COGNITION IN INTER-GROUP RELATIONS : THE EFFECT OF GROUP MEMBERSHIP ON THEORY OF MIND AND ITS PRECURSORS

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Abstract

Social categorization based on group membership has a significant and broad influence on behaviour (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). People perceived as being of the same group, ‘in-group’ members, are accorded all kinds of special treatment, such as the tendency to reward them over out-group members (Tajfel, Billig, Bundy, & Flament, 1971). At the other extreme is denigration based solely on a person’s status as ‘out-group’ member, sometimes even to the point of perceiving that person as less human than fellow in-group members, a phenomenon termed dehumanisation (Leyens et al., 2001). Historic examples of dehumanisation are abundant, such as the extermination of Jews in Nazi Germany. What is less well understood, however, are the cognitive processes involved in these inter-group phenomena. How can a normal human being, with fully functioning cognitive faculties, come to not only view another person as sub-human but also to act on such irrational beliefs?

One cognitive ability that, according to theory, plays a pivotal role in every human social interaction is the ability to attribute mental states to others, which enables humans to construct a theory of the minds they interact with. Having a ‘theory of mind’ allows an individual to interpret and predict behaviour in terms of underlying mental states (Premack & Woodruff, 1978). It is widely acknowledged that theory of mind is of fundamental importance to human social interactions (Baron-Cohen, Tager-Flusberg, & Cohen, 2000). For example, the ability to understand others’ intentions and goals allows humans to participate in collaborative action with shared ends, a hallmark capacity required for human social structures such as governments and economic systems (Tomasello, Carpenter, Call, Behne, & Moll, 2005). Given the importance of theory of mind to daily human life, a critical

question thus is when and how theory of mind is actually used, especially in inter-group contexts such as those previously mentioned. While the developing, abnormal, and non-human theory of mind have been thoroughly investigated, much less is known about how normal adults deploy their theory of mind in actual social situations, including in situations of inter-group conflict.

The present thesis has the primary aim of understanding how group membership affects the quotidian functioning of theory of mind and the social cognitive abilities that form its foundation, representation of intentionality and more basic processes of social learning. To this end, I will examine the effects of group membership on normal adults' theory of mind usage (study 1). I will then go on to look at the deeper effects of group membership on social cognition, particularly its effect on some of the building blocks of theory of mind, representation of intentionality and basic social learning. To this end, I will first look at how intentionality is represented as a function of a person's group membership with and without social competition (studies 2 & 3), and on how perceptions of group membership and social power impact basic social learning processes (studies 4 & 5). This process will elucidate the degree to which social cognition processes, from theory of mind down to its basic cognitive roots, are affected by perceptions of group membership. A secondary goal is to generate more informed hypotheses about the nature of the cognitive mechanisms underlying group-based social phenomena, such as dehumanisation.

Contents

Chapter 1

Introduction

Inter-group Relations

Group membership can make people do funny things. The vast implications of this very simple statement become obvious when one compares the different behaviour that takes place on one particular Tuesday every spring on different sides of the Atlantic Ocean. The Tuesday before the start of the season of Lent, or Mardi Gras as it is known in the Americas, is celebrated by the convergence of thousands of people on various cities, dressed in a variety of ostentatiously coloured, rather minimal costumes, followed by the excessive consumption of alcohol and corresponding displays of wild abandon. The highlight of that same day on the other side of the ocean in Britain, there known as Shrove Tuesday, is a meal of pancakes, possibly with sugar on top. This profound difference in behaviour is just one example of how group membership can lead to different normative behaviour (Abrams & Hogg, 1990). This example is a fairly innocuous consequence of group membership. At worst in this case, someone shows up for a pancake meal entirely too scantily-clad. However, there exists a vast range of behavioural effects stemming from categorisation based on group membership, which in their most extreme can extend to the exclusion and even destruction of whole populations.

Categorisation

Group membership both stems from and is a product of people's inherent tendency to categorise themselves and others along social lines (Turner et al., 1987). This tendency to divide the social world is thought to be based, very generally speaking, on both perceived similarities and differences to one's own group. Individuals perceived as sufficiently similar and minimally different to one's self and group are categorised as 'in-group', whereas the opposite is true for people perceived as sufficiently dissimilar, who are categorised as 'out-group' (Tajfel, 1978). The perception of similarity and difference can be in relation to any number of categories, depending on what is salient in any given moment. For instance, at a march for religious freedom the category of religion may be more important than other factors such as gender or age, meaning that marchers would categorise and then interact with others as Christian or Atheist sooner than as male or female. Whatever the context, this tendency to classify people as 'in' or 'out' persists throughout social situations.

The range of behavioural consequences that stem from such simple categorisation is vast. It has been argued that identification with one's own group enhances self-esteem, which explain peoples' need to believe in the superiority of one's own group and the related consequences, including conflict with other groups who also maintain the same belief in their own superiority (Tajfel, 1982). While conflict is not the only outcome of categorisation, it is a common consequence of categorisation, and as such is probably an important foundation of many behavioural effects leading from categorisation.

For instance, at the most basic end of the spectrum, even membership in artificially formed groups that are based on totally arbitrary categories and made up of members who have never seen each other can have a profound impact on behaviour. For instance, when Tajfel and colleagues experimentally formed groups based on supposed preference for different painters (which were in actual fact based on random assignment), participants who were allowed to dole out rewards favoured others solely on the basis of their status as in-group as perceived via these artificial categories, and they attempted to punish out-group members by withholding rewards (Tajfel et al., 1971). Artificially created groups can also lead people to physically approach in-group members more and avoid out-group members (Novelli, Drury, & Reicher, 2010b). On a functional level, being able to categorise people based on real-life group memberships can be highly useful, as it is likely to promote both social stability and collective action by solidifying the relationships between those identified as in-group (Drury & Reicher, 2000; Kelly, 1993).

Categorisation-based Conflict

In its more ruthless guise, however, group categorisation can have more devastating effects. In its most extreme, history provides evidence of how perceived group differences can lead to aggression and even genocide, the suffering inflicted on Jews in Nazi Germany solely because of their religious identity being a prime example. The group-based discrimination of the Jews took many forms. As described by one survivor of the Auschwitz death camp, Primo Levi, he was stripped of his clothes and made to stand for inspection, which made him feel like he no longer perceived himself as a human being, but instead as a worm (Levi, 1989). He goes on to quote one of his captors, who was in the process of assessing him for work, as saying of him, "This something in front of me belongs to a species which it is obviously opportune to suppress" (Levi, 1986, p. 106).

Dehumanisation

While these illustrations from Nazi Germany may be timeworn, our understanding of the psychological underpinnings of these phenomena is not. Only recently have the psychological processes that both instigate and facilitate such inter-group conflict begun to be studied. For instance, we now know that the psychological 'dehumanisation' of out-group victims underlying these phenomena plays a significant role during periods of ethnic conflict, war, and even genocide. (For a review of dehumanisation processes see Haslam, 2006). A common strategy in these situations is to decrease others perceived humanity by likening them to non-human entities, particularly animals in the case of inter-group conflict, which is likely to facilitate less than human treatment (Haslam, Loughnan, Kashima, & Bain, 2008). The functionality of dehumanisation was overtly admitted to by Franz Stangl, commandant of the Treblinka death camp in Poland during World War II. In an interview after the war he was asked why, if killing the Jews was the object, he bothered to train his troops to degrade and humiliate them first. His response was, "To condition those who actually had to carry out the policies. To make it possible for them to do what they did", p.101 (Serreny, 1974).

However, there is also evidence that dehumanisation occurs also outside inter-group conflict. Mere categorisation of others as in-group or out-group alone can be sufficient to induce a process originally termed 'infra-humanisation', which is the foundation of dehumanisation (Leyens, 2009). At a cognitive level, once someone is perceived to be sufficiently different to oneself and one's group, people have a tendency to both categorise them as 'out-group' and then to subsequently deny them uniquely human characteristics, such as complex emotions and intelligence (Leyens et al., 2001). In a series of experiments, Leyens and colleagues showed that, simply on the basis of belonging to a different ethnic group, people attributed fewer 'secondary' (or more complex, uniquely human) emotions such as envy and pride, and intelligence to members of other groups (Leyens et al., 2000). This type of infra-humanisation occurs in conflict alongside dehumanisation. Research has shown that perpetrators of crimes against an entire out-group even infra-humanise their victims and then go on to dehumanise them by explicitly viewing them as less human than members of their own group (Castano & Giner-Sorolla, 2006). Gender also plays a role in dehumanisation. Sexualised women are viewed as less human, in that both men and women implicitly associate them with more animalistic words and less human words compared to sexualised men (Vaes, Paladino, & Puvia, 2011). Furthermore, dehumanisation seems to promote active discrimination against the out-group, in that people have been shown to help out-groupers less the more they are dehumanised (Vaes, Paladino, Castelli, Leyens, & Giovanazzi, 2003).

This evidence of dehumanisation in inter-group situations chimes with both historical and present day evidence of inter-group conflict touched on earlier. For instance, to go back to the previously raised issue of the treatment of Jews in Nazi Germany, dehumanisation was a clear and overt tactic used by the guards, for instance, by Franz Stangl in his descriptions of how he treated prisoners (Serreny, 1974), and even felt by the prisoners themselves , as when Primo Levi describes how such treatment made him feel like a lesser animal (Levi, 1986). As a death camp survivor, Levi seeks to raise awareness of dehumanisation arising in these types of inter-group situations in order to avoid their potentially lethal paths. He starts his book with a powerful plea:

> "You who find, returning in the evening,
> Hot food and friendly faces:
> Consider if this is a man
> Who works in the mud
> Who does not know peace
> Who fights for a scrap of bread
> Who dies because of a yes or no…" (p. 11).

Levi enjoins his readers to consider the relationship between what we today call dehumanisation and the consequently too-easily justified inhumane treatment that can follow. Despite this plea, these phenomena continue to repeat themselves. From accounts of the abuse Iraqi prisoners of war suffered at Abu Graib, we see that present-day soldiers still refuse to view their victims as human in certain situations (Post & Panis, 2011). While categorisation into different social groups does not inevitably lead to conflict and dehumanisation, both recent history and current-day events suggest that out-group derogation is still all too common a consequence of mere categorisation. In many cases then, dehumanisation is powerful, predictable and seemingly pervasive in such inter-group situations.

Remaining Questions

While dehumanisation is well documented, the fundamental cognitive processes underlying it remain unclear. We know that some situations lead people to deny humanity to others, but what happens cognitively in these cases? How can cognitively normal adults be driven to perceive other humans as non-human? That is, do normal adults sometimes actively refuse to view certain people as human, or instead, do they simply fail to attend to what would constitute humanity, such as mental, emotional, and cognitive states, in these people?

A natural start to address this question seems to be one cognitive mechanism that all normal adults share: theory of mind. Having a theory of mind means, simply, being able to understand others' mental states. According to accepted theory, all normal adults have, and use, a theory of mind. So how can these cognitively normal adults with a working theory of mind engage in the types of inter-group behaviours described above? The next section will detail what we know about theory of mind, which will help us begin to address this question.

Theory of Mind

As a concept, 'theory of mind' burst onto the academic scene in the 1970**'s,** introduced by researchers of primate cognition who asked the question, 'Does the chimpanzee have a theory of mind?' (Premack & Woodruff, 1978). With their seminal paper, Premack and Woodruff sought to understand whether a chimpanzee would, like a human, impute mental states to others, thereby giving evidence that they had a 'theory' of another's mind. The researchers presented a chimpanzee, 'Sarah', with videos of a person confronted with unsolved physical problems (e.g., food out of reach) and then gauged the chimpanzee's choice of suitable solutions to the person's problem from a range of photographs (e.g., a picture of a stick as a solution to the inaccessible bananas). Sarah consistently chose the photograph depicting the correct solution to each physical problem presented in the videotape. Given the novel nature of the problems Sarah was presented, Premack and Woodruff ruled out associationist explanations of these results (e.g. that Sarah had chosen the correct solution only because past experience had taught her that 'inaccessible bananas' can be remedied with 'stick'). They concluded that, somewhat like a human, Sarah too must have understood not only the physical structure of the problems inherent in these tasks but also one particular aspect of the human protagonist's mental state: his intent. It seemed that Sarah had some rudimentary theory of mind.

The conclusions, and moreover the notion that an animal may actually conceive of others' minds, were both ground-breaking and controversial. Not surprisingly, the study sparked an explosion of research into human and non-human theories of mind. As a result, it is now widely thought that theory of mind is probably one of the most fundamental, crucial cognitive skills for successful functioning in a social society (Saxe & Kanwisher, 2003). To be able to understand another person's behaviour in terms of the mental states that produced it (e.g. beliefs, desires, intentions) allows us to better predict what that person will do, and to structure our own behaviour accordingly (Keysar, Lin, & Barr, 2003). In the past few decades, researchers the world over have become interested in theory of mind and dedicated themselves to understanding three main facets of the mechanism: its development, its non-human form, and its pathological forms. The knowledge amassed in these areas is considerable and will be discussed in turn, in order to set the stage for the ways in which this concept could be integrated with the study of inter-group relations.

Theory of Mind Development

Developmental research has provided a detailed time-line of the cognitive steps children go through to a fully-developed theory of mind. For a detailed review see Ensink and Mayes (2010). The standard view is that, to begin understanding others' mental states, children typically start by learning about others' intentions. Infants as young as 9 months old behave differently to an adult who is unwilling to help them compared to an adult unable to help them. That is, they react more impatiently to an unwilling adult than a willing adult, indicating that at this early age infants already have some understanding of intention (Behne, Carpenter, Call, & Tomasello, 2005). At 14 months, infants can understand intention in socially relevant gestures, such as pointing and gazing (Carpenter, Nagell, Tomasello, Butterworth, & Moore, 1998). By 18 months a child begins to develop another rudimentary building block of mental representation in the form of pretence, which requires meta-representation, the ability to simultaneously hold mental representations of reality and differences from reality (Leslie, 1987). Around this same age children also start to show an advanced understanding of other people's intentions and desires, as shown when they try to complete a task demonstrated by an adult who attempts but fails to finish it (Meltzoff, 1995).

A further landmark in the development towards an adult theory of mind is the understanding of what others think or believe about the world, an ability that was thought to develop around age three (Wimmer & Perner, 1983). However, recent evidence continues to shift the bar lower, and using specialised looking-time techniques Surian and colleagues have produced evidence that suggests that children as young as 13 months can understand a person's beliefs (Surian, Caldi, & Sperber, 2007). That is, using looking time as a gauge of expectation, the authors showed that infants expected an animal to successfully search for an object only if it had been given prior correct information. An elaboration of this is the ability to understand others' knowledge and desires, which enables the child to deceive others to its own end. While 2-3 year olds can deceive others, only by age 4 do children do so regularly (Sodian, Taylor, Harris, & Perner, 1991).

However, it is not until children can understand that others' beliefs about the world can be wrong, or incorrect, that they reach the crowning achievement of a theory of mind: the understanding that people can hold 'false beliefs'. A now-famous test was designed in the 1980's to assess children's understanding of others' false belief (Wimmer & Perner, 1983). In its more modern form, the 'Sally-Anne Test', the task involves predicting where a character in a vignette, Sally, will look for an item after Anne secretly moves it from the place Sally had originally hidden it (Baron-Cohen, Leslie, & Frith, 1986). Success on this task involves understanding that Sally now holds a 'false belief' about where the object is located, and that she will therefore look in the *wrong* place for the object. The reason this simple task is difficult for the developing theory of mind is that it involves an understanding that belief does not necessarily correspond to reality, and the cognitive ability to simultaneously represent these two very different states.

For some time, accepted wisdom held that children developed a full-blown theory of mind around age four, as most children passed this false-belief litmus test at this age (Alison & Astington, 1988; Baron-Cohen, Leslie, & Frith, 1985). However, one of the issues surrounding the Sally-Anne task is the fact that it can only test for false belief understanding in linguistically developed children, and hence depends on other executive functions besides mental state comprehension. A non-verbal experimental paradigm was therefore designed by Tomasello and Call to assess false belief understanding in pre-linguistic children. This non-verbal task allowed a child to either use or disregard information given by an adult with a false belief when searching for a hidden reward. Results from this study showed that children's abilities correlated with their abilities on verbal false belief tests (Call & Tomasello, 1999). That is, four year olds failed to correctly use information from an adult who held a false belief whereas five year olds succeeded.

However, more recent research with refined methods endeavours to continually shift the bar even lower. Two and a half year old children can pass non-verbal false belief tests if they are allowed to spontaneously respond rather than subjected to direct questioning (He, Bolz, & Baillargeon, 2012). Moreover, children as young as 18 months have shown evidence of false belief understanding in a helping situation (Buttelmann, Carpenter, & Tomasello, 2009). Using an elegant behavioural paradigm, Buttelmann and colleagues showed that, when asked to help an adult, young children could use both the adult's true and false belief about the location of an object to infer the adult's goal and offer the appropriate help. Together, what these studies show is that children's abilities to pass false belief tests depend on the nature of the problem they are presented with and the nature of the responses required: for instance, paradigms using implicit measures like looking time may well require simpler levels of understanding. In any case, regardless of the youngest possible age at which children can pass false belief tests, theory of mind abilities relating to the understanding of all mental states continue to develop throughout childhood and they dramatically improve with time until they level out around age 7, as shown by a recent meta-analysis (Wellman, Cross, & Watson, 2001).

Using a more ethological approach, much research into the child's developing theory of mind has been carried out via analysis of children's developing speech (Bretherton, 1991; Bretherton, McNew, & Beeghly-Smith, 1981). For instance, Shatz and colleagues analysed children's natural conversations for the spontaneous use of mental state verbs (e.g., think, know, understand) (Shatz, Wellman, & Silber, 1983). They showed that, between the ages of

2 and 3, children's use of mental state verbs increased from 1% of total utterances to 8%, with idiomatic usage of the verb 'know' in the form 'I don't know' first appearing at 2 years, 2 months and more complex mental state representations (e.g. 'she knows') appearing at approximately 2 years, 8 months.

Considerable argument surrounds the debate on the processes by which children actually develop a theory of mind, particularly whether children use themselves as a template when considering others' mental states (Carruthers & Smith, 1996). Two major theoretical positions have emerged from this debate. In brief, 'simulation theorists' hold that children simulate others' mental worlds by using their own as a template (Gordon, 1986), while 'theory theorists' hold that children engage in a working process to build a model of other minds piece by piece based on each instance of mental state reference, which allows for correction to the model as evidence presents itself (Gopnik & Wellman, 1992). The current neurological empirical evidence suggests that, most likely, simulation is at the basis of the process, as goal-related actions are coded for by mirror neurons, that is, in both observation and action (Gallese & Goldman, 1998), but that on top of this more complex 'theories' of other minds are then built (Gallese, 2007).

Animal Theories of Mind

Regarding the question originally posed, 'Does the chimpanzee have a theory of mind' (Premack & Woodruff, 1978), we may be no nearer an answer than at its outset. The biggest problem facing researchers of animal theories of mind results from having to deal with non-linguistic subjects. The task then becomes teasing apart whether an animal is aware of and responding to another animal's behaviour versus its underlying mental states that could be driving that behaviour. The details of the debate on whether any non-human animal does indeed possess a theory of mind have been nicely summarised by Heyes (1998), who argues that, parsimony notwithstanding, evidence is not present to ascribe any non-human a theory of mind.

It is now generally accepted that non-human primates do not have a full-blown theory of mind. While chimpanzees, our closest non-human primate relative, can understand what another chimpanzee knows, they cannot understand what another believes and therefore they fail non-verbal false belief tests (Call & Tomasello, 1999; Kaminski, Call, & Tomasello, 2008). However, this is not to say that they do not have sophisticated and complex social cognition abilities that would amount to precursors of a complete theory of mind. For instance, apes can use ‘social abstraction’ to categorise behaviours they encounter, which is possibly useful in forming rudimentary ideas about basic mental states (Call, 2003). Chimpanzees also follow each other’s gaze (Tomasello, Call, & Hare, 1998), and they can use this ability to understand that ‘seeing’ leads to ‘knowing’ (Hare, Call, & Tomasello, 2001). In the latter study, Hare and colleagues developed an elegant non-linguistic paradigm using pairs of chimpanzees that pitted a subordinate and a dominant against each other in a competitive situation. In the experiment, the subordinate individual was allowed to choose between two food rewards, one that the dominant could see and one that the dominant could not see. When given first choice, the subordinate preferentially chose food that the dominant could not see. This behavioural reaction to what another individual can and cannot see, and therefore knows about, has been interpreted as an indication that chimpanzees do have some appreciation of mental states, even if they do not pass the false-belief test commonly used as a litmus test for a full-blown theory of mind (Hare et al., 2001).

