Pearson Correlation	-.014		.383	-.014
	Sig.	.859		.000	.859
Free play 2	Pearson Correlation	-.008	.383		-.008
	Sig.	.914	.000		.914
Classroom	Pearson Correlation	-.012	-.014	-.008	
	Sig.	.879	.859	.914	

Appendix 12

		A/F	IC	IM	Popularity t1	Popularity t2	Complex non-oppositions	Mixed communication
A/F	Pearson Correlation		-.361	.223	-.082	-.049	.029	.128
	Sig.		.000	.003	.283	.520	.705	.091
IC	Pearson Correlation	-.361		-.407	.241	.260	-.016	-.010
	Sig.	.000		.000	.001	.001	.834	.893
IM	Pearson Correlation	.223	-.407		-.194	-.228	-.040	.329
	Sig.	.003	.000		.010	.002	.599	.000
Popularity t1	Pearson Correlation	-.082	.241	-.194		.773	-.029	.051
	Sig.	.283	.001	.010		.000	.707	.505
Popularity t2	Pearson Correlation	-.049	.260	-.228	.773		-.006	.046
	Sig.	.520	.001	.002	.000		.941	.548
Complex non-oppositions	Pearson Correlation	.029	-.016	-.040	-.029	-.006		-.379
	Sig.	.705	.834	.599	.707	.941		.000
Mixed communication	Pearson Correlation	.128	-.010	.329	.051	.046	-.379	
	Sig.	.091	.893	.000	.505	.548	.000	

		A/F	IC	IM	Popularity t1	Popularity t2	Complex communication	Simple communication
A/F	Pearson Correlation		-.36	.223	-.082	-.049	-.002	.113
	Sig.		.000	.003	.283	.520	.974	.139
IC	Pearson Correlation	-.36		-.407	.241	.260	.097	.016
	Sig.	.000		.000	.001	.001	.202	.838
IM	Pearson Correlation	.223	-.41		-.194	-.228	-.103	.333
	Sig.	.003	.000		.010	.002	.175	.000
Popularity t1	Pearson Correlation	-.08	.241	-.194		.773	.028	-.024
	Sig.	.283	.001	.010		.000	.718	.753
Popularity t2	Pearson Correlation	-.05	.260	-.228	.773		.065	-.045
	Sig.	.520	.001	.002	.000		.393	.554
Complex communication	Pearson Correlation	.00	.097	-.103	.028	.065		.042
	Sig.	.974	.202	.175	.718	.393		.583
Simple communication	Pearson Correlation	.113	.016	.333	-.024	-.045	.042	
	Sig.	.139	.838	.000	.753	.554	.583	

Appendix 13

Steps entered

Predictors for popularity at t2

Model 1:	Popularity t1
Model 2:	Popularity t1, Temperament (impulsivity [IM], inhibitory control [IC], anger/frustration [A/F])
Model 3:	Popularity t1, Temperament, Communication (Free play: Simple factor, Complex factor, Task settings: complex non-oppositional factor, mixed factor)
Model 4:	Popularity t1, Temperament, Communication, Temperament x Communication interactions

1. Free play setting

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.595	.597	254.648	1	172	.000
2	.599	.011	1.605	3	169	.190
3	.595	.001	.259	2	167	.772
4	.593	.012	.838	6	161	.542

ANOVA

Model	df	F	Sig.
1	1,172	254.648	.000
2	4,169	65.538	.000
3	6,167	43.395	.000
4	12,161	21.990	.000

Model		Beta	t	Sig.
1	Popularity t1	.773	15.958	.000
2	Popularity t1	.747	14.959	.000
	A/F	.053	1.015	.311
	IC	.072	1.282	.202
	IM	-.066	-1.232	.220
3	Popularity t1	.747	14.898	.000
	A/F	.053	1.010	.314
	IC	.073	1.267	.207
	IM	-.056	-.974	.331
	Complex communication	.032	.664	.507
	Simple communication	-.017	-.323	.747
4	Popularity t1	.747	14.662	.000
	A/F	.071	1.333	.184
	IC	.067	1.119	.265
	IM	-.087	-1.462	.146
	Complex communication	.036	.702	.484
	Simple communication	.007	.124	.902
	IM x complex	.052	.814	.417
	IM x simple	-.016	-.311	.756
	A/F x complex	-.017	-.308	.758
	A/F x simple	-.003	-.060	.952
	IC x complex	-.020	-.293	.770
	IC x simple	-.105	-1.911	.058