Most strikingly, though, there is little doubt that chimpanzees possess the cornerstone of theory of mind, the ability to understand intention (Call & Tomasello, 2008). Amongst other paradigms, this has been shown most convincingly in a simple experiment in which an experimenter gives a chimpanzee the choice to search for rewards in boxes that were intentionally or accidentally marked by an experimenter. Chimpanzees will reliably choose boxes that were intentionally marked, thus indicating that our closest living relative in the animal kingdom shares our capacity to interpret behaviour as driven by intentions, which requires an understanding of what is in the end an invisible mental state (Call & Tomasello, 1998).

Abnormal Theories of Mind

The third area of theory of mind that has received considerable empirical attention is its pathological forms (for a review see Pisula, 2010). The focus in this area of research is on theory of mind as produced by human brains that have either not developed normally (e.g. autism) or that are characterised by abnormal physiological processes (e.g. lesions or schizophrenia). Although children at the age of 4 pass the standard Sally-Anne test for false belief understanding, autistic children ranging between 6 and 16 years of age continue to have trouble with it (Baron-Cohen et al., 1985; Surian & Leslie, 1999), as do people with different types of schizophrenia (Frith & Corcoran, 1996).

Interestingly, all of these populations also have difficulty inferring intention. For example, schizophrenics cannot infer intentions from cartoon strips (Sarfati, Hardy-Baylé, Besche, & Widlöcher, 1997), and patients with fronto-temporal brain lesions have no understanding of intentions expressed in non-literal ways, such as with irony (Rowe, Bullock, Polkey, & Morris, 2001). Autistic children have similar difficulties in that they fail to interpret story characters' intentions correctly (Happe, 1994) and they have difficulty identifying accidental outcomes as non-intentional (Phillips, Baron-Cohen, & Rutter, 1998). The fact that these difficulties in attribution of intention are coincident with difficulty on the false belief test (which indicates stunted theory of mind) underscores the fact that representation of intention is an essential foundation on which theory of mind is built.

Indeed, it is the understanding of intentionality that provides the basis for understanding other epistemic states, and without it, as these populations demonstrate, theory of mind cannot develop normally.

Precursors of Theory of Mind

The three areas of research detailed above have all informed current thinking about the social cognition skills that provide the foundation for theory of mind. While all the precursors to a theory of mind discussed in this section are necessary to the development of a theory of mind, there is no claim that they are therefore sufficient. For instance, chimpanzees understand each other's behaviour in terms of goals and intentions, which allows them to successfully predict their neighbour's future behaviour, but they do not develop a full-blown theory of mind (Call & Tomasello, 2008). However, from data on developing children, it is clear that an understanding of intention is arguably the most crucial skill on which mental state representation is based (Meltzoff, 1999). With the ability to understand another person's intentions and goals comes the understanding of a host of other mental states (Tomasello, 1999). Once a child understands that other people's behaviour is driven by intention, the child can, quite simply, better understand what a person is doing and then represent other mental states that coincide with the behaviour (Tomasello et al., 2005). The ubiquitous use of such a simple cognitive skill becomes apparent when one considers a basic action such as picking up a glass. Although the physical activity of picking up the glass may look the same in any situation, the intentions of the person picking up the glass will entirely change how the situation is perceived, and what can be gleaned from it in terms of predictable future behaviour. Just for instance, a person could pick up the glass because she is worried about the possible hazards for young children in the vicinity or because she is thirsty and wants to use it. In both cases other mental states may accompany this same action (e.g. anxiety vs. desire) and her subsequent behaviour may look very different (e.g. putting the glass away vs. filling it with liquid).

This ability to mentally represent a person's intent is what allows a person to enter into a purely human state, what Tomasello and colleagues call 'shared intentionality' (Tomasello et al., 2005). Shared intentionality is simply the ability to cooperate based on mutual understanding of individual intention, which forms the bedrock not only of theory of mind, but also of human cultural institutions such as economic systems and government (Tomasello & Carpenter, 2007). Furthermore, with the ability to understand another's intent comes the ability to enter into cognitive processes unique to our species, such as culture and language (Tomasello, 1999). Without the ability to represent intent then, a theory of mind cannot even begin to develop. This is illustrated succinctly by the aforementioned research on the pathologic theory of mind: people who have trouble understanding intent, such as autists and schizophrenics, cannot then develop a normal theory of mind.

Social learning processes also provide vital building blocks required for normal theory of mind development. Social learning is defined as learning via social means, which improves upon individual learning by trial and error in that it is usually faster and more accurate, since it cuts down on the learning of irrelevant or useless information (Heyes, 1994). Social learning includes both higher-level processes that draw on the ability to understand another person's intent, such as imitation, and lower-level processes in which social learning occurs without any representation of others' intent. Basic imitation begins at birth (Soussignan, Courtial, Canet, Danon-Apter, & Nadel, 2011), and develops through to the point at which, around 18 months, infants demonstrate the ability to imitate not just others' actions but the intentions behind their actions. That is, at this age infants can complete a physical problem solving task left unfinished by a demonstrator (Meltzoff, 1995). Furthermore, imitation itself is a key building block of theory of mind (Meltzoff, 2002). The innate ability to imitate provides an infant with an early appreciation that other people are 'like me', and therefore that they will have similar mental states which a child can begin to understand with themselves as a template (Meltzoff, 2007).

Conversely, one social learning mechanism that occurs below the level of representation of intention is stimulus enhancement. Stimulus enhancement is a more simple form of social learning than imitation in that it requires no understanding of intention, and instead, simply the ability to learn something about the environment in response to actions of a social demonstrator (Thorpe, 1963). For instance, using stimulus enhancement, 18-month old infants were able to focus their attention on specific aspects of a box in order to reproduce the target behaviour of pushing or pulling a box lid, although they could not reproduce the same target behaviour when it was modelled in a 'ghost' condition in which the object was automatically manipulated in targeted ways without a social demonstrator (Tennie et al 2006). Stimulus enhancement is one of the most rudimentary building blocks of theory of mind in that it facilitates the perception of other people as socially relevant, from which arises more complex cognition such as representation of intentionality and imitation.

The 'Normal' Theory of Mind

While it is clear that the developing, non-human, and abnormal theory of mind have been extensively explored, much less attention has been devoted to the study of theory of mind itself and how the mechanism is actually used by those lucky enough to develop it correctly. While some researchers have stressed that isolating theory of mind from the social cognitive abilities it is intricately related to cannot provide a complete picture of its functioning (Apperly, 2012), there is nevertheless a dearth of research and knowledge about how theory of mind is actually deployed and some isolation of the mechanism to facilitate this study is needed. Possibly as a result of this lack of research on the normal theory of mind, the default assumption that the ability to represent other minds equates to its automatic deployment in every social situation has somehow evolved (e.g. Senju, Southgate, White, & Frith, 2009). This assumption has permeated work in various related domains. For instance, researchers of empathic accuracy (Ickes, 2003) and autism (Baron-Cohen, 2005), as well as theorists of human cognition (Leslie, German, & Polizzi, 2005; Sperber & Wilson, 2002) have given voice to the pervasive view that a normal adult theory of mind is consistently used and constantly 'switched on'. This assumption is further supported by fMRI studies showing automaticity of action mapping. That is, the same areas of the human brain respond automatically to goal directed actions whether a person observes another person carrying out an act or enacts it out himself (Fadiga, Fogassi, Pavesi, & Rizzolatti, 1995; Frith & Frith, 1999; Ramnani & Miall, 2004). Researchers have used these finding to argue that humans are 'hard-wired' to automatically infer others' mental states when observing their behaviour (Blakemore & Decety, 2001).

This assumption of automatic (i.e. not under conscious control), consistent functioning of theory of mind is the norm to which all developmental trajectories are assumed to head, and from which all variations in mind-reading behaviour are gauged as 'abnormalities'. Most detrimentally, this assumed 'norm' has begun to limit our view of theory of mind abilities and behaviours: we seem to have forgotten that theory of mind has evolved to enable social living, and that therefore theory of mind in its deployment will probably look as varied as the social situations people interact in.

A new body of literature suggests that when looking at the normal functioning of theory of mind assumptions about its consistency may be ill-founded. For instance, children who pass the standard false belief test have even been known to 'fail' the classic Sally-Anne false belief test if the experimenter emphasises the target's motivation to avoid a displaced object (Leslie & Polizzi, 1998). The same test also becomes more difficult with distraction and alterations in mood: participants given a simultaneous verbal distractor task perform worse on the false belief task than those distracted with a non-verbal task (Newton & de Villiers, 2007), while artificially altered moods can also lead people to fail the test (Converse, Lin, Keysar, & Epley, 2008).

Furthermore, other research has shown that theory of mind processing involves effortful cognition rather than automatic processesing. For example, Apperly and colleagues used an interesting paradigm involving unexpected questions during the typical false belief test. If participants were instructed only to track the object's location in a variant of the typical Sally-Ann test, they answered unexpected questions about the target person's beliefs more slowly than questions about the object's actual location, indicating that the target person's belief was not as readily tracked as the object's location (Apperly, Riggs, Simpson, Chiavarino, & Samson, 2006)

Related Processes

In order to begin to strip away the assumptions about how the normal theory of mind might actually function on a daily basis a good starting point is a group of similar cognitive processes, research on which suggests that both social and cognitive factors play a role in processes similar to mental state attribution.

First, there is significant evidence that a person's culture impacts the way he or she perceives other's agency. For instance, cultural anthropology provides evidence that there is a huge variation in the way people and other beings are perceived as a function of their social group. For instance, the Japanese more typically assign agency to another person than to themselves when explaining their own behaviour (Lillard 1998), Africans from nations where pan-psychism predominates assign agency to external, inanimate objects (Skrbina 2003), and

Hindu Indians explain many of their own behaviours in terms of the situation instead of the corresponding mental states (Miller 1984).

Second, a growing area of research has focussed on the impact of social and contextual factors on what different bodies of research have termed ‘perspective taking’. In all, perspective taking behaviours are quite similar to, or else at the basis of, mental state attribution. For instance, in the field of social psychology where perspective taking is understood to mean attempting to understand how another person feels (Ruby & Decety, 2004), we know that actively trying to take another person’s perspective limits the degree to which they are stereotyped and the target of prejudice (Galinsky & Moskowitz, 2000). Active perspective taking in response to overt instructions also increases the stereotypicality of one’s own behaviour which in turn facilitates social bonding (Galinsky, Ku, & Wang, 2005). From the cognitive psychology side, perspective taking, defined broadly as the ability to interpret another’s thoughts and feelings, is frequently an inaccurate process (Epely & Caruso, 2009). Results from one study suggest that perspective taking in social interactions may not be consistent. Using a very elegant paradigm, Keysar and colleagues tracked the eye movements of participants who were asked to hand over a specific object which had two possible referents. The eye-tracking data showed that participants considered even objects the speaker could not see as possible referents of their request, indicating that they did not automatically interpret the speaker’s visual perspective correctly (Keysar, Barr, Balin, & Brauner, 2000). Using the same paradigm another study demonstrated cultural differences in perspective taking: Chinese participants almost never failed to correctly interpret a speaker’s visual perspective, regardless of the speaker’s cultural identity, whereas American participants frequently made mistakes (Wu & Keysar, 2007). Lastly, increased mood in the form of artificially induced happiness also leads to worse performance on this test (Converse et al., 2008)

Third, the person's actual identity may be important in how we consider others' mental states. Thus, it has been found that people ascribe more 'mind' to people they like, as measured by participants' attribution of probable emotions, intentions, and cognition to a character in a story (Kozak, Marsh, & Wegner, 2006), and less 'mind' to people they objectify (Loughnan et al., 2010).

Fourth, cognitive factors are proving to be highly important in how people attempt to infer what another person knows. An entire area of research is devoted to what is termed the 'curse of knowledge', or the idea that people regularly over-impute their own knowledge to other people on no empirical grounds whatsoever. For reviews see Nickerson (1999) and Rozman, Cassidy, and Baron (2003). For instance, people have difficulty interpreting another person's perspective without using their own knowledge as a template, a process termed epistemic egocentrism, e.g.(Fussell & Krauss, 1991; Krauss & Fussell, 1991; Nickerson, Baddeley, & Freeman, 1987). Epistemic egocentrism can lead even highly motivated people to incorrectly predict behaviours in social situations. Keysar and colleagues showed that, in a negotiation situation, simply giving participants more information about the actual worth of a property lead them to misjudge what a buyer would decide to do, even though participants were overtly told that the buyer did not have the same information (Keysar, Ginzel, & Bazerman, 1995).

Lastly is the process of empathy, which is quite similar to perspective taking. Originally defined as the vicarious experiencing of observed emotion (Eisenberg & Strayer, 1987), current thinking holds that empathy has both an affective and cognitive component (Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004). Using a specially developed self-report questionnaire, Baron-Cohen and Wheelwright showed that, compared to cognitively normal adults, adults with both autism and Asperger's have lower empathy abilities (Baron-Cohen & Wheelwright, 2004). The empathizing system that allows for empathic responses augments current theory about understanding other's mental states to include the representation of affect along with cognitive mental states that drive observed behaviours. This is an important distinction, given that the two are conceptually and developmentally separate (Baron-Cohen, 2005).

While none of these studies involves attribution of specific, on-line mental states as such, they all suggest that, when it comes to actually representing another person's mental states, there may be similar variation. For example, variation in understanding another person's visual perspective could not then lead to consistent or accurate inference of subsequent mental states such as knowledge and desire.

While all of these studies were done using paradigms that involved characters in stories or cartoon strips, as opposed to real social interactions, they nevertheless suggest that less than accurate mind reading may underlie these behaviours. At the very least, these studies are highly suggestive that previous assumptions about the consistency and automaticity of theory of mind may not be correct.

For instance, there are patent social aspects of the above-mentioned 'failures' of theory of mind. Just for instance, the over-prediction of behaviours that are normative to a group could aid group stability. The consideration of hidden objects as possible referents of a person's speech could result from a desire to detect deception. These, however, are only possibilities. The possible social situations and pressures affecting our mind reading skills are endless. To determine the social nature of theory of mind and its various social-cognitive building blocks, social factors need to be identified and studied that may moderate, motivate, and change the very way in which we view other minds. In short, we return now to the influence of group membership in order to begin the study of daily theory of mind functioning.

Theory of Mind and Group Categorisation

In light of the current evidence presented on both inter-group processes and theory of mind, it is very likely that group membership plays an important role in how people view other minds. For instance, the literatures on dehumanisation and more complex social phenomena, such as group-based abuse and genocide, suggest that people are simply less interested in the minds of others they perceive to be 'out-group'. Although the social phenomena described in the first section are well and clearly documented, the underlying psychological forces and cognitive processes are much less clear. What is particularly striking is that fact that, in all social situations described in the first section, both naturally experienced and experimentally induced, participants were cognitively normal adults with a fully operating theory of mind. It can be assumed, therefore, that the role played by each person's theory of mind in these situations must be to some degree causally responsible for the observed inter-group behaviour ranging from basic avoidance to derogation and actual abuse. How, then, with a working theory of mind, can people produce or allow situations that lead to the denigration or abuse of another? In interactions with out-group members, specifically those that involve derogation or abuse, do people simply fail to use their theory of mind and therefore fail to form representations of their mental states? Or, alternatively, do they employ their theory of mind but, under pressure from existing social norms, simply fail to show evidence of it, possibly suppressing the representations they have made of others' mental states?

This thesis is designed to begin to answer these questions by describing how group membership affects the functioning of normal theory of mind and its precursors in healthy adults. The effect of group membership on theory of mind and its precursors - representation of intention and social learning – will be examined in five different empirical studies. These five studies gauge the impact of group membership on 1) the normal human adult's theory of mind usage, 2) representation of intentionality, 3) representation of intentionality under varying levels of competition, 4) basic social learning processes, and 5) the impact of social power on basic social learning processes. By examining the impact of these social variables on theory of mind and its precursors, it is hoped that some of the social-cognitive consequences resulting from categorisation will be identified to shed light on the relationship between normal, daily theory of mind processing and group-based social phenomena.

Chapter 2

Methods

Abstract

In the completion of this thesis a variety of methods were employed. The method which was repeatedly used in studies 1 - 4 to artificially create the groups used to study the effect of social categorisation based on group membership was the minimal group paradigm (Tajfel et al., 1971). The minimal group paradigm allowed for the formation of groups based on minimal characteristics in order to assure that aspects such as group histories, inherent prejudices, and implicit associations were not a factor in the present groups' interactions. Each study also employed other methods used to gauge social cognition. Study 1 extended past attempts to analyse speech for the presence of mental state reference, e.g. (Schwanenflugel, Martin, & Takahashi, 1999), and developed a coding system to examine theory of mind usage. Studies 2 and 3 used a joint Simon Task (Sebanz, Knoblich, & Prinz, 2003a) to examine representation of others as intentional agents. Study 3 also employed a manipulation to control for competition. Studies 4 and 5 employed an object-search paradigm to examine stimulus enhancement developed for the current thesis. To provide a background for subsequent chapters, each of these methods will be discussed in turn.

Minimal Group Paradigm

Real-life groups are complex entities with even more complex interaction dynamics. A variety of social factors affect inter-group interactions and can impact on the behaviour of individuals. For instance, long and complex histories of group interaction, e.g. (Stott & Reicher, 1998), inherent power differentials between two established groups (Mullen, Brown, & Smith, 1992), and anxiety associated with some group interactions (Hyers & Swim, 1998) can all change how individuals view and interact with members of other groups. Furthermore, implicit attitudes, defined as behaviours or attitudes that are under automatic control without the actor's awareness, can also influence inter-group behaviour (Greenwald & Banaji, 1995). For instance, past evidence has shown that regardless of their level of self-described prejudice, people react more quickly to own-race categories associated with a positive stimulus than to other-race categories associated with a positive stimulus (Fazio, Jackson, Dunton, & Williams, 1995; Greenwald, McGhee, & Schwartz, 1998).

Minimal group paradigms are used to avoid these and the innumerate other complex social factors that play a role in real-life group interactions. As categorisation alone can produce a bias towards the in-group (Rabbie & Horwitz, 1969), using minimal criteria on which to form groups gives researchers a tool with which participants' group memberships to each other can be controlled in order to isolate the effects of group categorisation (Tajfel et al., 1971). Ostensibly, in the minimal group paradigm, participants are put into categories on the basis of some trivial criterion, such as their ability to estimate the number of dots in a pattern as in this thesis. Such simple criteria gives participants a sufficient sense of the meaningfulness of their group identity which is nevertheless based on the most minimal characteristics possible that could lead to group formation (Tajfel et al., 1971). In reality participants are randomly allocated into groups. Importantly, by using artificially created and randomly assigned groups, one can ensure that the groups in an experiment have no associated real-group prejudice, no meaningful history of interaction with each other, and no other implicit associations.

The minimal group paradigm used in studies 1-4 was conducted at the beginning of each experiment. Participants were told that the experimenter was studying how cognitive styles affected a specific behaviour (which varied with each study). For example, in study 1, participants were told that they were taking part in a study designed to uncover the relationship between cognitive style and social interaction. The ‘cognitive style’ ruse was intended as a rationale for the minimal group paradigm, the Dot Estimation Task (DET). The DET was adapted from previous studies as the minimal group paradigm (Abele, Gendofla, & Petzold, 1998; Howard & Rothbart, 1980). Participants in studies 1-4 were told that the DET was the typical test used to determine which type of cognitive style a person had since being an ‘under-estimator’ or ‘over-estimator’ was indicative of different types of cognitive functioning in other domains. To this end, before the DET participants were given a brief cover story which differed slightly with each study about the correlation between different types of estimation abilities (i.e. over- or under-estimation) and other aspects of cognition that were to be tested(e.g. methods of solving mathematical problems). No value judgement was placed on either type of ‘cognitive style’.