2. Task setting

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.595	.597	254.648	1	172	.000
2	.599	.011	1.605	3	169	.190
3	.595	.001	.267	2	167	.766
4	.586	.005	.378	6	161	.892

ANOVA

Model	df	F	Sig.
1	1,172	254.648	.000
2	4,169	65.538	.000
3	6,167	43.402	.000
4	12,161	21.405	.000

Model		Beta	t	Sig.
1	Popularity t1	.773	15.958	.000
2	Popularity t1	.747	14.959	.000
	A/F	.053	1.015	.311
	IC	.072	1.282	.202
	IM	-.066	-1.232	.220
3	Popularity t1	.744	14.763	.000
	A/F	.048	.905	.367
	IC	.066	1.159	.248
	IM	-.079	-1.374	.171
	Complex non-oppositions	.027	.510	.610
	Mixed communincation	.039	.681	.497
4	Popularity t1	.741	14.246	.000
	A/F	.052	.971	.333
	IC	.067	1.108	.269
	IM	-.089	-1.520	.130
	Complex non-oppositions	.039	.696	.488
	Mixed communincation	.054	.914	.362
	A/F x complex	.008	.138	.891
	A/F x mixed	-.010	-.169	.866
	IC x complex	-.081	-1.319	.189
	IC x mixed	-.046	-.675	.501
	IM x complex	.006	.097	.923
	IM x mixed	-.040	-.708	.480

3. Free play setting: Boys

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.626	.630	143.178	1	84	.000
2	.631	.018	1.391	3	81	.251
3	.624	.002	.196	2	79	.822
4	.638	.039	1.531	6	73	.180

ANOVA

Model	df	F	Sig.
1	1,84	143.178	.000
2	4,81	37.338	.000
3	6,79	24.464	.000
4	12,73	13.490	.000

Model		Beta	t	Sig.
1	Popularity t1	.794	11.966	.000
2	Popularity t1	.744	10.412	.000
	A/F	.039	.568	.572
	IC	.062	.803	.424
	IM	-.111	-1.541	.127
3	Popularity t1	.742	10.155	.000
	A/F	.042	.600	.550
	IC	.075	.921	.360
	IM	-.096	-1.253	.214
	complex communication	-.007	-.099	.921
	simple communication	-.043	-.601	.550
4	Popularity t1	.775	10.152	.000
	A/F	.054	.755	.452
	IC	.083	1.016	.313
	IM	-.128	-1.603	.113
	complex communication	.000	.001	.999
	simple communication	.010	.135	.893
	IM x complex	.194	2.050	.044
	IM x simple	-.109	-1.485	.142
	A/F x complex	.031	.373	.710
	A/F x simple	-.044	-.619	.538
	IC x complex	.042	.414	.680
	IC x simple	-.122	-1.715	.091

4. Task setting: Boys

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.626	.630	143.178	1	84	.000
2	.631	.018	1.391	3	81	.251
3	.630	.008	.881	2	79	.418
4	.643	.038	1.501	6	73	.190

ANOVA

Model	df	F	Sig.
1	1,84	143.178	.000
2	4,81	37.338	.000
3	6,79	25.112	.000
4	12,73	13.785	.000

Model		Beta	t	Sig.
1	Popularity t1	.794	11.966	.000
2	(Constant)		.126	.900
	Popularity t1	.744	10.412	.000
	A/F	.039	.568	.572
	IC	.062	.803	.424
	IM	-.111	-1.541	.127
3	Popularity t1	.747	10.387	.000
	A/F	.025	.360	.720
	IC	.034	.418	.677
	IM	-.137	-1.818	.073
	Complex non-opposition	-.040	-.557	.579
	Mixed communication	.069	.906	.368
4	Popularity t1	.802	10.650	.000
	A/F	.023	.320	.750
	IC	.021	.246	.806
	IM	-.116	-1.454	.150
	Complex non-opposition	-.057	-.743	.460
	Mixed communication	.050	.634	.528
	A/F x complex	-.063	-.736	.464
	A/F x mixed	-.168	-2.158	.034
	IC x complex	-.008	-.092	.927
	IC x mixed	.053	.461	.646
	IM x complex	.092	1.026	.308
	IM x mixed	-.070	-.872	.386

5. Free play setting: Girls

Model	Adjusted R Square	Change Statistics				
		R Square Change	F Change	df1	df2	Sig. F Change
1	.549	.555	107.075	1	86	.000
2	.538	.005	.312	3	83	.817
3	.536	.008	.792	2	81	.457
4	.523	.021	.631	6	75	.705

ANOVA

Mode	df	F	Sig.
1	1,86	07.075	.000
2	4,83	26.360	.000
3	6,81	17.749	.000
4	12,75	8.947	.000

Model		Beta	t	Sig.
1	Poularity t1	.745	10.348	.000
2			-.540	.591
	Poularity t1	.742	9.978	.000
	A/F	.045	.538	.592
	IC	.073	.829	.410
	IM	-.013	-.162	.871
3				
	Poularity t1	.753	9.981	.000
	A/F	.031	.367	.715
	IC	.053	.587	.559
	IM	-.010	-.110	.913
	Complex communication	.094	1.241	.218
	Simple communication	.014	.174	.862
4	Poularity t1	.752	9.634	.000
	A/F	.049	.523	.602
	IC	.049	.499	.619
	IM	.019	.194	.846
	Complex communication	.110	1.359	.178
	Simple communication	-.020	-.224	.823
	IM x complex	-.089	-.918	.362
	IM x simple	.076	.924	.358
	A/F x complex	-.001	-.014	.989
	A/F x simple	.052	.581	.563
	IC x complex	-.074	-.705	.483
	IC x simple	-.041	-.426	.671

6. Task setting: Girls

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.549	.555	107.075	1	86	.000
2	.538	.005	.312	3	83	.817
3	.538	.010	.971	2	81	.383
4	.554	.046	1.487	6	75	.194

ANOVA

Model	df	F	Sig.
1	1,86	107.075	.000
2	4,83	26.360	.000
3	6,81	17.885	.000
4	12,75	10.008	.000

Model		Beta	t	Sig.
1	Popularity t1	.745	10.348	.000
2	Popularity t1	.742	9.978	.000
	A/F	.045	.538	.592
	IC	.073	.829	.410
	IM	-.013	-.162	.871
3	Popularity t1	.754	10.008	.000
	A/F	.030	.354	.724
	IC	.057	.644	.521
	IM	-.008	-.084	.934
	Complex non-oppositions	.100	1.242	.218
	Mixed communication	-.009	-.103	.918
4	Popularity t1	.730	9.662	.000
	A/F	.043	.497	.620
	IC	.070	.772	.442
	IM	.024	.260	.796
	Complex non-oppositions	.177	1.992	.050
	Mixed communication	-.011	-.126	.900
	A/F x complex	.012	.142	.887
	A/F x mixed	.129	1.449	.151
	IC x complex	-.092	-1.046	.299
	IC x mixed	-.167	-1.782	.079
	IM x complex	-.082	-1.067	.289
	IM x mixed	.013	.150	.882

7. Free play setting: Primary 3

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.684	.687	215.523	1	98	.000
2	.685	.010	1.072	3	95	.365
3	.694	.015	2.363	2	93	.100
4	.681	.007	.362	6	87	.901

ANOVA

Mode	df	F	Sig.
1	1,98	15.523	.000
2	4,95	54.803	.000
3	6,93	38.371	.000
4	12,87	18.576	.000

Model		Beta	t	Sig.
1	Popularity t1	.829	14.681	.000
2	Popularity t1	.798	12.978	.000
	A/F	-.010	-.166	.869
	IC	.117	1.716	.089
	IM	.052	.802	.424
3	Popularity t1	.812	13.302	.000
	A/F	.008	.135	.893
	IC	.138	2.012	.047
	IM	.107	1.549	.125
	Complex communication	.047	.844	.401
	Simple communication	-.122	-2.001	.048
4				
	Popularity t1	.800	12.374	.000
	A/F	.022	.353	.725
	IC	.121	1.678	.097
	IM	.091	1.245	.217
	Complex communication	.048	.741	.461
	Simple communication	-.105	-1.628	.107
	IM x Complex	.007	.099	.921
	IM x Simple	-.034	-.535	.594
	A/F x Complex	-.003	-.043	.966
	A/F x Simple	.044	.718	.475
	IC x Complex	-.009	-.121	.904
	IC x Simple	-.082	-1.247	.216