The DET itself consisted of three pictures of a large group of dots, each showing approximately 150 randomly dispersed dots (see figs. 2.1, 2.2, and 2.3 for the pictures used in all experiments as the DET).

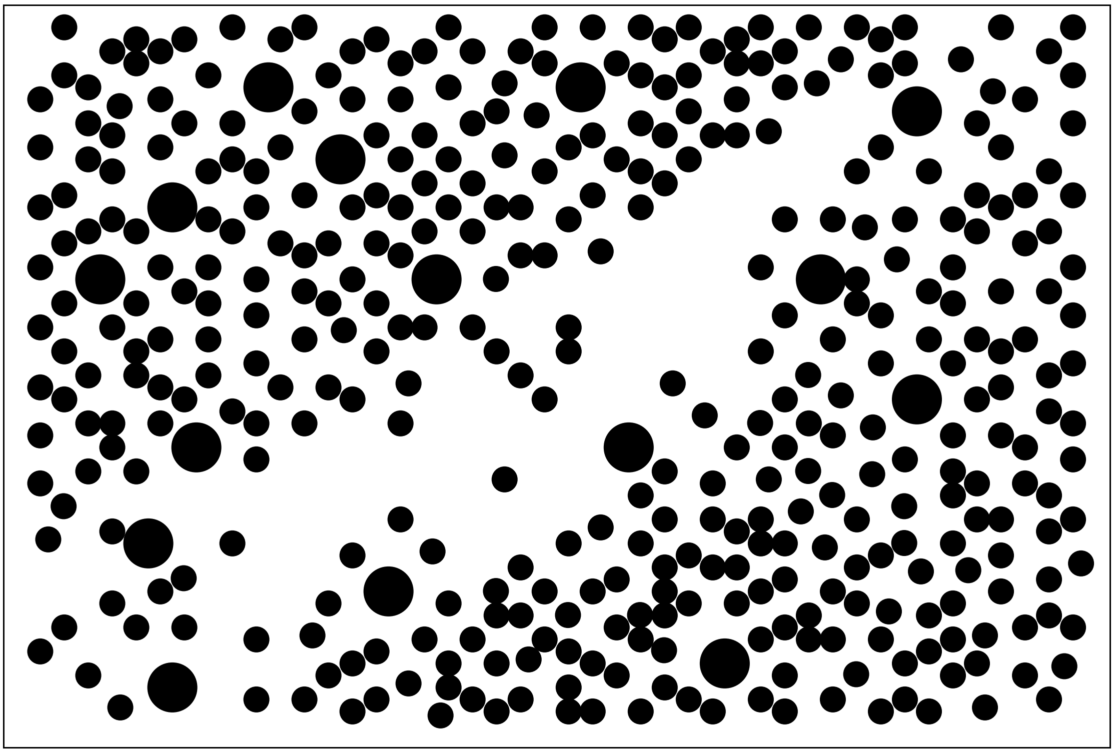


Figure. 2.1 Picture 1 in the Dot Estimation Task.

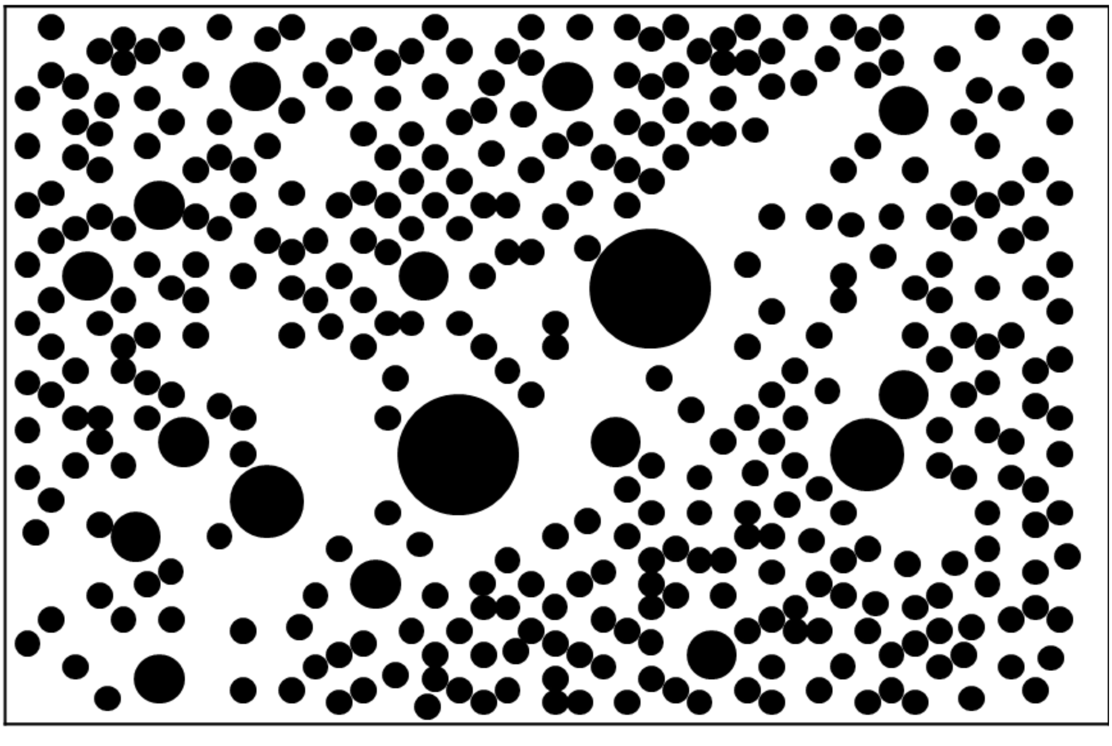


Figure. 2.2 Picture 2 in the Dot Estimation Task.

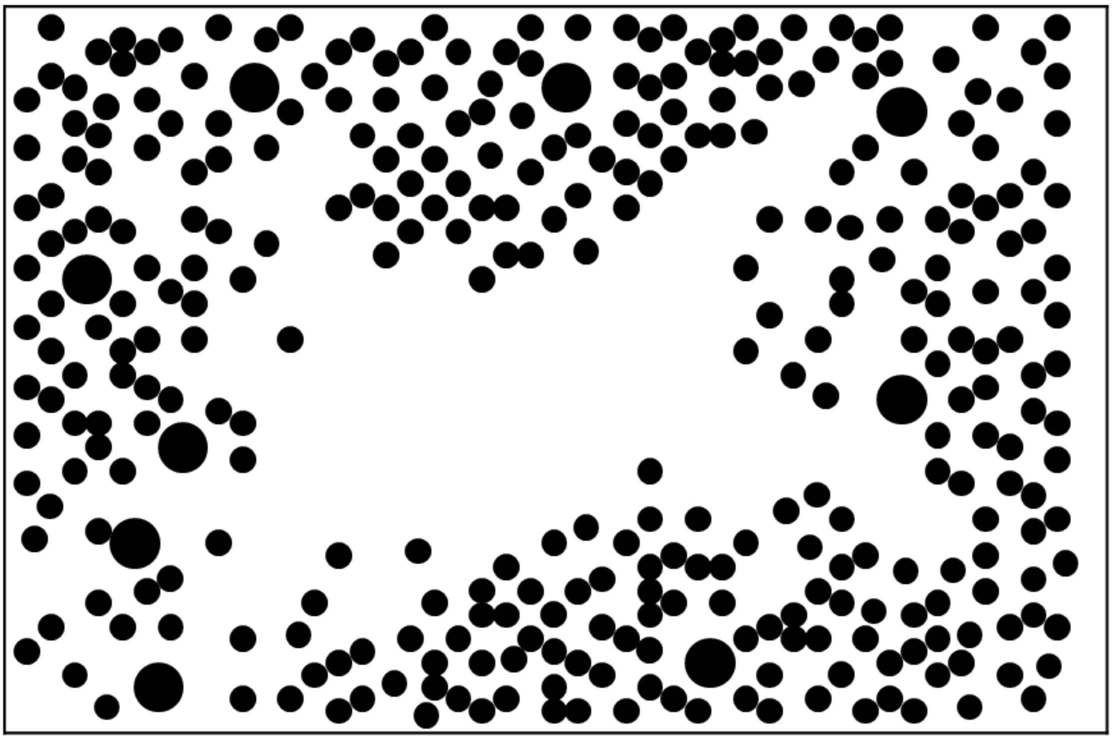


Figure. 2.3 Picture 3 in the Dot Estimation Task.

Participants saw each picture for approximately 7 seconds and were asked to estimate the number of dots in each picture. They were asked to do this task alone and silently to 'allow the researchers to get a true picture of their estimation abilities'. In actual fact this instruction was given to avoid participants knowing how their estimations actually compared to their partner's. On completion of the DET, I pretended to use participants' estimates and a calculator to determine whether participants were over- or under-estimators, although of course, allocation to groups was in fact arbitrary. Participants were then informed which cognitive style they had and asked to wear badges (of approximately 3cm by 5cm) with their individual cognitive style printed on them, ostensibly so the experimenter 'would not forget who was what for later analysis'. Badges were visible to the other participant as well. Half of the participant pairs in each experiment were randomly assigned to the in-group condition in which participants interacted with a member of the same group (randomly, either two under-estimators or two over-estimators). The other half of participant pairs was assigned to the out-group condition in which participants interacted with a member of the other group (one over-estimator and one under-estimator). At this point the minimal group paradigm was finished and the rest of the experiment was conducted to gauge the effect of group membership on various aspects of social cognition.

Study 1: Theory of mind in an inter-group context

In Study 1, after the minimal group paradigm, participants' spontaneous theory of mind usage in conversation was analysed by doing a basic content analysis of speech and written descriptions. Typically children show evidence of unambiguous mental state reference in conversation from the ages of 2 to 3 years (Furrow, Moore, Davidge, & Chiasson, 1992; Shatz et al., 1983). Mental state talk development also correlates with children's developing ability to pass false belief tasks (Astington & Baird, 2005; Brown, Donelan-McCall, & Dunn, 1996) , and their mental-state verb usage corresponds to their manifestation of theory of mind (Schwanenflugel, Henderson, & Fabricius, 1998). However, although children's use of language has long been used to assess their developing theory of mind, and although language assessment is a typical approach to studying entire culture's folk theory of mind (Schwanenflugel et al., 1999), adult conversational speech has yet to be used to study the manifestations of the theory of mind usage.

Although researchers have previously noted that the use of mental state verbs does not necessarily indicate an understanding of their semantic presuppositions (Shatz et al., 1983), it is nevertheless one useful read-out of baseline theory of mind functioning, especially in a population of normal adults (Bretherton et al., 1981; Dunn, Bretherton, & Munn, 1987). However, because of the ambiguity involved in much mental state talk, it has been coded in a variety of ways, usually dependent on the researcher's aims. Typically researchers argue that, unless it can be ascertained with certainty that a speaker intends to refer to another's mental state, talk cannot necessarily be coded as ‘mentalistic’, or, stemming from theory of mind usage (Brown et al., 1996). However, study 1 did not aim to study the development of mental state talk or its predictive value behaviourally. Study 1 aimed only to determine whether group membership affects this particular manifestation of theory of mind. Given that, a finite list of mental state reference words was developed to then code and quantify this type of conversational ToM usage.

In study 1 participants were told they were taking part in a study designed to examine the relationship between cognitive style and social interaction. After participants were categorised into in-group and out-group conditions using the DET, they were then told that they would have a short break from the experiment and then a social interaction task would follow. This short break involved the experimenter leaving the room. Participants were told they could chat while the experimenter set up the social interaction task if they wanted. The experimenter then left the room and allowed the participants 7 minutes to freely converse, during which time the CCTV camera system in the lab was recording. After the conversation, participants were then separated and asked to write about their partner to help them ‘solidify their impressions’ of each other before the supposed social interaction task. At this point the experiment was concluded and participants were debriefed in full.

To analyse both the 7-minute conversation and the impression forms, a word list was devised based on previously used lists to analyse the presence of mental state reference, e.g. (Bartsch & Wellman, 1995; Jenkins, Turrell, Kogushi, Lollis, & Ross, 2003; Shatz et al., 1983). Previous lists were by no means exhaustive, so a more extensive list was made to include a broader range of words. To do this, transcripts of participants’ conversations were first examined to produce a list of all words participants used to reference their partner’s mental states. This ‘master list’ constituted words used in previous studies (e.g. Jenkins et al., 2003) and participants' own new additions. The master list was then used to locate and code all references participants made to each other's mental states in our study.

Once all usages of the mental state reference words were located, each was coded for complexity of theory of mind usage, e.g. (Baron-Cohen, 1989; Flavel, Botkin, Fry, Wright, & Jarvis, 1968; Wimmer & Perner, 1983). First order mental state reference involved referencing one mental state, for example 'You like chocolate?'. Second order mental state reference involved embedding one of the partner's mental states in another, such as, 'So you really think you'll like studying here?'. In this way, amount of mental state reference in both the naturalistic conversations and the subsequent participant descriptions could be quantified and compared between the in-group and out-group settings.

Study 2 and 3: Joint Action in an inter-group context

Studies 2 and 3 looked at how group membership affects representation of intentionality. After the minimal group paradigm, a standard joint action task was used (Sebanz, Knoblich, Stumpf, & Prinz, 2005) to examine how group membership influences representation of others as intentional, goal-directed beings. The joint action task was adopted from the classic 'Simon Task' (Simon & Rudell, 1967). The 'Joint Simon Task', as it is called, involves a participant pressing one of two buttons in response to one feature of a compound stimulus, such as the colour of an arrow (e.g. red = left key; blue = right key), while ignoring the other feature, such as its direction (e.g. pointing right or left). Even though they have been instructed to ignore the irrelevant spatial aspect of the stimulus, participants still react faster if the irrelevant spatial dimension of the stimulus corresponds to the response location (e.g., based on the example above, a red arrow pointing left and a blue arrow pointing right) than if they do not correspond. This difference in response time to stimuli whose extraneous spatial dimensionthat corresponds to the response location compared to those that do not correspond is called the ‘Simon Effect’. Interestingly, if participants are only given one half of the task to do, e.g. they are instructed to only respond to red stimuli by pressing the left key, the Simon Effect disappears: the irrelevant spatial dimension is easily ignored in this case.

In the joint task, participants cooperate by each doing half of the task simultaneously (e.g. participant A responds to red stimuli; participant B responds to blue stimuli; see fig. 2.4). In this case the irrelevant spatial dimension becomes harder to ignore. In this joint task, the ‘Social Simon Effect’ occurs, which essentially means that although participants are still doing only half of the task in which no interference from the spatial dimension should arise, they nevertheless experience interference from their partner’s intended actions and the Simon Effect recurs, making participants both faster on corresponding trials and slower on non-corresponding trials (Sebanz et al., 2003a). This ‘Social Simon Effect’, as it is termed, only occurs if both partners are socially and intentionally active, regardless of online information about their actions, such as the movement of their hands or noise from their key-press responses (Sebanz et al., 2003a; Sebanz, Knoblich, Stumpf, et al., 2005; Vlainic, Liepelt, Colzato, Prinz, & Hommel, 2010). Furthermore, the Social Simon Effect only occurs if participants are engaged in a collaborative as opposed to an independent task (Guagnano, Rusconi, & Umiltà, 2010). This body of research has been interpreted to mean that representation of a partner’s intended actions occurs only, if the partner is intentionally active in the task and not merely present.

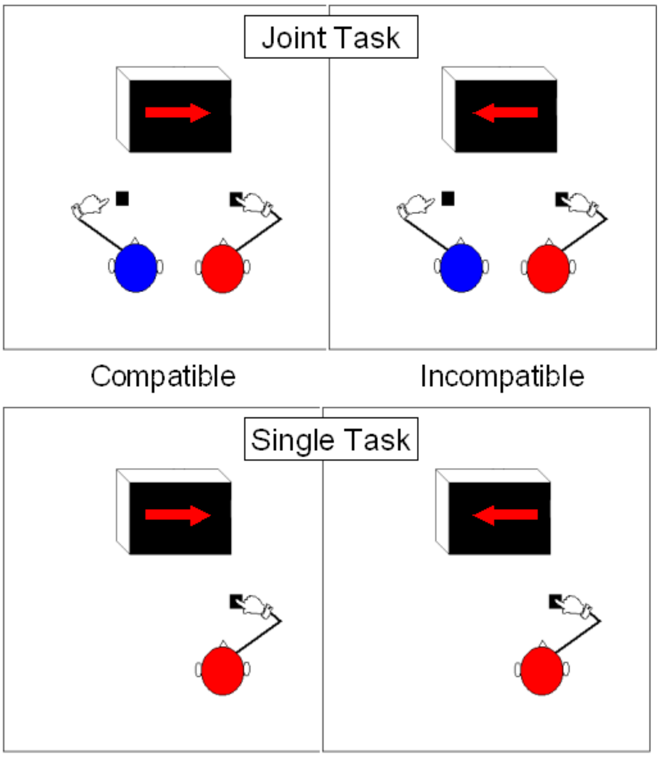


Fig. 2.4. Schematic of the experimental tasks from the perspective of the red participant. Compatible (left panels) and incompatible trials (right panels), for the Joint Task (top) and the Single Task (bottom).

In studies 2 and 3, participants were told that the study was aimed at investigating the relationship between cognitive style and reaction times. As usual, the 'cognitive style' aspect was a cover story for the minimal group paradigm in the form of the Dot Estimation Task. After the DET, participants then carried out the Joint Simon Task, which consisted of responding to stimuli presented on a CRT monitor using Experimental Run Time Software (ERTS). The stimuli consisted of red or blue coloured arrows 35 mm long and 4 mm wide, presented centrally on black background, pointing either to the left or right. Responses were recorded using ERTS keypads. All participants performed the task alone (single task) and together with a partner (joint task), with task order counter-balanced across participants. In the single condition, an empty chair remained beside each participant. In the joint task, participants sat next to each other in front of the monitor.

In the single task, participants were instructed to respond to arrows of one colour only, and to withhold the response to arrows of the other colour. In the joint condition the partner was assigned the other colour, whereas in the single condition no one was assigned to the other colour. The four stimulus alternatives (red or blue arrows pointing to the left or right) were presented randomly and with equal probability. For each task, two experimental blocks (8 practice and 64 experimental trials each) were presented, separated by short rests. Stimuli were presented until response or a maximum of 1500ms, followed by a 1000ms blank interval.

This joint action task was used to assess the impact of group membership on representation of others as intentional agents.

Study 3: Joint Action in an inter-group context controlled for competition

In study 3 the additional variable of competition was manipulated. Given that the effects of competition can be strong in an inter-group context when specific tasks are undertaken (Brewer, 1979), this study introduced a manipulation to standardize social competition based on the relevant categories. After participants completed the minimal group paradigm, the competition manipulation was introduced to form two conditions: the competition condition and the no-competition condition. In the competition condition, participants were told that performance in the forthcoming reaction time task they would do on the computer was correlated with cognitive abilities and general intelligence. Evidence was given for the relationship between reaction time task performance and intellectual capability, and participants were asked to perform to the best of their ability in order that the researcher could ‘get an accurate measure’ of the capabilities of their particular cognitive style. Conversely, in the no-competition condition, participants were told they would be given extensive practice on the computer task before the 'actual experiment' (which of course never came), and that they could use the practice sessions to ‘relax and just get comfortable’ with the task. No mention of the need for speed or performance was made.

This manipulation of competition was used in conjunction with the joint action task to assess the impact of group membership on representation of others as intentional agents while controlling for competition.

Studies 4 and 5: Stimulus Enhancement

In studies 4 and 5, a test used to gauge stimulus enhancement was employed. Stimulus enhancement occurs when a person’s attention is drawn to salient aspect of the environment via social means (Thorpe, 1963). An aspect of an object in the environment can be ‘enhanced’ when another person touches it (e.g. Horne, Erjavec, & Lovett, 2009), or moves it (e.g. Huang, Heyes, & Charman, 2002).

Heretofore stimulus enhancement paradigms have been developed for use with non-human animals and infants. For instance, ravens (Fritz & Kotrschal, 1999), marmosets (Caldwell & Whiten, 2004), and kea parrots (Huber, Rechberger, & Taborsky, 2001) all show evidence of stimulus enhancement in that, after observers watch a demonstrator interact with a physical object, observers focus their attention on the same aspects of the object that the demonstrator did. In infants, stimulus enhancement seems to promote learning of basic behaviours more quickly and earlier than non-social processes. Using stimulus enhancement, 18 month old infants were able to focus their attention on specific aspects of a box in order to reproduce the target behaviour of pushing or pulling a box lid, whereas they could not reproduce the target behaviour in a ‘ghost’ condition in which the target movement of the lid occurred automatically without a social demonstrator (Tennie, Call, & Tomasello, 2006). Evidence converges on the 1.5-year mark for the onset of susceptibility to stimulus enhancement: in another study, 2 and 3 year-old children touched the pin-bolt mechanism on a box as their demonstrators had done, and succeeded in opening it more quickly than children with no demonstration, while 1 year-olds rarely touched the pin and showed no evidence stimulus enhancement (Rigamonti et al 2005). Stimulus enhancement in the form of both touching objects (Horne et al., 2009) and moving objects (Huang et al., 2002) can even lead infants to produce behaviours at rates that were previously assumed to require imitative processes, eschewing imitation or understanding of another person's intention entirely (Heyes, Ray, Mitchell, & Nokes, 2000)

As stimulus enhancement had never been studied in adults, a new paradigm had to be developed for this thesis. To operationalize stimulus enhancement in studies 4 and 5, participants were told that part of the experiment was concerned with their memory for objects. In study 4 participants interacted with a confederate who enhanced the objects during the memory task, whereas in study 5 participants interacted with myself as the experimenter and I enhanced the objects during the memory task. The memory task constituted the stimulus enhancement manipulation and involved the participant memorizing 10 objects that were placed on a table between themselves and a confederate or myself as the experimenter. The aim of the task, participants were told, was to produce a free-recall list of the 10 objects after a 'learning phase' in which they would be allowed to manipulate the objects at will. One of the 10 objects would then be removed and they would be asked to identify it if they could.

The objects were all office supplies chosen for their ordinariness as follows: a green pencil box (5.5 cm x 5.5cm x 5.5cm), a blue floppy disk, an orange circular tin box (7cm diameter), a box of staples (with staples removed), a small SONY mini-DV tape, a usb cable (wound up), a small magnet (9cm long), a large black paper clip, a ruler, and a JVC-VHS tape (10cm x 6cm x 2.5 cm). The objects were chosen as they were similar along the lines of normal usage (all typical work-environment supplies), size (all fit in a participant's hand), appearance (all had some sort of written description or function on them), and saliency. Saliency was determined by pilot tests based on a short forced-choice in which participants (N=26) we asked to 'pick up the object that seemed the most interesting'. Results showed that each of the objects was identified as 'most interesting' between 7.6% and 15.4% of the time.

Two of the ten objects were chosen on which to focus for the purposes of counterbalancing and analysis. The object that was enhanced by either the confederate or myself by touching it was termed the 'focal object' (FO), the other object used for comparative purposes that the was not touched was termed the 'control object' (CO). The FO and the CO were at the center-left and center-right of the entire group of objects. The FO object itself (alternately the box of stapes and the JVC-VHS tape) and its position were counterbalanced to control for saliency of object and location. The JVC-VHS tape and the empty box of staples were chosen to alternate as the focal object given that they were of equal saliency to participants in the pilot phase (each being chosen 3 out of the 26 forced choice trials, or 11.5% of the time). The two objects chosen to be alternate FO's also had no obvious function as a tool, and therefore no obvious way in which to manipulate them to any use. All objects were placed on a table between the confederate's or experimenter's chair and participant's chair, and the two sat facing each other. Objects were arranged in roughly a circle, with the two focal objects in the middle of the circle, one centre-right and one centre-left. See fig. 2.5 for a photograph of object placement.

Figure 2.5. Object placement for the ‘memory task’ in studies 4 and 5, with the FO and CO (the blue box and the black cassette) centre-left and centre-right.

In study 4, stimulus enhancement was manipulated during the memory task in the following way. Participants were instructed that the memory task would involve first a learning phase and then a recall phase. The 60-second learning phase would allow them to memorise a set of objects on the table in front of them. During this learning phase they were told they could ‘do whatever they wanted with the objects that would help them to memorize them’. After the learning phase, the objects would be covered and the recall phase would involve listing as many of the objects they could recall and then listing one object that would be removed. After these instructions, the objects on the table were uncovered and the confederate was (seemingly randomly) always given the first ‘learning phase’ to allow her to touch one of the objects first. She manipulated the FO (again, either the JVC-VHS tape or the empty box of staples) for approximately 5 seconds and then replaced it in the same location, pretending to study all the objects closely during the rest of her learning phase. The participant was then given her learning phase, during which she was allowed to manipulate the objects in any way she chose. The objects were then re-covered and both were asked to freely list as many objects as they could recall. Next, I then removed one object using the cover as a shield (either the FO or the CO, counterbalanced). I then removed the cover to reveal the remaining 9 objects and asked the participant and confederate to write down the missing object, at which point the measures of stimulus enhancement concluded.

The stimulus enhancement manipulation in study 5 was almost identical except that I as the experimenter manipulated the pre-designated FO during the instructions.

Chapter 3

Study 1: Theory of Mind in an inter-group context

Results of this chapter have been submitted: McClung, Jentzsch, and Reicher (submitted)

'Representing other minds: Theory of mind is moderated by group membership'

Abstract

The development and pathology of the human ability to represent others' mental states, our 'theory of mind', has been extensively researched. What is less well known is the degree to which theorising about other minds plays a role in normal adult social interactions. The aim of this study is to determine whether different social contexts motivate people to differentially deploy their theory of mind. Different social contexts based on group membership were artificially created using a minimal group paradigm in the form of a Dot Estimation Task (Abele et al., 1998). The Dot Estimation Task allowed for the manipulation of participants' group membership to produce an in-group condition (in which participants interacted with a presumed in-group member) and an out-group condition (in which participants interacted with presumed out-group member). Participants in both conditions were then given 7 minutes in which they were allowed to chat at will. Afterwards, participants were asked to give a written description of their partner. These naturalistic conversations and written descriptions were then coded for evidence of reference to the partner's mental state. Results showed that, when interacting with a presumed out-group partner, participants referenced their partner's mental states significantly less often compared to in-group partners. This effect was found during both casual conversations and when later asked to describe the partner. Together, these results demonstrate that cognitively fully

developed humans do not make uniform and consistent use of their theory of mind. Instead, theorising about other minds is subject to categorisation of a social partner based on group membership and significantly curtailed if a social partner is perceived as ‘other’.

Introduction

Theory of mind (ToM) research has long focused on its development, pathology, and non-human forms. Researchers have investigated the developing theory of mind (for a review see Ensink & Mayes, 2010), the abnormally developed theory of mind (for a review see Pisula, 2010), and the non-human theory of mind (for a review see Call & Tomasello, 2008) in extensive detail. This thorough canvassing of the many aspects of the 'non-normal' theory of mind has, however intentionally, been to the detriment of study of the function of the mechanism itself (Apperly & Butterfill, 2009; Apperly, Samson, & Humphreys, 2009). Possibly as a result of this gap in current knowledge, the assumption has flourished that the possession of a fully developed theory of mind equates to its automatic and uniform deployment in every social situation. This assumption has permeated work in various related domains. Researchers of empathic accuracy (Ickes, 2003), autism (Baron-Cohen, 2005), and theorists of the modularity concept of theory of mind development (Leslie et al., 2005; Sperber & Wilson, 2002), are only a few who have given voice to the pervasive assumption that a normal adult theory of mind is constantly 'turned on'. This automaticity assumption is buttressed by a number of highly influential fMRI studies showing that the same brain areas respond automatically to goal directed actions, whether we are acting ourselves or observing the same actions in others (Fadiga et al., 1995; Frith & Frith, 1999; Ramnani & Miall, 2004). Such findings, along with more recent results showing that infants may have an innate understanding of false belief (Buttelmann et al., 2009), have been used to argue that we are 'hard-wired' to automatically activate representations of others' mental states regardless of context (e.g. Ruby & Decety, 2004).

However, evidence from peripheral fields suggests that some social, cultural, and even cognitive factors may render theory of mind processes less than automatic. For instance, people have difficulty interpreting another person's perspective without using their own knowledge as a template, a process termed epistemic egocentrism, e.g. (Fussell & Krauss, 1991; Keysar et al., 2000; Nickerson et al., 1987). As mentioned in the general introduction, epistemic egocentrism occurs even when people are motivated to make more accurate decisions (Keysar et al., 1995). High executive demands and distraction (Epley, Keysar, Van Boven, & Gilovich, 2004; Lin, Keysar, & Epley, 2010), or even simply a happy mood (Converse et al., 2008), can also lead people to answer questions about a partner's visual perspective less quickly and accurately than when not distracted or in a bad mood. Apperly and colleagues have also shown that questions requiring theory of mind usage are answered less quickly than non-mentalistic, reality-matching questions (Apperly et al., 2006), a further indication that theory of mind usage may not be entirely automatic.

Cultural differences also seem to play a role in how effectively people take another's perspective, as shown by a study in which Chinese participants could accurately infer another person's visual perspective whereas American participants could not (Wu & Keysar, 2007). Contrastingly, mentalistic language gauged from parent-child conversations differs across cultures (Vinden, 1996; Wierzbicka, 1986): Chinese parents refer less to mental states in conversation with their children than do American parents (Wang, Leichtman, & Davies, 2000).

Social factors, such as group membership, may also make people less attendant to other minds (Haslam, 2006). People categorized as 'other', or out-group, may be dehumanized in that they are attributed fewer uniquely human emotions (Leyens et al., 2001), and fewer human values and traits such as intelligence (for a review see Haslam, 2006). Conversely, we attend more to in-group members as their perspectives are more relevant to our social reality (Turner, 1991; Turner et al., 1987). Many of these findings chime with historical evidence, such as the numerous accounts of how Nazis ignored the perspectives of

Jews (Sofsky, 1997), as well as present day evidence showing that the guards at Abu Graib prison in Iraq refused to view their prisoners turned victims as human (Post & Panis, 2011).

These trends towards viewing members of an out-group as less than human than in-group members suggest there may be a difference in how mental states are attributed to others. However, the cognitive processes involved in these social phenomena remain unknown. While the empirical evidence discussed so far suggests that cognitive processes related to theory of mind processing are neither automatic nor consistently accurate, and that social factors may play a role in how people mentalise, what happens to theory of mind processing in inter-group situations remains unclear. Study 1 attempts to address this issue via the following question: Does group membership impact how people attribute mental states to others? With a customised analysis scheme commonly used in developmental psychology, I sought to examine spontaneous theory of mind usage in linguistic behaviour during a typical daily social interaction between in-group and out-group members. To this end, linguistic data were extracted from brief conversations between two participants and from their written descriptions of each other in order to be assessed for evidence of spontaneous mental state attribution.

The method was drawn upon from developmental research. In children's natural conversations, evidence of unambiguous mental state reference usually emerges between the ages of 2 to 3 years (Furrow et al., 1992; Shatz et al., 1983). Mental state language correlates with children's performance on false belief tasks (Astington & Baird, 2005; Brown et al., 1996), while their mental-state verb usage corresponds to other manifestations of theory of mind, such as their increasing understanding that mental states can involve uncertain beliefs (Schwanenflugel et al., 1998). Although children's use of language is routinely used to assess underlying cognitive abilities, including the presence of a theory of mind, this method has not been used to assess theory of mind usage in healthy adults, apart from cultural studies examining entire cultures' folk theories of mind (Schwanenflugel et al., 1999).

In this study, theory of mind manifestation was gauged by examining conversations between pairs of participants as well as their written assessments of each other. Social context was experimentally manipulated in order to arbitrarily allocate pairs of participants to in-group or out-group conditions. As discussed in chapter 2, minimal group paradigms are used to vary participants' group membership relative to each other using the most minimal criteria possible (Tajfel et al., 1971). Ostensibly, participants are put into categories on the basis of some trivial criterion (in this case, whether they allegedly over- or under-estimated the number of dots in a series of patterns) although in reality categorisation is random. Importantly, by using a minimal group paradigm a researcher can ensure that experimental groups have no significant meaning to participants in terms of real-group prejudice, that participants have no meaningful history of interaction with each other, and that they are prevented from making any other implicit associations about each other. Prior studies have shown that the minimal group paradigm is very effective for studies of social cognition because it reveals the effects of categorisation alone.

After this crucial manipulation, participants were allowed to have a brief conversation with each other. They were then asked to write down their impressions of their conversation partner. The first hypothesis was that participants should show less evidence of theory of mind usage, both simple (first order) and more complex (second order), when interacting with an out-group than an in-group member which would be evidenced by a lower frequency of reference to their partner's mental states during their conversations. The second hypothesis was that this differential theory of mind usage should also affect participants' perceptions of their partners: subsequent descriptions of out-group members should be based less on their mental states than subsequent descriptions of in-group members. This should be evidenced by a lower frequency of both simple (first order) and more complex (second order) mental state reference when describing out-group members.

Method

Participants

Participants were recruited using noticeboards within the University of St Andrews (please see Appendix 3.1 for recruitment sheet). Participants from all academic departments except psychology were accepted to take part in the study. Only females were recruited to standardise the gender of participants. 86 female undergraduates (age range 17 – 20) took part in the study to form a total of 43 pairs. Before each trial it was confirmed that participants did not know each other. Two of the pairs were discarded from analysis, one because one of the participants already knew what a minimal group paradigm involved, and another because the recording equipment did not function during the trial. In total this produced 41 pairs, 21 in the out-group condition and 20 in the in-group condition. All participants were tested in a single session lasting approximately 30 minutes. All participants were naïve to the experimental hypothesis, gave informed consent, were fully debriefed at the end of each experiment, and received £3 for participation.

Procedure

The experiment was conducted in the 'Social Immersion Laboratory' in the Psychology Department at the University of St Andrews. Prior to each trial, both participants confirmed that they did not know each other in any way. Participants arrived at a prearranged time at the facility and were given instructions before any social chatting could take place. Participants were given an information form describing the experiment and then asked to complete a consent form (please see Appendix 3.2 and 3.3 for information and consent forms).

Participants were then given the cover story of the experiment which provided the rationale for the minimal group paradigm and the subsequent conversation (see Appendix 3.4 for experiment protocol). They were told that the experiment was designed to study the link between 'cognitive style' and 'social interaction'. To that end, the experimenter would first assess their cognitive style and then ask them to complete a social interaction task. Their cognitive style, they were told, would be assessed using a test called the 'Dot Estimation Task' (DET), which was in reality the minimal group paradigm used to arbitrarily categorise participants into out-group and in-group conditions (adapted from Howard & Rothbart, 1980). Participants were told that using the DET, the experimenter would be able to tell whether they were over- or under-estimators, and that this categorisation would be indicative of their cognitive style in general. See chapter two for full details of this procedure.

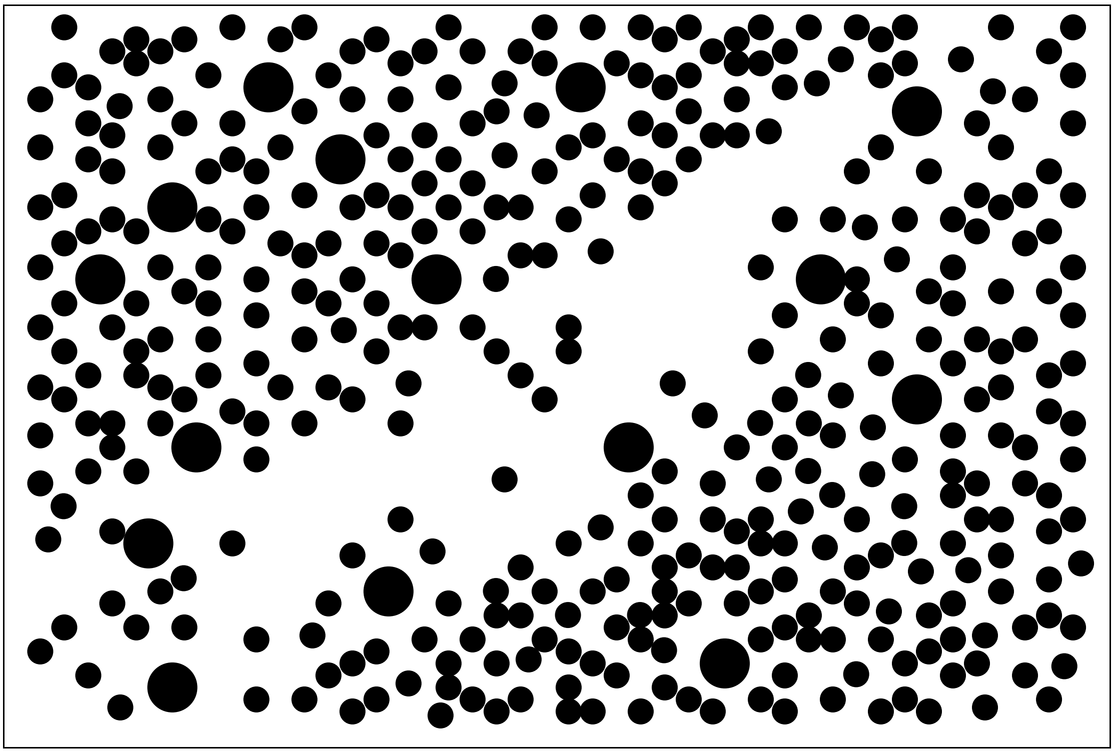


Figure 3.1. A typical exemplar of the pictures used in the 'Dot Estimation Task'.

Participants were asked to do the task alone in order to get a clear read-out of their cognitive styles. In actual fact this request was designed to keep participants from discussing their answers and thereby realising that there was no actual correlation between estimates and assigned category. I then made a brief show of calculating the average of their three estimates, and then assigned each participant to be either an over- or under-estimator, which was pre-determined based on the experimental condition. To make these categories salient, participants were asked to wear a badge with their cognitive style displayed on it. For instance, in the out-group condition one participant was asked to wear a small badge with the word 'Over-estimator' printed on it, while the other participant was asked to wear a badge with the word 'Under-estimator' printed on it. Participants were told these badges were to facilitate data analysis so that I as the experimenter 'did not forget' participants' cognitive styles. For an example of the experimental set-up participants engaged in please see Fig 3.2 below.

Figure 3.2. An example of the experimental set-up in which participants had 7 minutes to chat freely. In this case, an example of the out-group condition in which one participant has been categorised as an over-estimator and the other as an under-estimator.

Once categorised, participants were then told that, before the next phase of the experiment which would involve a short social interaction task, they were to take a short break during which they could just have a brief chat. Participants were told they were allowed to chat to make them more comfortable so that the social interaction task would be as naturalistic as possible while I set it up in the other room. I then left the room and allowed the participants 7 minutes to freely converse, during which time a preinstalled CCTV camera system was recording their interaction. Participants had been informed at the beginning of the experiment that they may be filmed and all consented. After this period, participants were separated and asked to write about their partner to help them 'solidify their impressions' of each other before the supposed social interaction task. After completion of this task, the actual experiment was terminated and participants were debriefed in full (please see Appendix 3.5 for debriefing sheet).

Coding

Prior research has shown that the use of mental state verbs provides a useful metric of theory of mind functioning in children (Bretherton et al., 1981; Dunn et al., 1987). This is because mental state verb usage is correlated with children's theory of mind development as measured by false belief tasks (Brown et al., 1996). Despite this consensus, mental state talk has been coded in a variety of ways, usually tailored to the study's particular aims. The aim of the current study was to quantify differences in linguistic behaviour as a function of the key experimental manipulation, whether or not participant thought they were members of the same group. To this end, a master list of mental state words was devised to identify any and all references participants made to their partner's mental states (for full details of this process see chapter 2).