8. Free play setting: Primary 3 boys

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.783	.787	177.295	1	48	.000
2	.770	.001	.100	3	45	.960
3	.784	.022	2.548	2	43	.090
4	.774	.019	.685	6	37	.663

ANOVA

Model	df	F	Sig.
1	1, 48	177.295	.000
2	4,45	41.906	.000
3	6,43	30.709	.000
4	12,37	15.022	.000

Model		Beta	t	Sig.
1	Popularity t1	.887	13.315	.000
2			-.063	.950
	Popularity t1	.871	11.024	.000
	A/F	-.020	-.292	.771
	IC	.032	.364	.718
	IM	-.002	-.025	.980
3	Popularity t1	.868	11.345	.000
	A/F	.000	-.003	.998
	IC	.080	.919	.363
	IM	.065	.806	.425
	Complex communication	-.002	-.024	.981
	Simple communication	-.163	-2.256	.029
4	Popularity t1	.889	10.498	.000
	A/F	.027	.368	.715
	IC	.041	.435	.666
	IM	.016	.172	.864
	Complex communication	-.055	-.651	.519
	Simple communication	-.132	-1.693	.099
	IM x complex	.115	1.175	.247
	IM x simple	-.096	-1.114	.272
	A/F x complex	-.061	-.681	.500
	A/F x simple	.033	.418	.678
	IC x complex	.055	.593	.557
	IC x simple	-.096	-1.085	.285

9. Free play setting: Primary 3 girls

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.494	.504	48.852	1	48	.000
2	.490	.027	.880	3	45	.459
3	.483	.014	.665	2	43	.519
4	.451	.040	.593	6	37	.734

ANOVA

Model	df	F	Sig.
1	1,48	48.852	.000
2	4,45	12.782	.000
3	6,43	8.616	.000
4	12,37	4.360	.000

Model		Beta	t	Sig.
1	Popularity t1	.710	6.989	.000
2	Popularity t1	.712	6.474	.000
	A/F	-.028	-.237	.814
	IC	.175	1.390	.171
	IM	.110	.903	.371
3	Popularity t1	.764	6.387	.000
	A/F	-.014	-.120	.905
	IC	.195	1.527	.134
	IM	.158	1.165	.251
	Complex communication	.118	1.067	.292
	Simple communication	-.049	-.428	.671
4	Popularity t1	.725	5.556	.000
	A/F	.036	.248	.806
	IC	.194	1.328	.192
	IM	.199	1.389	.173
	Complex communication	.125	.997	.325
	Simple communication	-.046	-.372	.712
	IM x complex	-.126	-.888	.380
	IM x simple	.022	.186	.853
	A/F x complex	.061	.425	.673
	A/F x simple	.097	.733	.468
	IC x complex	-.127	-.827	.414
	IC x simple	-.111	-.797	.431

10. Task setting: Primary 3

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.684	.687	215.523	1	98	.000
2	.685	.010	1.072	3	95	.365
3	.686	.007	1.143	2	93	.323
4	.683	.017	.860	6	87	.527

ANOVA

Model	df	F	Sig.
1	1,98	215.523	.000
2	4,95	54.803	.000
3	6,93	37.026	.000
4	12,87	18.777	.000

Model		Beta	t	Sig.
1	Popularity t1	.829	14.681	.000
2	Popularity t1	.798	12.978	.000
	A/F	-.010	-.166	.869
	IC	.117	1.716	.089
	IM	.052	.802	.424
3	Popularity t1	.818	13.011	.000
	A/F	-.004	-.068	.946
	IC	.133	1.903	.060
	IM	.085	1.173	.244
	Complex non-oppositions	.042	.659	.512
	Mixed communication	-.066	-.934	.353
4	Popularity t1	.802	12.192	.000
	A/F	.008	.131	.896
	IC	.126	1.694	.094
	IM	.076	1.023	.309
	Complex non-oppositions	.058	.864	.390
	Mixed communication	-.054	-.733	.465
	A/F x complex	.084	1.324	.189
	A/F x mixed	.047	.708	.481
	IC x complex	-.110	-1.496	.138
	IC x mixed	-.040	-.510	.611
	IM x complex	-.059	-.828	.410
	IM x mixed	-.065	-.926	.357