To devise the master word list, I began with previous research which analysed spoken language to identify instances of mental state reference, e.g. (Bartsch & Wellman, 1995; Jenkins et al., 2003; Shatz et al., 1983). Jenkins and colleagues (2003) have produced what has come to be a standard list of verbs used to reference three categories of mental states: desire, feeling, and cognitive. However, the verbs that constitute the Jenkins list are by no means exhaustive of all possible ways of referencing mental states. The current corpus of transcribed speech showed that participants in the current study used many more expressions to attribute these and other mental states to their conversation partners. The master list was therefore formed to identify all of these. For example, for mental states referring to desires, I used the four words identified by Jenkins and colleagues (2003) (want, hope, wish, and care) and then complemented them with 19 expressions from the current corpus (e.g. to be interested in, to be pleased to...), to generate a list of 23 expressions. For mental states referring to feeling, I used Jenkins' and colleagues original 17 verbs (e.g. to be sad, to be happy...) and then complemented these with 7 more expressions used the current corpus (e.g. to be worried, to be anxious). Lastly, for mental states referring to cognition, I began with Jenkins' original 10 verbs (e.g. to think, to know...) and complemented them with another 35 verbs from the current corpus (e.g. to underestimate, to judge). See table 3.1 for full list of words coded. All the words in table 3.1, old and new additions, comprised a master list. This master list then allowed for the location of all references participants made to each other's mental states using a Microsoft Word XP search function.

Table 3.1. Words used to reference mental state, both in previous studies and the additions made by the current study. All forms of the words listed were coded.

Mental State	Previously Used Mental State Reference Words (Jenkins et al 2003)	Mental State Reference Words Added by the Current Study
Desire	to want to hope to wish to care	to be pleased to to be tempted to to be interested in to be bothered to to be keen on to look forward to to be into to be bored of to have a crush on to be mad about to fancy to miss to need to enjoy to be fond of to hate to prefer to glad to to dread
Feeling	to be sad to be hurt to be angry to be happy to be excited to love to dislike to be afraid to enjoy to have fun to be glad to be mad to be scared to be upset to be surprised to fear to be disgusted	to worry to be anxious to be relieved to be shocked to be disappointed to be nervous to feel ____

Cognitive	to think to know to believe to wonder to remember to forget to guess to pretend to understand to expect	to have a clue to be confused to notice to assume to get it to find out to underestimate to have/form an impression to agree to be sure to make sense to disagree to be able to relate to to find - if referencing a perspective, not finding an object to see – if referencing understanding to judge to mean to be determined to be only joking to be serious to realise to recognise to learn to have an idea to be conscious of to imagine to reckon to fathom to figure (out) to plan to to lie to be sorry to decide to intend to choose

Conversations were first transcribed to produce a written transcript of the entire word corpus produced by participants in both conditions. I then identified and coded the presence of each instance of mental state attribution in the corpus. Coding was carried out so that coders were blind to experimental condition. This consisted of using a Microsoft Word XP search function to locate every occurrence of each word on the master list (and all related grammatical forms). All grammatical forms were located by inputting the stem of a verb into the search function, or each grammatical form for irregular verbs. For example, to find all references to the mental state 'to want', the word 'want' would be put into the search function and therefore every instance of all grammatical forms, including for example to want, wanted, and will want, would all be highlighted. The same procedure was applied to participants' written impressions of each other. After a word was identified as belonging to the master list of possible mental state reference words, its usage was then coded (see Appendix 3.6 for an example of conversation coding). To be considered an instance of mental state attribution, the statement was required to make sense only if some sort of reference of the partner's mental states was invoked. For example, in one written impression a participant wrote the following: 'She was nervous. Lots of nervous laughter'. The phrase 'She was nervous' was coded as a mental state reference (as it referred to a mental state on the master list), while 'Lots of nervous laughter' was not coded as mental state reference, as the phrase did not refer to the partner's mental state but to the laughter itself. (See Appendix 3.7 for an example of written impression form coding). The only ambiguous phrase was the phrase 'You know?' Given that in many instances this phrase is a conversational filler, it was only coded as reference to an epistemic state if it had an object, such as in 'You know him?'

Once all usages of the mental state reference words were located, each was coded for complexity of theory of mind usage, e.g. (Baron-Cohen, 1989; Flavel et al., 1968; Wimmer & Perner, 1983). First order mental state reference involved one participant referencing one of a partner's mental states, for example 'You *like* chocolate?' More complex, second-order mental state attributions were coded in the same way as the first-order ones, with the additional requirement of at least two embedded mental state reference words to be used in reference to the partner within the same expression. To be considered second-order the expression had to consist of two mental states connected in that one referenced the other.

Second order mental state reference involved a participant embedding one of the partner's mental states in another, such as, 'So you really *think* you'll *like* studying here?' See

A second coder blind to condition and hypothesis then independently coded 20% of all transcripts and, given the small sample size, all of the second-order instances. Inter-rater reliability was high with kappas all > .86, and second-order kappa = 1.00. Where coders disagreed, the utterance was discussed until agreement was reached.

Results

Phase 1: Natural conversations

Overall amount of spoken words: All data in this experiment was subjected to Analysis of Variance tests to determine significant differences between conditions. The overall amount of spoken words did not differ significantly between the out-group condition (mean = 1,409) and in-group condition (mean = 1,280, $F(1, 39) = 2.14$, $p = .15$, see also figure 3.3). If anything, participants in the out-group condition produced more words than participants in the in-group condition. This is important because the differences in mental state reference discussed below are unlikely to be due to differences in the overall quantity of speech produced between the two groups.

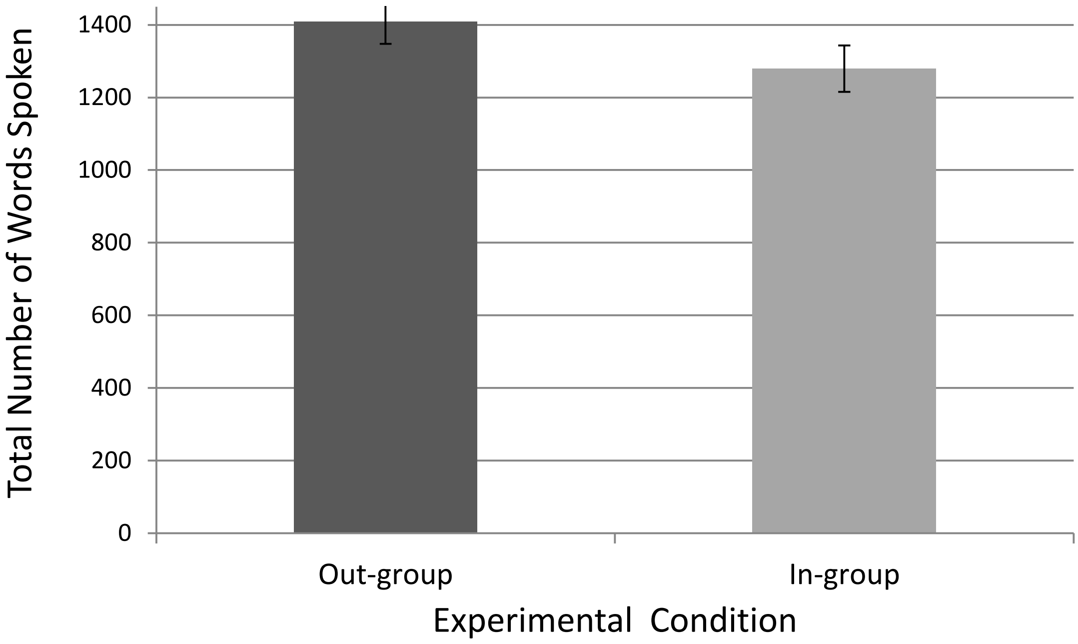


Figure 3.3 Mean number of (±SE) words spoken in both conditions.

First order mental state reference: To analyse how participants referenced their partner's mental states, the total number of instances of mental state reference across all mental state categories was tallied for each pair, according to the coding scheme explained in table 3.1 In natural conversations, participants referred to their partner's first order mental states less often if the partner was an out-group member (mean = 3.1) compared to a presumed in-group member (mean = 5.0; $F(1, 39) = 7.89$, $p = .01$; fig. 3.4).

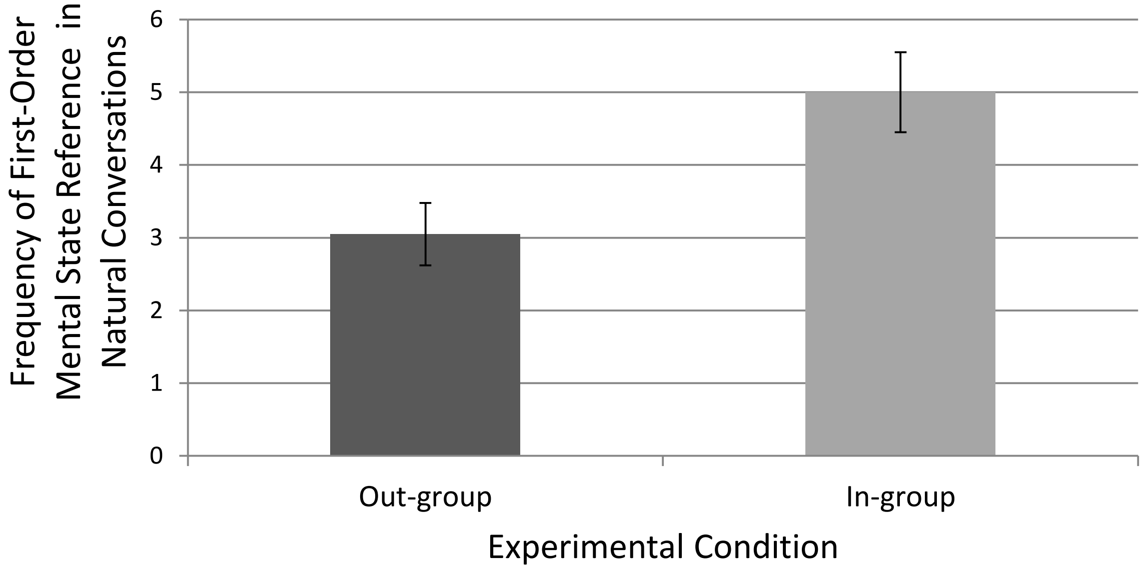


Figure 3.4. Mean frequency (± SE) of reference to partner's first order mental states in natural conversations as a function of the partner's group membership.

Second order mental state reference:

Although second-order mental state references occurred less frequently than first-order references, participants continued to make fewer references to their partners' second-order mental states in the out-group condition (mean = 0.05) compared to the in-group condition (mean = 0.35; $F(1, 39) = 4.87$, $p = .03$; fig. 3.5).

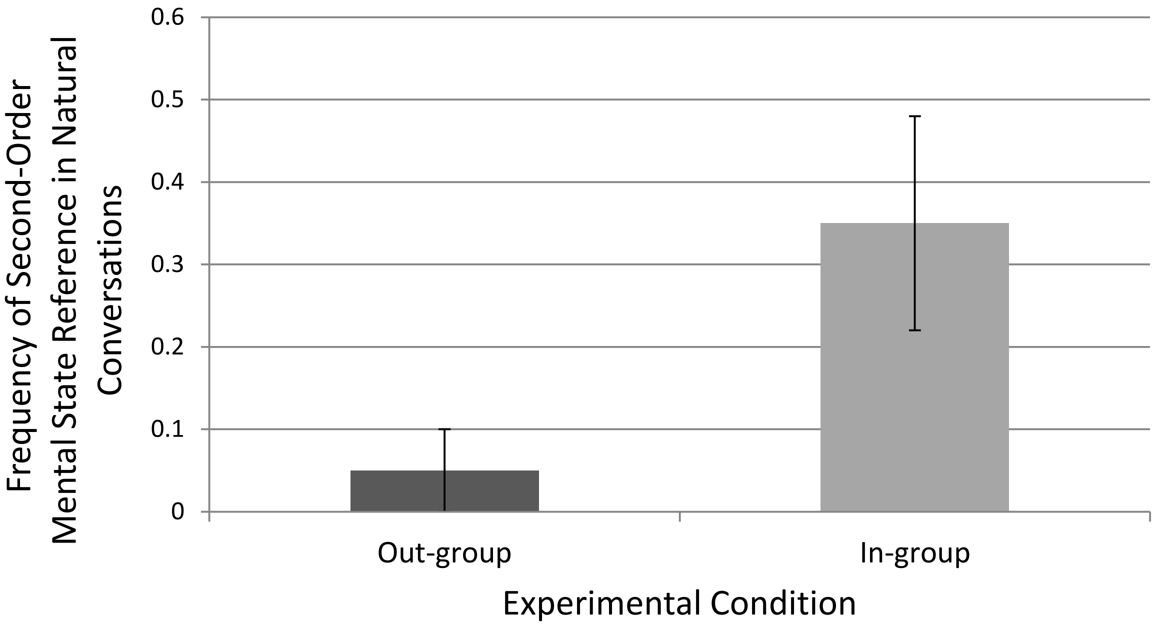


Figure 3.5. Mean frequency (± SE) of reference to the partner's second order mental states in natural conversations as a function of the partner's group membership.

<u>Phase 2: Written statements</u>

Overall amount of written words: There was no statistical difference between the total number of words participants wrote about each other in the in-group (mean = 149) and out-group condition (mean = 177; $F(1, 39) = 2.5$, $p = .12$; fig. 3.6. Again, this means that the differences in mental state reference discussed below are not likely to be due to difference in total amount of descriptions produced.

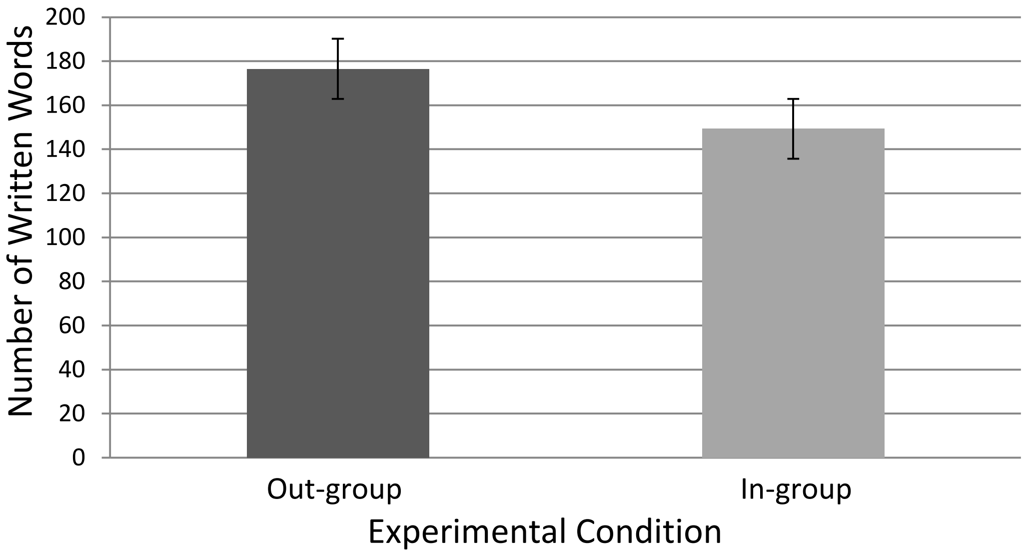


Figure 3.6. Mean number (±SE) of total words written to describe partners in both the out-group and in-group conditions.

First order mental state reference: When writing about out-group members, participants described their partner less in terms of their first order mental states (mean = 2.30) than when writing about in-group members (mean = 5.39; F (1, 39) = 12.35, p = .00; fig. 3.7).

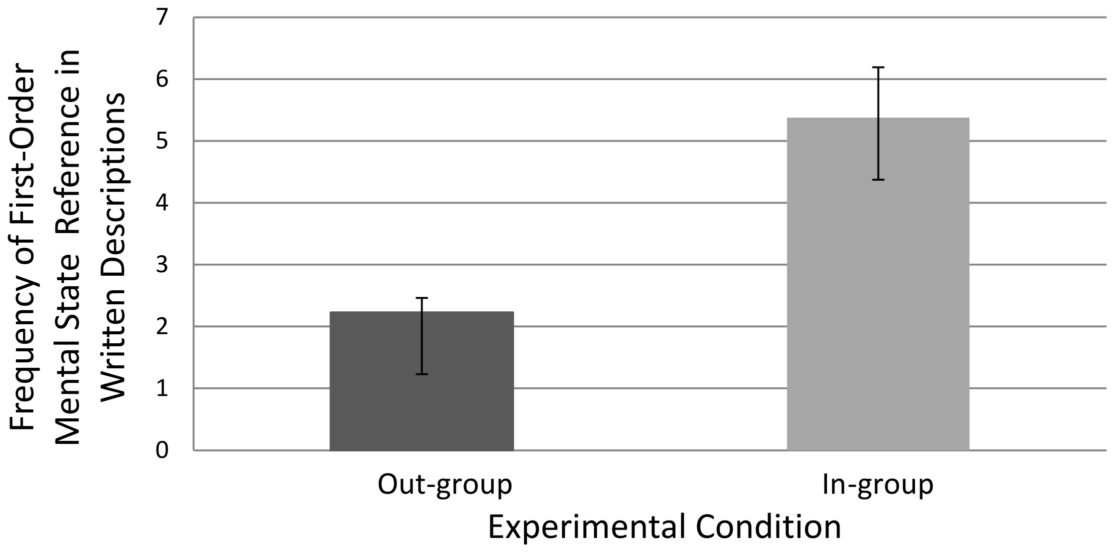


Figure 3.7. Mean frequency (± SE) of reference to the partner's first order mental states in written descriptions as a function of the partner's group membership.

Second order mental state reference: The same pattern was evidenced regarding more complex mental states. That is, participants writing about a presumed out-group member referenced their second order mental states (mean = .12) less than those writing about a presumed in-group member (mean = .72), $F(1, 39) = 7.88$, $p = .01$, see also figure 3.8.

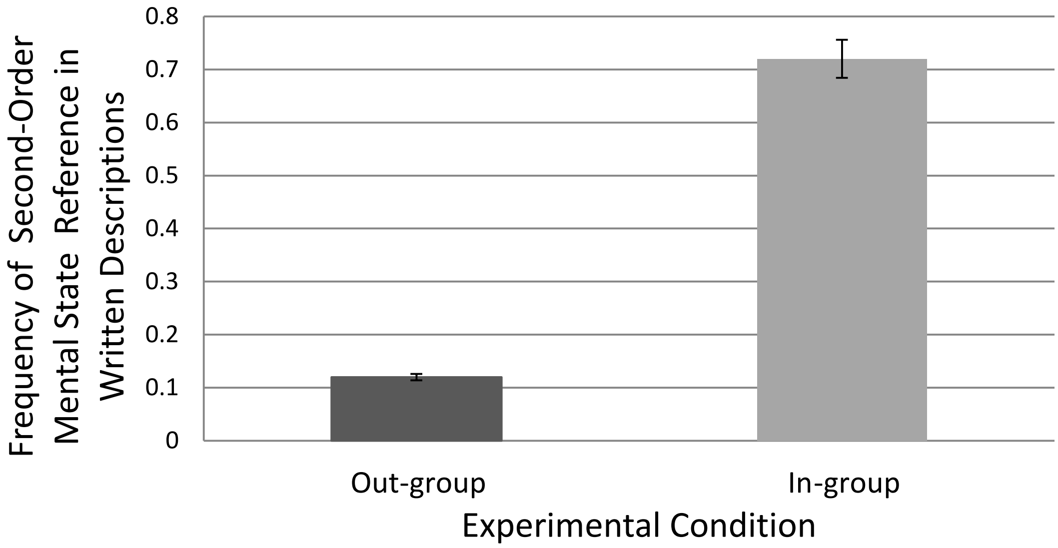


Figure 3.8. Mean frequency (± SE) of references to the partner's second order mental states in written descriptions as a function of the partner's group membership.

Discussion

In this study, I examined every-day conversation to determine whether people use their theory of mind automatically and consistently across social conditions or whether group membership impacts its manifestation.

The results of this study have demonstrated that participants showed an overall decreased interest in out-group member's mental states compared to in-group members. That is, when interacting with an out-group member, participants referenced their partner's mental state less, both in their linguistic interactions with each other and afterwards in their written descriptions of each other. Specifically, results showed that participants spoke significantly less about their partner's basic, first-order mental states if they presumed their partner was a member of another group. For example, when speaking with an in-group member, participants were more likely to make statements such as, 'Did you know they're doing a German market and stuff?' (Trial 24). Participants also referenced their partner's more complex, second-order mental states more frequently in the in-group condition. That is, statements that referenced one of the partner's mental states embedded in another such as 'So do you know what it feels like?' (Trial 24) were more frequent in the in-group condition. In the out-group context, participants discussed a similar range of topics, such as the weather, student life, and the drawbacks of being in St Andrews: they simply referred to fewer mental states even when discussing these basic themes. A key finding was that communication effort was not affected by group membership status. If anything, participants produced slightly more linguistic output in the natural conversations in the out-group condition, suggesting that differences in mental state attribution were not due to differences in motivation to communicate.

Similarly, participants also described their partner significantly more in terms of mental-state attributes when writing their impressions of in-group than out-group members. That is, when describing a presumed fellow in-grouper, participants were more likely to reference their first-order mental states using phrases such as, 'She seems to be very happy here' (Trial 28). Participants were also more likely to describe in-group partners using more complex, second-order mental state references such as '…. not afraid to do what she wants…' (Trial 28). Written impressions of presumed out-groupers centred around less mentalisitc analysis: statements about common acquaintances, life as a student, and general superficial statements about student life were more common when participants described out-group partners. As with the previous analysis, these trends occurred regardless of the number of written words. Participants in both groups spoke and wrote equivalent amounts about each other.

Taken together, these results suggest that people are less likely to show evidence of theory of mind usage in interactions with members of other groups than members of their own group. That is, normal, spontaneous mental state attribution is significantly affected by social context, in this case social categorisation based on group membership. The key finding was that this effect occurs between groups artificially created using the most minimal characteristics. In other words, whatever real-life histories or prejudices participants brought to the experiment, these factors did not influence the results. The results of this study suggest that, not only is mental state attribution curtailed if participants believe they are interacting with an out-group member, but furthermore that perception and subsequent depiction of their partners is significantly altered. Even after friendly and natural social interactions, members of a presumed out-group are described in more physical and less mentalistic terms than members of one's own group.

These results contribute to the growing body of literature showing that theory of mind usage is by no means automatic in normal human adults. In previous studies, mental state attributions have been assessed with paradigms involving false belief and visual perspective taking. For the former, theory of mind automaticity has been studied using well-timed questions about a cartoon character's beliefs (Apperly et al., 2006). This research was able to show that people reading a story about a given character do not necessarily reason about the character's false belief without external motivation. That is, unless some explicit need to reason about another's belief crops up, such as an overt question in the case of the Apperly and colleagues' study, people track reality more readily than they do a character's belief state.

In studies that have focused on visual perspective taking, it has been shown that people do not automatically infer the affordances of another person's visual perspective (Keysar et al., 2000). That is, people fail to interpret a communicator's instructions accurately based on what that person can see: people mistakenly gauge what another person can see if their own knowledge gets in the way. Although this body of research has generated important progress, neither of these approaches has examined mental state attribution between actual people during natural social interactions. The current findings are very relevant in this respect, by showing that experimentally altered social context can impact on mental state referencing during natural and friendly social interactions between participants who do not know each other. Importantly, this differential manifestation of mental state attribution occurred entirely spontaneously, without any prompting or requests that participants attend to any aspect of their partner's mental state.

Despite these clear-cut results, this study has some drawbacks. A minor drawback is the use of mental state verbs to gauge mental state attribution. Previously researchers of child development have noted that the use of mental state verbs does not necessarily indicate an understanding of their semantic presuppositions and meanings (Shatz et al., 1983). This study is therefore based on the assumption that, in a population of normal adults, the use of mental state verbs correlates to some degree with an understanding of their meaning.

The more significant criticism of this study is that the relative underperformance of participants regarding mental state attributions in the out-group condition may not have been due to participants being unconcerned with their partners' mental states. Instead, it is possible that social norms dictate that mental state attribution should not be revealed in such contexts, perhaps because out-group members are generally less useful to the structuring of a person's reality (Turner et al., 1987). In this case, people could be using their theory of mind but suppressing all mental state reference in out-group interactions. This seems unlikely given that such suppression would have probably been unnecessary after an interaction, but results still showed a detriment of mental state reference in subsequent descriptions of out-group partners.

This study was not designed to determine whether participants were consciously choosing to engage or disengage their theory of mind, or instead whether the prerequisite cognitive operations were simply never launched and theory of mind cognition rendered impossible. This is partly because there is currently no strong theory that details how the assembly line process towards mental-state representations operates. Differences in mental state referencing, in a context like this, could be due to a number of processes, ranging from differences in the amount of attention paid to participants depending on whether they are perceived as in- or out-group, to differences in displaying the results of that interest due to social norms, or differences in early cognition processes at some earlier point in the interaction. That is, there is a considerable difference between mentalising and overt mental state reference in a conversation, and getting at what is going on in a person's mind that drives overt language is a difficult task. Hence participants could be mentalising, or representing their partner's mental states, to the same degree, while only differing in overt mental state attribution, or the degree to which they display the products of their theory of mind usage.

With the subsequent studies, I will try to elucidate the nature of this difference in more detail. The subsequent studies were designed to begin to answer these questions.

Chapter 4

Study 2: Representation of intentionality in an inter-group context

Abstract

The previous study has shown that people manifest their theory of mind less with members of an out-group than an in-group. However, these results have not addressed at what cognitive level the group-membership effect takes place. It is still unclear whether perception of a person's group membership directly affects actual theory of mind processing, its display, or simply the more foundational social cognition processes on which theory of mind is built. The current study was therefore designed to examine whether one of the most fundamental components of mental state attribution, the perception of intentionality, is affected by group membership. The ability to perceive other individuals' actions as stemming from goals and intentions is a central, foundational skill of mental state attribution, which ultimately enables humans to develop a theory of mind. Study 2 therefore looked at whether the propensity to represent others as intentional agents was influenced by group membership. To do this, a well-established joint action task was used, the 'Joint Simon Task', which measures paired subjects' reaction times in response to stimuli that either correspond or conflict with the response location. The standard finding for this manipulation is that reaction times are altered if participants carry out the task jointly with a partner compared to when doing it alone to produce the so-called 'Social Simon Effect'. The Social Simon Effect occurs as participants reaction times are altered as they represent their partner's intentional actions simultaneous to their own. In study 2, participants first underwent a minimal group paradigm to split them into in-group and out-group conditions, and they then carried out the Joint Simon Task on computers. Contrary to expectations, results from this study produced no

evidence for a Social Simon Effect. That is, participants' reaction times were not significantly altered when paired with an in-group compared to an out-group member. Based on these findings one could conclude that in-group members were not more likely to be represented as intentional agents than out-group members and therefore that group categorisation has no effect on the cognition underlying theory of mind processing. However, methodological issues with this study render this an uncertain conclusion that is discussed in light of the current joint action task literature.

Introduction

Study 1 provided evidence that mental state attribution is context dependent. When naturally conversing with an out-group member, participants referenced their partner's mental state significantly less often than when interacting with an in-group member. Participants also subsequently described their out-group partners by referring less to their mental states, suggesting that out-group members are generally perceived as less mental beings compared to in-group members. Although this differential use of theory of mind is striking, results do not address the underlying cognitive processes leading up to this behaviour.

The observed effect of group membership on theory of mind use could stem from profoundly different cognitive processes. For example, social norms may dictate that, although subjects consistently attribute mental states to any conversation partner, this is less appropriate in interactions with an out-group member and should therefore be suppressed. On the other hand, people interacting with an out-group member may not even attend to their partner as socially relevant and therefore they may not even attribute mental states in such interactions. This, in turn, could be due to a breakdown of mental state attribution itself in interactions with the out-group, or some more basic social cognition processes on which mental state attribution is based. It is possible, in other words, that the key cognitive processes on which theory of mind is based are affected early and unconsciously by group membership, before mentalising itself can even begin.

The perception of intention is one such early process, and the building block on which mental state attribution is based (Tomasello et al., 2005). Whilst the exact cognitive processes remain unclear, a large body of research points to the fact that intention is the earliest and most basic mental state inferred, and it is usually inferred automatically during observations of other's actions (for a review see Blakemore & Decety, 2001). For instance, even pre-school children who cannot pass the false belief litmus-test for a theory of mind, when observing two balls in action distinguish between intentional and non-intentional events between such inanimate objects (Dasser, Ulbaek, & Premack, 1989). However, crucially, we do not yet know if there is a difference in how in-groupers and out-groupers are perceived as intentional beings. Whether they are or not may have cascading effects on social cognition, including the derailment of theory of mind processes.

Study 2 was designed to address this issue. It is based on the well documented fact that perception-action links are routinely used by people to infer other's intentions (Rizzolatti & Craighero, 2004). For example, when we watch someone lift a cup to the vicinity of their face, we automatically interpret the behaviour as stemming from the mental state of intent to drink the contents of the cup, and it is this working interpretation that would lead to surprise if the person threw the contents over their head instead. In fact, it is one area of the human brain, the superior temporal sulcus, that both perceives action and interprets the intentions behind an action (Allison, Puce, & McCarthy, 2000; Frith & Frith, 1999), and it is this area of the brain that produces automatic interpretation of the mental states (usually intention) that caused an action (Gallagher et al., 2000). At the physiological level, there is evidence that 'mirror neurons', found in the pre-motor cortex of non-human primates, do not encode the process by which an action is accomplished but the action's intended end result (Rizzolatti, Fogassi, & Gallese, 2001). In the classic example, in macaque monkeys (*Macaca nemistrina*) the exact same neurons fire regardless of whether the monkey observes a goal-directed action (grasping an object) or engages in the act itself (Rizzolatti, Fadiga, Gallese, & Fogassi, 1996). These mirror neurons are now considered to be one of the biological bases of mental state interpretation in humans upon which theory of mind is built (Gallese & Goldman, 1998; Gallese & Sinigaglia, 2011).

Given that the coding of actions coincides automatically with coding the actor's intent (Iacoboni et al., 2005), study 2 employed a classic joint action paradigm which required participants to complete a simple reaction time task. The paradigm used is referred to as the 'Joint Simon Task' (e.g. Sebanz, Bekkering, & Knoblich, 2006; Sebanz, Knoblich, & Prinz, 2003b), a manipulation that is routinely used to investigate the degree to which participants represent each other as intentional beings. The Joint Simon Task in which participants co-act is based on a classic task involving only one person called the 'Simon Task' (Simon & Rudell, 1967). In the original Simon Task a single participant is required to press one of two keys in response to a relevant stimulus feature, such as colour (e.g. red = left key; blue = right key). The pivotal manipulation, however, is that the colour of the stimulus is presented in conjunction with a spatial aspect of the stimulus, for example, an arrow pointing either right or left. This generates four distinct combined stimuli (red arrows pointing left and right, blue arrows pointing left and right). Although participants are instructed to ignore the spatial dimension of the stimulus, they nonetheless react faster if the irrelevant spatial dimension of the stimulus corresponds to the correct response location (based on the example above, a red arrow pointing to the left key), rather than to the incorrect location (a red arrow pointing to the right). This is the so-called 'Simon Effect' that occurs because people find it difficult to ignore the spatial aspect of the stimulus, even though they are instructed that it is meaningless. Interestingly, when participants are given only half of the task (called the 'single task'), for example to only press the left key to red stimuli, the 'Simon Effect' disappears. In the single task people can easily ignore the irrelevant spatial dimension of the stimuli. The Simon Task was modified into the Joint Simon Task by Sebanz and colleagues, who asked pairs of participants to cooperate by sharing the task (Sebanz et al., 2003a). As in the single task, each participant is asked to only respond to one of the two stimulus colours (for instance, person A presses the left key to any red stimulus; person B presses the right key to any blue stimulus, see fig. 4.1). The critical finding is that, although the demands are no different from the single task, the 'Simon Effect' reappears, i.e. participants' reaction time is altered, as if their processing capacity is somehow affected by the demands of their partner. Somehow, doing the same 'single task' alongside a partner doing the same task simultaneously is not the same as doing the single task alone. This effect has been termed the 'Social Simon Effect' (Dolk et al., 2011). The general consensus is that the Social Simon Effect occurs only when people represent each other as intentional agents, as a variety of studies show. For instance, the physical presence of the partner is not required as the effect can occur if the partner carries out his portion of the single task in another room (Tsai, Kuo, Hung, & Tzeng, 2008). The 'Social Simon Effect' only occurs if participants are co-acting on the unified joint action task, but not if the partner is present during the task but inactive (Sebanz et al., 2003a; Sebanz, Knoblich, Stumpf, et al., 2005), non-cooperative ((Guagnano et al., 2010), or unintentionally acting (e.g. if the actions are controlled by a machine, (Sebanz & Knoblich, 2009).

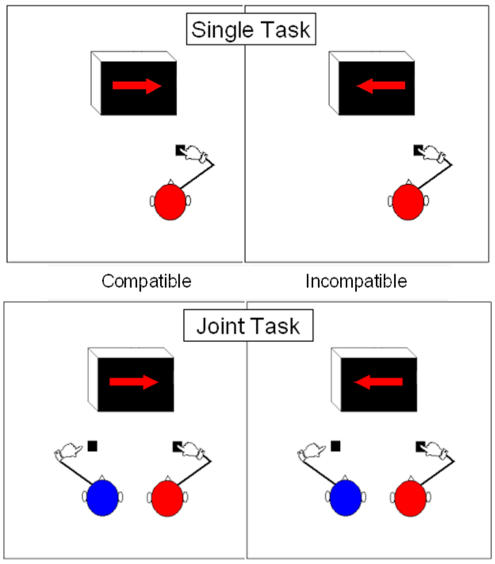


Figure 4.1 Schematic of the Joint Simon Task. From the perspective of the red participant, showing compatible trials (left panels) and incompatible trials (right panels), for the Single Task (top) and the Joint Task (bottom).

In sum, the key factor in producing a Social Simon Effect is an intentionally acting partner, in which case people react during the joint task similarly to how they behave when they do the entire task alone, although they are still only carrying out half of the task. That is, in the joint task, people slow down on incompatible trials and speed up on compatible trials compared to when they do the single task, although of course their actual task is the same in both conditions. Accepted reasoning holds that this combined interference and facilitation on the joint task stems from representing the partner's intended actions simultaneously to one's own, which then produces different reaction times in the form of the Social Simon Effect (Sebanz & Knoblich, 2009).

In this study, the objective was to capitalise on these previous findings and explore whether perceived group membership had an impact on subjects' performance in the Social Simon Task. That is, this study was designed to find out whether group membership affects representation of intentionality via the identification of the Social Simon Effect in either the in-group condition only (which would occur if increased mental state reference with in-group members is a result of curtailed building blocks of theory of mind) or in both the in-group and out-group conditions (which would occur if increased mental state reference with in-group members is a result of some higher-level process, such as a conscious suppression of mental state reference with the out-group).

To this end, I first generated differences in perceived group membership with a minimal group manipulation as in study 1 (Tajfel et al., 1971), followed by the joint action task. Again, this study was designed to assess whether the differences in mental state attribution observed in the first study were a result of higher-level decision making processes that affected overt mental state attribution, possibly in order to adhere to social norms about the appropriateness of displaying interest in the out-group, or on the other hand, the result of a lack of mentalising itself, which in this case would be driven by lower-level processes involving curtailed social cognition which could affect the building blocks for mentalising.

Two alternative hypotheses exist for this study. Since in-group members are generally more relevant for a person's every-day social life (Turner et al., 1987), by corollary participants may be more likely to perceive in-group members as intentional agents than out-group members. Accordingly, the Social Simon Effect should be observed in the in-group condition only. The absence of the Social Simon Effect in the out-group condition would indicate a lack of representation of out-group members' intentionality. Such results would support the conclusion that the decreased theory of mind shown in study 1 is a result of a reduced lower-level process, which in turn would lead to insufficient building blocks to form mental-state representations in the first place.

On the other hand, the presence of a Social Simon Effect in both the in-group and out-group conditions would support the conclusion that the decreased theory of mind with out-group members shown in study 1 resulted from not a decrease in mentalising itself, but instead a higher-level processes which would affect overt mental state attribution, possibly resulting from an awareness of social norms. Study 2 was carried out to determine which of these hypotheses would better explain the results from study 1.

Method

Participants

As with study 1, female undergraduate students at the University of St Andrews were recruited to control for gender effects during social interactions. Participants were recruited using an online research participation system in which participants can browse and sign-up for studies at will. Sixty-four individuals (age range: 17-20 years) participated. All were tested in pairs (N=32 pairs) in sessions lasting approximately 30 minutes each. All participants were naive to the experimental hypothesis, gave informed consent, were fully debriefed at the end of the study and received course credits for participation. Participants were arbitrarily assigned to the in-group or out-group experimental condition before each trial in order to counterbalance condition and order of joint and single trials (see chapter 2 for details).

Materials and Procedure

At the beginning of the experiment, participants were told that the study was aimed at investigating the relationship between cognitive style and reaction time (see Appendix 4.1 for information sheet). This was intended to provide participants with a rationale for the forthcoming minimal group manipulation, by which group membership was (arbitrarily) assigned using the dot estimation task (see chapter 2 for details and dot pictures). Participants were told that their cognitive styles would first be assessed using a 'classic test' (the DET), for which fabricated background research was given to emphasise the connection between estimation abilities and other aspects of general cognition. Participants were told that, after their cognitive style was assessed, they would be asked to complete a short reaction time task on the computer. Participants were then asked to sign a consent form (see Appendix 4.2 for consent form) and the experiment began.

The DET was carried out in the same way as in study 1. Participants were told that their general cognitive style would be indicated by whether they over- or under-estimated the actual number of dots in a pattern (see Appendix 4.3 for exact cover story delivered to participants). No value judgement was placed on either category of cognitive style. Unlike in study 1, where the DET was projected using a Microsoft Power Point programme, the DET in this study was carried out in the same lab in which the computer task was conducted. The DET therefore was presented in the lab, and consisted of the same three pictures of dots used in study 1 printed onto three placards, 59cm by 42cm. Participants saw each card for approximately 7 seconds and were asked to estimate the number of dots they saw on each placard. Upon completion, participants were asked to disclose their estimations in response to which they were (arbitrarily) categorised by the experimenter as an over- or under-estimator. Depending on their group membership, participants were then asked to wear the corresponding badge on their shirts as in study 1, visible to the other participant (see fig. 4.2 for an exemplar photo of the experimental set-up after the Dot Estimation Task).

Figure 4.2. An exemplar of an out-group condition trial.

Half of the participants (N=16 pairs) were assigned to the in-group condition, i.e. both were members of the same group, either under-or over-estimators. The other half of participants were assigned to the out-group condition, i.e. one over- and one under-estimator.

Participants then carried out the reaction time task, which consisted of a version of the 'Social Simon Task' with different coloured arrows (see fig. 4.1 for a schematic, and chapter two for full details).

Briefly, participants were instructed to respond to arrows of one colour only, and to withhold the response to arrows of the other colour. In the joint condition, the co-actor was assigned the other colour, whereas in the single condition no-one was assigned to the other colour. The four stimulus alternatives (red or blue arrows pointing to the left or right) were presented randomly and with equal probability. For each task, two experimental blocks (8 practice and 64 experimental trials each) were presented, separated by short rests lasting as long as the participant required, none were over 1 minute. Stimuli were presented until response or a maximum of 1,500 ms, followed by a 1,000 ms blank interval. Participants were fully debriefed at the end of each session (see Appendix 4.3 for debriefing form) and given course credit for their participation.

Data analysis

All trials with incorrect, too fast (<100 ms) or too slow responses (>1,000ms) were discarded from subsequent analysis of reaction times (<1 % of all trials).

Results

Main Effects:

As expected, participants were significantly faster on compatible (289.44 ms) than incompatible trials (293.10 ms; $F(1, 28) = 6.50$, $p < .001$; see figure 4.3 below). Participants also responded significantly faster in the joint (281.43 ms) than the single task condition (301.11 ms; $F(1, 28) = 39.74$, $p < .001$, see fig. 4.4 below).