11. Task setting: Primary three boys

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. (F Change)
1	.783	.787	177.295	1	48	.000
2	.770	.001	.100	3	45	.960
3	.767	.007	.772	2	43	.468
4	.755	.019	.647	6	37	.692

ANOVA

Model	df	F	Sig.
1	1,48	177.295	.000
2	4,45	41.906	.000
3	6,43	27.911	.000
4	12,37	13.591	.000

Model		Beta	t	Sig.
1	Popularity t1	.887	13.315	.000
2	(Constant)		-.063	.950
	Popularity t1	.871	11.024	.000
	A/F	-.020	-.292	.771
	IC	.032	.364	.718
	IM	-.002	-.025	.980
3	Popularity t1	.878	11.013	.000
	A/F	-.016	-.220	.827
	IC	.064	.686	.496
	IM	.033	.398	.693
	Complex non-oppositions	-.089	-1.052	.299
	Mixed communication	-.105	-1.141	.260
4	Popularity t1	.919	10.039	.000
	A/F	.007	.098	.923
	IC	.022	.207	.837
	IM	.033	.359	.722
	Complex non-oppositions	-.115	-1.218	.231
	Mixed communication	-.100	-1.023	.313
	A/F x complex	-.002	-.019	.985
	A/F x mixed	-.039	-.413	.682
	IC x complex	-.059	-.554	.583
	IC x mixed	.044	.377	.708
	IM x complex	.079	.706	.485
	IM x mixed	-.095	-.870	.390

12. Task setting: Primary 3 girls

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.494	.504	48.852	1	48	.000
2	.490	.027	.880	3	45	.459
3	.514	.042	2.100	2	43	.135
4	.541	.080	1.421	6	37	.233

ANOVA

Model	df	F	Sig.
1	1,48	48.852	.000
2	4,45	12.782	.000
3	6,43	9.638	.000
4	12,37	5.812	.000

Model		Beta	t	Sig.
1	Popularity t1	.710	6.989	.000
2	Popularity t1	.712	6.474	.000
	A/F	-.028	-.237	.814
	IC	.175	1.390	.171
	IM	.110	.903	.371
3	Popularity t1	.791	6.786	.000
	A/F	-.037	-.319	.751
	IC	.190	1.532	.133
	IM	.165	1.196	.238
	Complex non-oppositions	.196	1.784	.081
	Mixed communication	-.054	-.431	.669
4	Popularity t1	.700	5.618	.000
	A/F	.002	.019	.985
	IC	.189	1.428	.162
	IM	.181	1.296	.203
	Complex non-oppositions	.268	2.106	.042
	Mixed communication	.013	.100	.921
	A/F x complex	.075	.692	.493
	A/F x mixed	.143	1.117	.271
	IC x complex	-.163	-1.270	.212
	IC x mixed	-.215	-1.542	.131
	IM x complex	-.098	-.836	.409
	IM x mixed	.031	.274	.786

13. Free play setting: Primary 2

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.471	.478	66.039	1	72	.000
2	.505	.054	2.642	3	69	.056
3	.510	.018	1.339	2	67	.269
4	.502	.033	.817	6	61	.561

ANOVA

Model	df	F	Sig.
1	1,72	66.039	.000
2	4,69	19.621	.000
3	6,67	13.655	.000
4	12,61	7.124	.000

Model		Beta	t	Sig.
1	Popularity t1	.692	8.126	.000
2	Popularity t1	.683	8.273	.000
	A/F	.157	1.622	.109
	IC	.050	.512	.611
	IM	-.216	-2.471	.016
3	Popularity t1	.695	8.326	.000
	A/F	.149	1.520	.133
	IC	.020	.195	.846
	IM	-.272	-2.883	.005
	Complex communication	-.027	-.305	.762
	Simple communication	.148	1.636	.106
4	Popularity t1	.710	8.291	.000
	A/F	.136	1.318	.192
	IC	.010	.092	.927
	IM	-.310	-3.161	.002
	Complex communication	.007	.075	.940
	Simple communication	.198	2.017	.048
	IM x complex	.084	.696	.489
	IM x simple	.038	.403	.688
	A/F x complex	-.060	-.532	.597
	A/F x simple	-.133	-1.075	.287
	IC x complex	-.096	-.716	.477
	IC x simple	-.181	-1.537	.130

14. Free play setting: Primary 2 boys

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.315	.335	17.117	1	34	.000
2	.430	.160	3.272	3	31	.034
3	.407	.014	.416	2	29	.663
4	.422	.112	1.127	6	23	.378

ANOVA

Model	df	F	Sig.
1	1, 34	17.117	.000
2	4, 31	7.591	.000
3	6,29	5.009	.001
4	12,23	3.134	.009

Model		Beta	t	Sig.
1	(Constant)		1.067	.294
	Popularity t1	.579	4.137	.000
2	(Constant)		-.165	.870
	Popularity t1	.475	3.598	.001
	A/F	.271	1.649	.109
	IC	.183	1.125	.269
	IM	-.378	-2.796	.009
3	(Constant)		-.086	.932
	Popularity t1	.507	3.578	.001
	A/F	.274	1.630	.114
	IC	.147	.865	.394
	IM	-.408	-2.872	.008
	Complex communication	-.052	-.369	.715
	Simple communication	.132	.907	.372
4	(Constant)		-.215	.832
	Popularity t1	.615	3.772	.001
	A/F	.152	.719	.479
	IC	.284	1.452	.160
	IM	-.388	-2.609	.016
	Complex communication	.010	.055	.957
	Simple communication	.121	.697	.493
	IM x complex	.307	1.230	.231
	IM x simple	-.220	-1.172	.253
	A/F x complex	.096	.288	.776
	A/F x simple	-.194	-.880	.388
	IC x complex	-.124	-.382	.706
	IC x simple	-.087	-.388	.702

15. Free play setting: Primary 2 girls

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.584	.595	52.993	1	36	.000
2	.575	.026	.752	3	33	.529
3	.568	.017	.732	2	31	.489
4	.518	.036	.461	6	25	.831

ANOVA

Model	df	F	Sig.
1	1,36	52.993	.000
2	4,33	13.539	.000
3	6,31	9.123	.000
4	12,25	4.315	.001

Model		Beta	t	Sig.
1	Popularity t1	.772	7.280	.000
2			.237	.814
	Popularity t1	.795	7.317	.000
	A/F	.130	1.064	.295
	IC	-.008	-.060	.952
	IM	-.143	-1.196	.240
3	Popularity t1	.791	7.175	.000
	A/F	.085	.651	.520
	IC	-.081	-.552	.585
	IM	-.191	-1.384	.176
	Complex Communication	.081	.638	.528
	Simple Communication	.119	.943	.353
4	Popularity t1	.806	6.485	.000
	A/F	.142	.920	.366
	IC	-.039	-.196	.846
	IM	-.140	-.780	.443
	Complex Communication	.161	1.019	.318
	Simple Communication	.002	.013	.989
	IM x complex	-.183	-.993	.330
	IM x simple	.150	.927	.363
	A/F x complex	-.109	-.730	.472
	A/F x simple	-.078	-.399	.694
	IC x complex	-.243	-1.218	.235
	IC x simple	-.044	-.227	.822

16. Task setting: Primary 2

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.471	.478	66.039	1	72	.000
2	.505	.054	2.642	3	69	.056
3	.509	.017	1.260	2	67	.290
4	.502	.035	.845	6	61	.541

ANOVA

Model	df	F	Sig.
1	1,72	66.039	.000
2	4,69	19.621	.000
3	6,67	13.600	.000
4	12,61	7.128	.000

Model		Beta	t	Sig.
1	Popularity t1	.692	8.126	.000
2	Popularity t1	.683	8.273	.000
	A/F	.157	1.622	.109
	IC	.050	.512	.611
	IM	-.216	-2.471	.016
3	Popularity t1	.694	8.355	.000
	A/F	.143	1.463	.148
	IC	.044	.452	.652
	IM	-.261	-2.850	.006
	Complex non-oppositions	-.023	-.265	.792
	Mixed communication	.130	1.402	.166
4	Popularity t1	.713	8.300	.000
	A/F	.141	1.398	.167
	IC	.090	.855	.396
	IM	-.275	-2.946	.005
	Complex non-oppositions	.027	.285	.777
	Mixed communication	.166	1.657	.103
	A/F x complex	-.156	-1.417	.162
	A/F x simple	-.119	-1.083	.283
	IC x complex	-.041	-.382	.703
	IC x mixed	-.143	-1.178	.243
	IM x complex	.090	.941	.351
	IM x mixed	-.050	-.544	.588