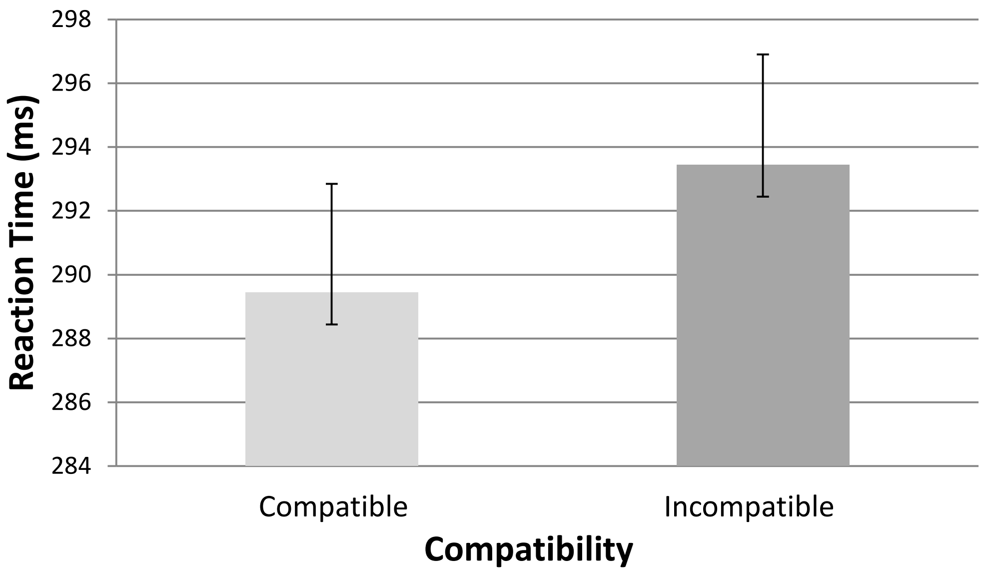


Figure 4.3. Average participant reaction times (means ±SE) as a function of compatibility of arrow direction and response location.

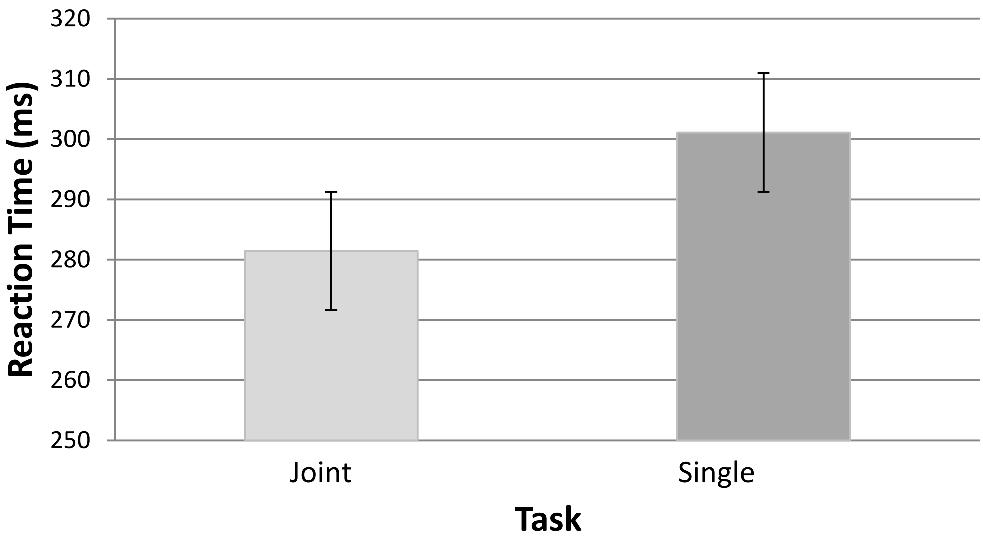


Figure 4.4. Average participant reaction times (means ±SE) as a function of task type.

Finally, participants were significantly faster in the out-group (281.43 ms) than in-group (301.11 ms) condition ($F(1,28) = 4.3$, $p < .05$; see fig. 4.5 below).

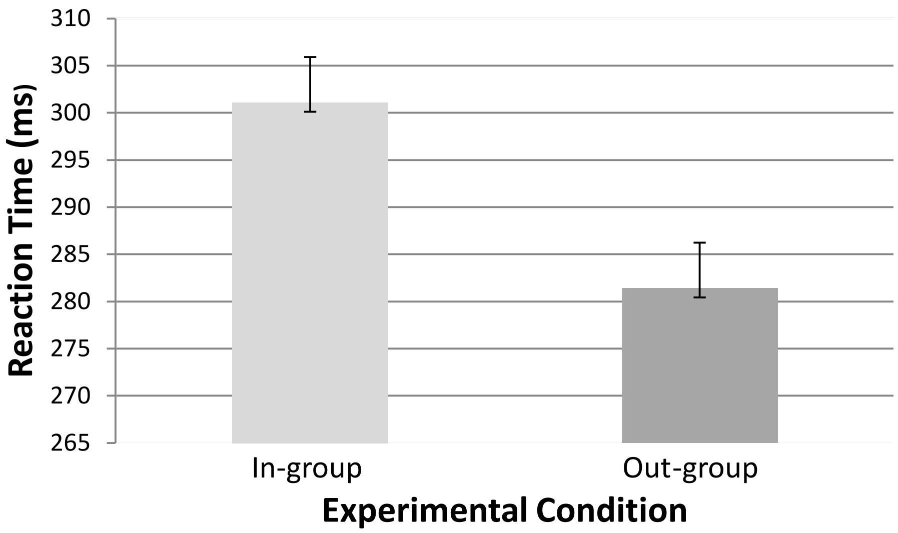


Figure 4.5. Average participant reaction time (means ±SE) as a function of group membership of the partner.

Interactions:

A Social Simon Effect would be indicated by an interaction between task type (joint vs single) and compatibility (compatible vs incompatible stimuli). Such an interaction could provide evidence that participants were faster on compatible trials and slower on incompatible trials in the joint task than the single task. Notably, results provided no evidence of an overall interaction between task type and compatibility ($F(1,30) = 1.18$, $p > .29$; see fig. 4.6 below). This means that the participants overall did not show any evidence, regardless of group membership, of the 'Social Simon Effect' reported elsewhere (Sebanz et al., 2003b). This was due to the fact that, in this experiment, doing the task together did not alter particpants' reaction time compared to doing the task alone. That is, participants in study 2 neither sped up on compatible trials nor slowed down on incompatible trials during the joint task compared to the single task, as would have been expected to produce a Social Simon Effect.

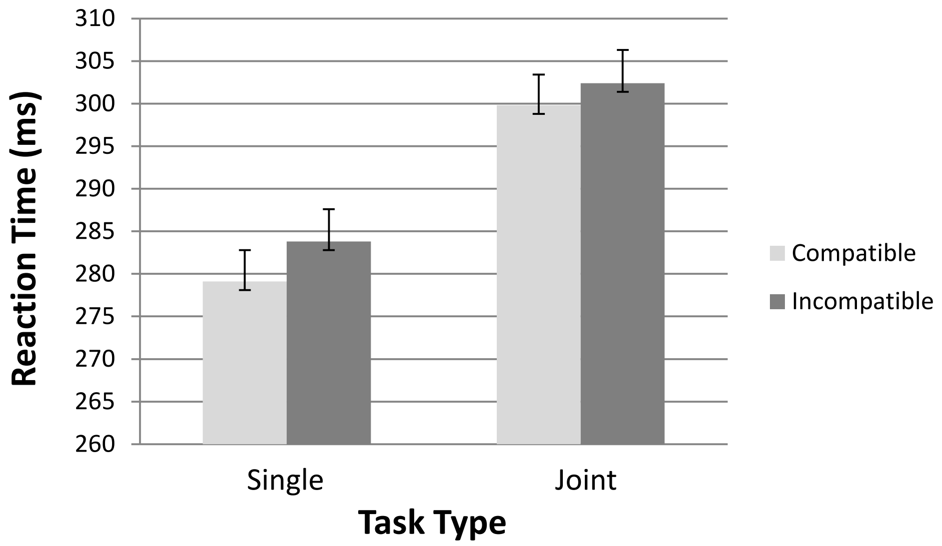


Figure 4.6. Average participant reaction times (means ±SE) as a function of task type and stimulus compatibility.

Furthermore, there was no interaction between group membership and task and compatibility, $F(1,28) = .09$, $p > .77$ (see fig. 4.7 and 4.8 below). That is, there was no Social Simon Effect in either the in-group or the out-group conditions. These results provide no evidence for even a limited Social Simon Effect in the in-group condition.

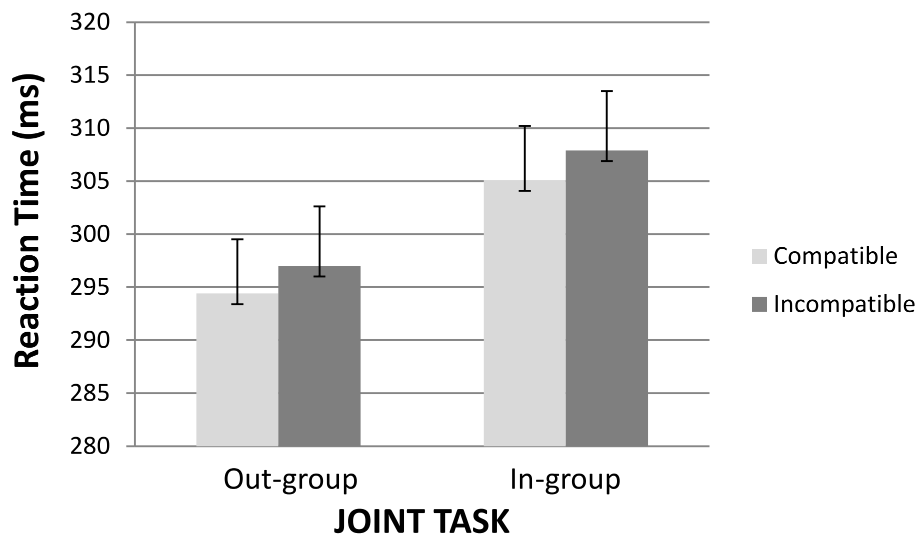


Figure 4.7. Participant reaction times (means ±SE) in the joint task as a function of group membership and compatibility.

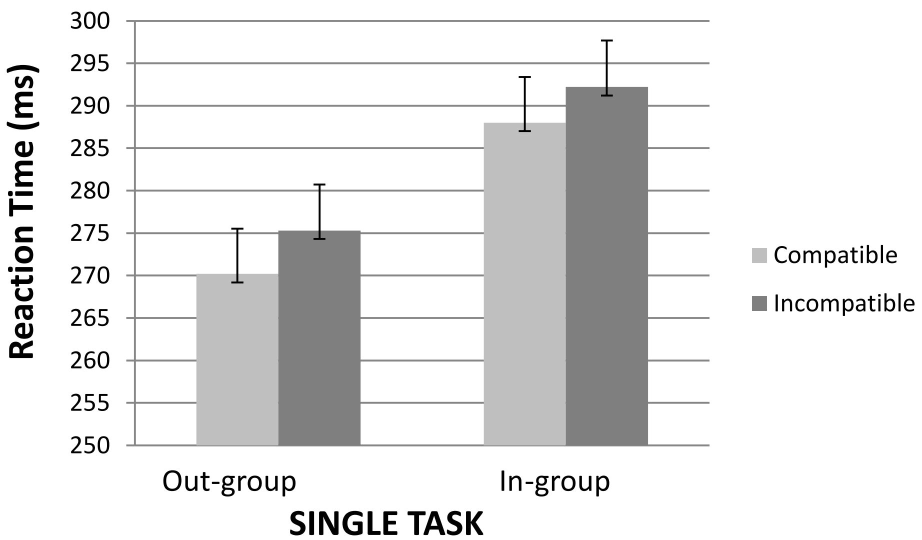


Figure 4.8. Participant reaction times (means ±SE) in the single task as a function of group membership and compatibility.

Discussion

The purpose of this study was to investigate whether people varied in how they represented others as intentional agents depending on the group membership of their interaction partner. The human ability to perceive intention is difficult to measure, but one promising indirect measure has been to compare reaction times of participants in the 'Joint Simon Task' (Sebanz et al., 2003b). Following on from the results of earlier studies, I investigated whether participants' reaction times would be altered when doing this standard reaction time task jointly with a partner to produce a 'Social Simon Effect'. In doing so, I was particularly interested in whether the Social Simon Effect would be moderated by group membership. The presence of the Social Simon Effect would indicate that, when doing the task together as opposed to alone, participants experience interference as they spontaneously represent their partner's intentional actions. Contrary to expectations, however, this study was unable to replicate the Social Simon Effect, although it has been a well-established finding in the human cognition literature. Nevertheless, in line with predictions, participants were significantly faster on compatible trials (in which the irrelevant spatial dimension of the stimulus corresponded to the response location) than on incompatible trials (in which the two did not correlate), suggesting that the basic setup was functioning according to expectations. Furthermore, participants were significantly faster when doing the task together than when doing it alone. However, there was no significant interaction between task type (alone vs. joint) and compatibility (of stimulus and response location). That is, doing the task with a partner did not speed participants up on compatible trials or slow them down on incompatible trials to produce a 'Social Simon Effect' as previous literature would have predicted (e.g. Kourtis, Sebanz, & Knoblich, 2010).

Although participants were significantly faster overall when doing the task with an out-group member as opposed to an in-group member, there was again no significant interaction between group membership and task and compatibility.   So not only did study 2 find no evidence of a normal Social Simon Effect in participants on the whole, it also did not find evidence of a limited Social Simon Effect present in only the in-group condition as expected. As a preliminary conclusion, these results suggest that participants did not represent each other as intentionally acting agents. However, there are some methodological issues which may hinder such a conclusion.

Thinking back to the hypotheses stated at the beginning of this chapter, this result does little to further our understanding of the origins of the differential theory of mind found in study 1. That is, these results show neither a Social Simon Effect in the in-group condition alone (which would have supported the conclusion that the lack of mental state attribution between out-group members in study 1 was a result of low-level processes, such as impeded social cognition processes), nor a blanket Simon Effect across group conditions (which would have supported the conclusion that said lack of mental state attribution between out-groupers resulted from a real lack of theory of mind processing, possibly due to higher-level processes such as active suppression of mental state attribution itself).   However, before we conclude that there is nothing to conclude, there are two important methodological issues which could have influenced this result.

The first is a minor but possibly highly important issue in relation to participant instruction. Some participants changed hands between single and joint conditions. This was because they were not instructed specifically to use the same hand in their joint task that they had used in the single task. Because of this, some participants who did the single task with their left hand (by pressing the left button to the appropriate colour) ended up pressing the same left button during the joint task with their right hand, and vice versa. This was only noted from responses given in the follow-up questions, after the experiment had been completed. The fact that participants did not consistently use the same hands in the single and joint tasks might have affected the results in a number of ways. First, representing a partner as an intentional agent is based on a triadic relationship being set up between a subject, her partner, and the object with which they are interacting, for a review see (for a review see Striano & Reid, 2006). It is possible that using the hand next to the partner sets up a boundary between the participant and her partner that prevents the formation of a triadic relationship (Sebanz & Knoblich, 2009). More importantly, using the 'wrong' hand on the joint task (i.e. the hand that does not correspond to the button the participant was directed to press) may directly interfere with the compatibility of the spatial aspect of the stimulus (Sebanz et al., 2003b). A spatially compatible stimulus, say, a red arrow pointing right (when the instructions are red stimuli = right button), means that the stimulus and response location are on the right hand side of the person responding. A person responding in this case with her left hand would thus change the compatibility of the trial by moving, even if minimally, the stimulus to her left perceptual field. Inconsistent hand use across trials during the joint task is a flaw of this study, and a possible reason why no evidence of a 'Social Simon Effect' was found.

A second issue of this study has to do with social competition. It is well known that manipulations of group membership can affect levels of competition between people, with higher levels of baseline competition in the out-group context (Tajfel et al., 1971). Related to this, it has been argued that baseline motivation levels are also higher when interacting with an out-group compared to an in-group member (Lount Jr & Phillips, 2007). In the absence of external influence, people expect interactions with out-group members to be more competitive and produce more anxiety than interactions with in-group members (Wilder & Shapiro, 1989). Differences in motivation and competition, possibly caused by the minimal group paradigm manipulation itself, may thus explain why the participants in this study were generally faster in the joint task with an out-group member compared to an in-group member.

Therefore, before concluding whether differential mental state attribution is a product of high-level or low-level processes, both of these issues need to be dealt with. The next study systematically addresses both issues of social competition and handedness to obtain a clearer understanding of the effect of group membership on the representation of others as intentional agents.

Chapter 5

Study 3: Representation of intentionality in an inter-group context controlled for competition

Results from this chapter have been submitted: McClung, Jentzsch, & Reicher (submitted) 'Representing other minds: Theory of mind is moderated by group membership'

Abstract

The previous study was designed to identify potential causes of differential mental state attribution depending on group membership, as first shown in study 1. This difference in mental state reference could have been due to a decrease in attributing mental states or a decrease in more foundational social cognition processes on which theory of mind is built, particularly differences in representing intentionality. While the previous study addressed these two possibilities, it failed to produce conclusive results, partly due to problems with experimental design and methodology. The current study, therefore, attempts to remedy these problems. In particular, an important additional variable is introduced when testing for the ability to represent others as intentional agents, the role of competition in an inter-group context. In this study I used the same joint action task, the Joint Simon task, with participants arbitrarily allocated to either in- or out-group contexts to determine which conditions would elicit the social Simon Effect. To control for competition, I manipulated participants' sense of rivalry with each other based on their social categories to create a high- and low-competition condition. Results of the current experiment showed that doing the joint task with an in-group member affected participants' reaction times compared to doing the single

task alone. Doing the task with an out-group member produced no such effect and participants reacted as if they were doing the single task alone. That is, the Social Simon Effect was present in the in-group condition only. This was the case in both the high- and low- competition conditions, showing no discernible effect of competition on representation of intentionality. Overall, these results suggest that participants only represented their partners as intentional agents if they were perceived as members of their own group. More generally, results suggest that representation of others as intentional agents is not automatic, but significantly affected by social context, in this case the perception of ‘other-ness’. Differences in mental state attribution, in other words, may not be the product of high-level suppression of mental state attribution itself, but caused by a lack of lower-level cognitive processing which subsequently affects more complex mentalising.

Introduction

Study 1 demonstrated that cognitive processes related to mental state attribution are affected by perceptions of group membership. That is, participants attributed fewer mental states, both during natural conversations and in subsequent descriptions, to social partners that were perceived as members of other groups. This result is relevant in that it shows that theory of mind is neither automatic nor used consistently in normally functioning human adults. What has not been shown by this experiment, however, is whether these results were the product of a suppression of mental state attribution, for example due to a conscious decision to adhere to a social norm that favours in-group members, or whether the previous results were due to a lack of more basic social cognition processing required for mental state attribution, for instance the ability to perceive others as intentional agents, which form the bedrock of theory of mind.

To help disentangle these two possible driving forces of differential mental state attribution, study 2 was conducted. Study 2 used a classic joint action paradigm, the 'Joint Simon Task' (Sebanz et al., 2003b), to investigate whether participants were able to perceive their social partners as intentional agents even if the partner belonged to another group. Results were inconclusive, possibly due to problems with the experimental design and methodology. That is, there was no evidence of a Social Simon Effect (SSE), which would have been evidence of spontaneous representation of another as an intentional agent, either overall or in either group condition. A specific concern with study 2 was that participants failed to represent others as intentional agents not because of differences in group membership (given that there was not even an SSE overall) but due to inconsistent use of their hands to carry out the joint task. It is possible that the compatibility of the stimuli was further influenced by the choice of hands.

On a conceptual level, it is possible that participants experienced different levels of competition due to differences in perceived group membership, and that interacting with an out-group member could increase competition which could have artificially masked the SSE. Any effects of group membership on cognitive processing, therefore, could be mere side effects of perceived social competition.