17. Task setting: Primary 2 boys

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.315	.335	17.117	1	34	.000
2	.430	.160	3.272	3	31	.034
3	.457	.056	1.796	2	29	.184
4	.495	.118	1.360	6	23	.272

ANOVA

Model	df	F	Sig.
1	1,34	17.117	.000
2	4,31	7.591	.000
3	6,29	5.919	.000
4	12,23	3.860	.003

Model		Beta	t	Sig.
1	Popularity t1	.579	4.137	.000
2	Popularity t1	.475	3.598	.001
	A/F	.271	1.649	.109
	IC	.183	1.125	.269
	IM	-.378	-2.796	.009
3	Popularity t1	.513	3.880	.001
	A/F	.213	1.301	.204
	IC	.119	.730	.472
	IM	-.444	-3.248	.003
	Complex non-opposition	-.060	-.444	.661
	Mixed communication	.233	1.723	.095
4	Popularity t1	.731	4.648	.000
	A/F	.080	.428	.672
	IC	.235	1.296	.208
	IM	-.480	-3.099	.005
	Complex non-opposition	-.119	-.597	.556
	Mixed communication	.216	1.512	.144
	A/F x complex	.036	.141	.889
	A/F x mixed	-.351	-2.066	.050
	IC x complex	-.019	-.101	.921
	IC x mixed	-.138	-.434	.668
	IC x complex	-.028	-.120	.906
	IC x mixed	-.178	-1.270	.217

18. Task setting: Primary two girls

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.584	.595	52.993	1	36	.000
2	.575	.026	.752	3	33	.529
3	.548	.000	.004	2	31	.996
4	.505	.044	.549	6	25	.766

ANOVA

Model	df	F	Sig.
1	1,36	52.993	.000
2	4,33	13.539	.000
3	6,31	8.483	.000
4	12,25	4.145	.001

Model		Beta	t	Sig.
1	Popularity t1	.772	7.280	.000
2	Popularity t1	.795	7.317	.000
	A/F	.130	1.064	.295
	IC	-.008	-.060	.952
	IM	-.143	-1.196	.240
3	Popularity t1	.794	7.059	.000
	A/F	.130	.996	.327
	IC	-.010	-.069	.945
	IM	-.140	-1.056	.299
	Complex non-opposition	.004	.034	.973
	Mixed communication	-.008	-.063	.951
4	Popularity t1	.804	6.759	.000
	A/F	.200	1.376	.181
	IC	.050	.322	.750
	IM	-.134	-.878	.388
	Complex non-opposition	.076	.471	.642
	Mixed communication	-.081	-.469	.643
	A/F x complex	-.071	-.456	.652
	A/F x mixed	.139	.725	.475
	IC x complex	-.002	-.014	.989
	IC x mixed	-.211	-1.406	.172
	IM x complex	.011	.088	.930
	IM x mixed	-.003	-.021	.983

19. Classroom observations

Model	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.595	.597	254.648	1	172	.000
2	.599	.011	1.605	3	169	.190
3	.603	.014	1.476	4	165	.212
4	.586	.012	.413	12	153	.957

ANOVA

Model	df	F	Sig.
1	1,172	254.648	.000
2	4,169	65.538	.000
3	8,165	33.876	.000
4	20,153	13.220	.000

Model		Beta	t	Sig.
1	Popularity t1	.773	15.958	.000
2	Popularity t1	.747	14.959	.000
	A/F	.053	1.015	.311
	IC	.072	1.282	.202
	IM	-.066	-1.232	.220
3	Popularity t1	.754	14.715	.000
	A/F	.067	1.269	.206
	IC	.075	1.322	.188
	IM	-.066	-1.237	.218
	Oppositions	-.085	-1.585	.115
	Extended non-oppostions/ no action	.088	1.057	.292
	extended non oppositions /non opositional justifications	-.028	-.359	.720
	Simple non-oppositions	.058	1.113	.268
4	Popularity t1	.753	13.912	.000
	A/F	-.019	-.099	.922
	IC	.084	1.406	.162
	IM	-.070	-1.266	.207
	Oppositions	-.088	-1.538	.126
	Extended non-oppostions/ no action	.103	1.157	.249
	extended non oppositions /non opositional justifications	-.032	-.385	.700
	Simple non-oppositions	.047	.855	.394
	Extended non-oppostions/ no action x A/F	.039	.409	.683
	extended non oppositions /non opositional justifications x A/F	.112	.567	.571
	Oppositions x A/F	.013	.201	.841
	Simple non-oppositions x A/F	-.015	-.253	.801
	Simple non-oppositions x IC	.005	.072	.942
	Simple non-oppositions x IM	.013	.205	.838
	Oppositions x IC	.039	.641	.523
	Oppositions x IM	-.027	-.477	.634
	Extended non-oppostions/ no action x IM	-.047	-.454	.650
	Extended non-oppostions/ no action x IC	-.100	-1.019	.310
	extended non oppositions /non opositional justifications x IC	.078	.892	.374
	extended non oppositions /non opositional justifications x IM	.030	.297	.767

Appendix 14

Correlations

		A/F	IC	IM	Popularity t1	Popularity t2	Simple non-oppose	Extended non-oppose	Justify non-oppose	Resolve	Simple oppose	Extended oppose	Justify oppose
A/F	Pearson Correlation		-.361	.223	-.082	-.049	-.074	-.084	-.043	-.039	.128	.036	.070
	Sig.		.000	.003	.283	.520	.329	.271	.572	.611	.093	.641	.358
IC	Pearson Correlation	-.361		-.407	.241	.260	.027	-.060	.087	-.035	-.020	.013	.047
	Sig.	.000		.000	.001	.001	.719	.434	.254	.643	.793	.864	.535
IM	Pearson Correlation	.223	-.407		-.194	-.228	-.013	.008	-.046	.070	.000	.024	.093
	Sig.	.003	.000		.010	.002	.860	.914	.548	.356	.995	.756	.222
Popularity t1	Pearson Correlation	-.082	.241	-.194		.773	.029	-.035	.118	.055	.071	-.033	-.179
	Sig.	.283	.001	.010		.000	.706	.648	.122	.472	.351	.667	.018
Popularity t2	Pearson Correlation	-.049	.260	-.228	.773		.100	-.007	.071	-.032	.011	-.057	-.176
	Sig.	.520	.001	.002	.000		.189	.928	.353	.676	.890	.454	.020
Simple non-oppose	Pearson Correlation	-.074	.027	-.013	.029	.100		-.117	-.041	-.054	-.017	-.061	-.151
	Sig.	.329	.719	.860	.706	.189		.125	.593	.476	.828	.427	.047
Extended non-oppose	Pearson Correlation	-.084	-.060	.008	-.035	-.007	-.117		.117	-.026	-.070	.197	.079
	Sig.	.271	.434	.914	.648	.928	.125		.124	.733	.359	.009	.302
Justify non-oppose	Pearson Correlation	-.043	.087	-.046	.118	.071	-.041	.117		-.060	-.139	.039	.081
	Sig.	.572	.254	.548	.122	.353	.593	.124		.430	.068	.607	.287
Resolve	Pearson Correlation	-.039	-.035	.070	.055	-.032	-.054	-.026	-.060		.060	.043	.040
	Sig.	.611	.643	.356	.472	.676	.476	.733	.430		.432	.571	.600
Simple oppose	Pearson Correlation	.128	-.020	.000	.071	.011	-.017	-.070	-.139	.060		.264	.097
	Sig.	.093	.793	.995	.351	.890	.828	.359	.068	.432		.000	.205
Extended oppose	Pearson Correlation	.036	.013	.024	-.033	-.057	-.061	.197	.039	.043	.264		.324
	Sig.	.641	.864	.756	.667	.454	.427	.009	.607	.571	.000		.000
Justify oppose	Pearson Correlation	.070	.047	.093	-.179	-.176	-.151	.079	.081	.040	.097	.324	
	Sig.	.358	.535	.222	.018	.020	.047	.302	.287	.600	.205	.000	