Given that both handedness and competition were not specifically addressed in study 2, the current study set out to remedy these issues. First, as discussed briefly in the previous chapter, handedness is an important issue in the Joint Simon Task. Some participants simply switched hands during the single and joint tasks since they were not given a reminder between the tasks to use the same hand throughout. For instance, some participants who did the single task with their left hand (by pressing the left button to the appropriate colour) ended up pressing the same left button during the joint task with their right hand, and vice versa. The fact that participants did not consistently use the same hands in the single and joint tasks might have affected the results in a number of ways as discussed in detail at the end of the previous chapter. Given this, it is imperative that in the current study participants are instructed as to hand use before each task.

Second is the issue of competition. Much research supports the conclusion that increased competition with out-group members is a result of a simple lack of resources: the fewer goods and commodities there are to go around, the higher the competition will be for the existing few. This proposal, called realistic conflict theory, holds that the struggle for limited resources is sufficient to cause inter-group competition, which can in turn lead to conflict (for a review see Jackson, 1993). For instance, periods of economic hardship produced more inter-group conflict in the American south than periods of economic affluence (Hepworth & West, 1988). Regardless of resources, simply the expectation of a future interaction with an out-group member can lead people to feel a sense of competitiveness

(Rabbie & Horwitz, 1969). Baseline motivation is also generally higher when interacting with an out-group member (Lount Jr & Phillips, 2007), and in the absence of external influence people expect interactions an out-group member to be competitive and they subsequently experience anxiety associated with this competition (Wilder & Shapiro, 1989).

Competition can derive from a struggle over psychological resources as well. Social competition ensues when members of different groups compete with each other to increase their self-esteem via the social standing of their group. The theory behind this process holds also that an individual's self-esteem is directly linked to the standing of their group, and that this link can lead to a social competition between individuals of different groups as they both attempt to increase the image and social standing of their own group (Tajfel, 1982). From both a psychological and physical perspective then, competition is an influential factor when members of different groups engage in any kind of interactive task.

Study 3 is therefore designed to address these issues of handedness and competition to better understand what exactly has driven the differential theory of mind manifestation in study 1. As mentioned before, study 3 is based on the same classic joint action task already employed in study 2 to investigate one of the most basic building blocks of mental state attribution, the ability to represent others as intentional, goal-directed agents (Sebanz, Knoblich, Stumpf, et al., 2005; Tomasello et al., 2005). As detailed in the previous chapter, it has been argued that the ability to represent others as intentional agents is a crucial building block of mental state representation and attribution (e.g. Baron-Cohen, 2005; Frith & Frith, 1999).

To ascertain whether participants represented their partners based on group membership, I used the same minimal group paradigm as before (see chapter 2 for details) before subjecting participants to the same joint action task as in the previous study (Sebanz et al., 2003a). Briefly, the 'Joint Simon Task' requires participants to respond to the coloured aspect of a stimulus while ignoring its irrelevant spatial dimensions (e.g. participant A responds with the left key to any red stimuli; participant B responds with the right key to any blue stimuli; see fig. 5.1). The single task involves responding to one colour alone, while the joint task involves responding in the exact same way but with another person sitting alongside, each doing their 'half' of the task simultaneously. The classic finding has been that, in the single condition, participants find it easy to ignore the irrelevant spatial dimension of the stimulus and respond equally quickly to stimuli whose spatial dimension correspond to the response location to those that do not correspond to the response location. In the joint condition, however, participants respond both more quickly to stimuli whose spatial dimension corresponds to the response location, and conversely, more slowly to stimuli whose spatial dimension does not correspond to the response location than in the single condition. That is, doing the same task with a co-actor seems to both facilitate (compatible) responses and hinder (incompatible) responses. The general interpretation has been that this alteration in reaction times in the joint task, called the 'Social Simon Effect' is due to interference that occurs when people represent their partners intentional acts simultaneous to their own (Hommel, Colzato, & van den Wildenberg, 2009). For the Social Simon Effect to occur it is also necessary that both participants are engaged in a collaborative as opposed to an independent task (Guagnano et al., 2010), and that both partners are intentionally active, regardless of the online information participants receive about their actions. That is, the Social Simon Effect still occurs if participants cooperate on the task with someone whose reactions they can neither see nor hear, so long as they know the other person is engaging in the task with them (Vlainic et al., 2010), but it does not occur with the mere presence of a person beside them who is not engaged in the task (Sebanz et al., 2003a).

Based on these previous findings, the Social Simon Task is ideal for assessing participants' perceptions of each other as intentionally acting agents, as argued in the previous chapter.

In this study, I sought to separate the effects of group membership and the competition people inherently feel when group membership becomes salient in a joint task. As previously noted, competition is tightly entwined with group categorisation, and is thought to be enhanced during inter-group interactions compared to intra-group interactions. Whatever the precise origin of the competition in inter-group encounters, it is likely that in a joint task people may feel an elevated level of competition regardless of the nature of the task or manipulation. The predicted effects of group membership on this task, in other words, could be a by-product of differences in perceived competition, rather than perceived group membership. To separate these two possibly confounded variables I attempted to control for the effects of competition independently of group membership in the subsequent study.

In the absence of resources to fight over or rewards to be obtained, social competition was manipulated in the following way. In the competition condition, participants were told that their performance on the 'computer task' as a whole would be indicative of their own intelligence, and that this would reflect on their group (defined as per usual with the minimal group paradigm using the Dot Estimation Task). Participants in the no-competition condition were told nothing about any link between the 'computer task' and general intelligence. Instead they were given extensive practice on the task and told that they could relax during the practice trials until the 'real task', which never came.

One hypothesis for this study was then that only participants interacting with in-group members should show reaction time differentials between compatible trials (compatible stimulus and response location) and incompatible trials (incompatible stimulus and response location) during the joint task than the single task. This would, in effect, be evidence of a selective Social Simon Effect in the in-group condition alone. Another hypothesis was that the Social Simon Effect should not be affected by social competition, and therefore that the Social Simon Effect should occur in the in-group condition regardless of the level of competition participants experienced. As explained before, the potential confounds of handedness during the joint task was controlled for with specific instructions to standardise hand usage across single and joint tasks. If results provide such evidence, specific conclusions about the source of the differential mental state attribution seen in study 1 may be supported.

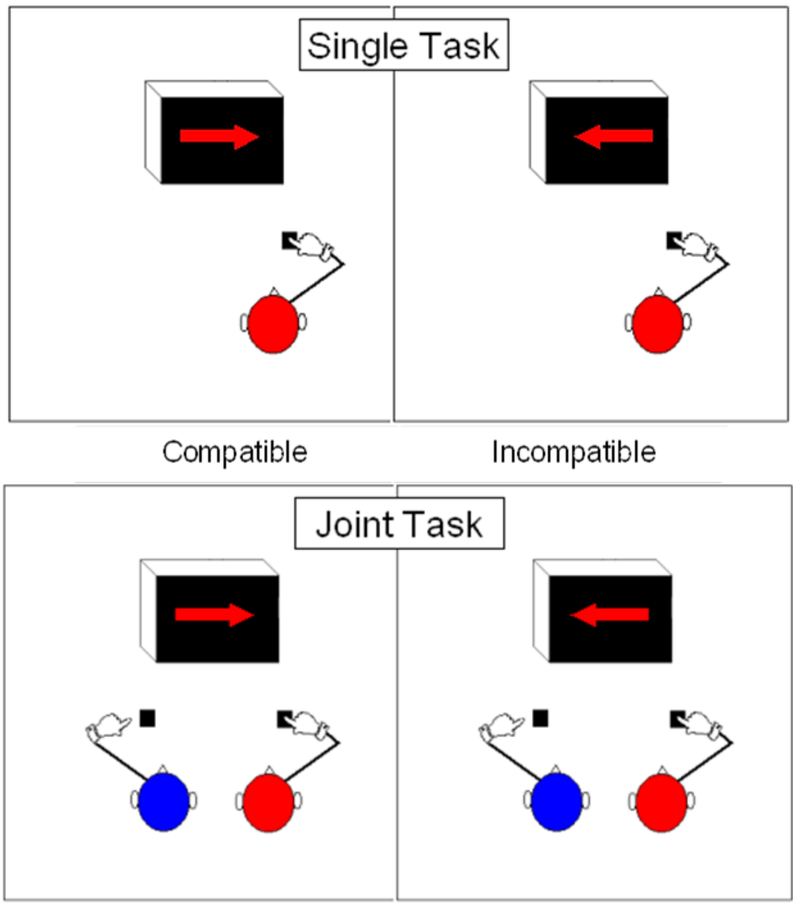


Figure 5.1. Schematic of the experimental tasks from the perspective of the red participant. Left column: compatible trials; right column: incompatible trials. Top row: Single Task;

bottom row: Joint Task. Participants in this study carried out both single and joint tasks in either the in-group or out-group condition and the competition or no-competition condition.

Method

Participants and Design

In order to avoid gender effects, only female students were recruited from the psychology department in the University of St Andrews via the on-line research participation system. Sixty-four undergraduates took part (age range: 17-20 years). All were tested in pairs (N = 32 pairs) in a single session lasting approximately 30 min. All participants were naive to the experimental hypothesis, gave informed consent, were fully debriefed at the end of the study and received course credit for participation. Participants were arbitrarily assigned to one of four experimental between-subjects conditions: out-group vs. in-group and competition vs. no-competition. Four additional pairs of participants were tested but then excluded from analysis because in three of these pairs participants disregarded the instructions they had been given and incorrectly used two hands instead of one to respond in the single task. In the other pair one participant had severe arthritis which impeded her reaction abilities.

The experiment consisted of a 2 (in-group vs out-group) X 2 (competition vs no-competition) between subjects design and 2 (joint task vs single task) X 2 (compatibility vs incompatibility) within subject factors.

Materials and Procedure

At the beginning of the experiment, participants were told that the study was aimed at investigating the relationship between cognitive style and reaction time (see Appendix 5.1 for information form). As in all previous studies, I then delivered the cover story about the two different cognitive styles and the research behind this approach. This was, of course, intended as a rationale for the minimal group paradigm, the usual dot estimation task (DET). As in studies 1 and 2, participants were told that their cognitive style could be tested using the DET and that their type of cognitive style would depend on whether they over- or under-estimated the number of dots in 3 patterns. Participants were then asked to sign a consent form (see Appendix 5.2). The minimal group paradigm was then carried out as in the previous two studies, which resulted in 32 pairs, 16 in the out-group and 16 in the in-group condition.

In both group conditions, 8 pairs underwent the competition manipulation and 8 each underwent the non-competition manipulation. In the competition condition, participants were told that there was scientific evidence showing that performance on the forthcoming computer task would correlate with their own cognitive abilities and general intelligence, presumably a highly relevant piece of information for most students. To support this baseless claim, fake evidence was given for an alleged relationship between computer task performance and intellectual capability, and participants were encouraged to perform as well as possible (see Appendix 5.3 for speech given to participants in the competition condition). To further emphasise the group aspect of the competition induced, participants were told that their best performance would give the researcher an accurate measure of the capabilities of people with their particular cognitive style. In the no-competition condition, participants were told they would be given extensive practice on the computer task before the 'actual experiment', which of course never came, and that they could use the long practice session to ‘relax and just get comfortable’ with the task. No mention of the need for speed or performance was made (see Appendix 5.4 for speech given to participants in the no-competition condition).

Participants then carried out the Joint Simon Task (see fig. 5.1 for a schematic of the task), doing both the joint task and the single task, with a reminder between the two for participants to use the same hand as instructed on each task. Other than this reminder and the competition manipulation, the single and joint trials were carried out the same way as in study 2, with the method and the same stimuli presentation as described in the previous study.

After doing both the joint and single tasks, participants were asked to complete a short questionnaire, which consisted of the following four sections: 1) general interest in the partner’s mental states, 2) similarity/closeness that they felt to their partner, 3) the importance of their identity as a student to them, and 4) the degree to which they felt competitive pressure (see Appendix 5.5 for full questionnaire). Participants were fully debriefed at the end of their session and given course credit (see Appendix 5.6 for debriefing form).

Data analysis

All trials with incorrect (responses to the wrong colour arrow) or outlier responses (< 100 ms, > 1000 ms) were discarded from reaction time analysis (< 1% of overall trials). Overall, the accuracy was very high (98% correct), which made an analysis of error rates superfluous. Participant pairs were used as the unit of analysis.

For analysis, the pair of participants was treated as a single data point. This was because participants did not react independently within their pairs, as demonstrated by the significant correlation between the reaction times in all 4 types of trials (including compatible, incompatible, single, and joint trials) of participants who did the task together ($r = .21$, $n = 128$, $p < .02$).

The key theoretical prediction was that participants would represent their partners' intentional actions less when asked to cooperate with an out-group than an in-group member. According to this hypothesis, the Social Simon Effect (a greater compatible vs incompatible reaction time difference in the joint than single task) should occur only when interacting with in-group members. If group membership is a key force behind the Social Simon Effect, then it should occur only in the in-group condition and regardless of the level of perceived competition. Instead, the level of perceived competition should act across social conditions, i.e. regardless of whether a partner is perceived as an in-group or out-group member. Therefore, the level of competition should affect the overall reaction times by producing faster reaction times in the 'competition' than the 'no-competition' condition, while not altering the Social Simon Effect itself.

Results

Main Effects

All data were analysed using analysis of variance tests. First, participants were faster in compatible (spatial orientation of stimulus corresponds with the response location, mean = 292.6 ms) than incompatible trials (spatial orientation of stimulus does not correspond with the response location, mean = 295.3 ms, $F(1, 28) = 6.41$, $p < .05$, see fig. 5.2 below).

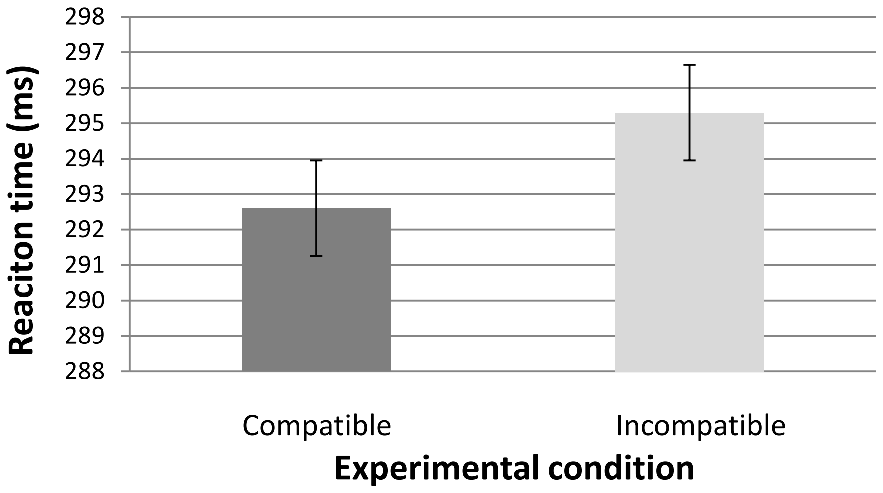


Figure 5.2. Participant reaction times (means ±SE) as a function of compatibility of stimulus and response location.

Second, participants were significantly faster in the joint task (mean = 281.8 ms) than the single task (mean = 306.2 ms; $F(1,28) = 66.2$, $p < .001$, see fig. 5.3 below).

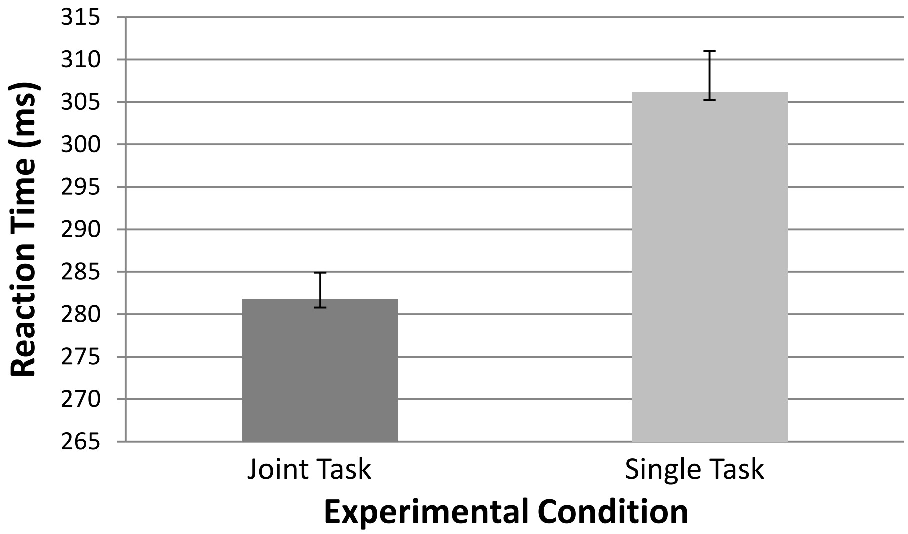


Figure 5.3. Participant reaction times (means ±SE) as a function of carrying out the task with a partner (joint) or alone (single).

Finally, participants reacted more quickly in the competition (mean = 286.2 ms) than the no-competition condition (mean = 301.8 ms; $F(1, 28) = 4.36$, $p < .05$, see fig. 5.4 below), showing that competition had an overall significant effect.

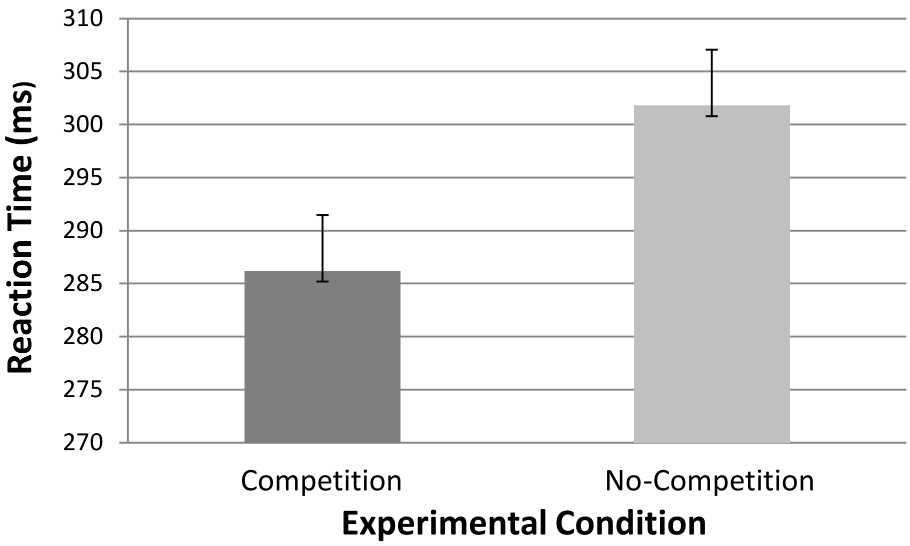


Figure 5.4. Participant reaction times (means ± SE) as a function of whether or not they were subjected to competition.

Third, participants responded faster in the out-group (290.1 ms) than in the in-group condition (297.9 ms), but the difference was not significant, ($F(1,28)$ = $p > .31$, see fig. 5.5 below).

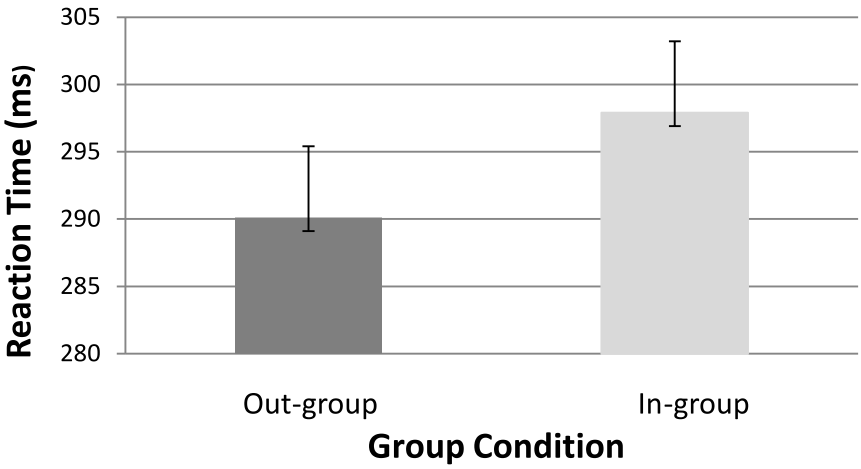


Figure 5.5. Participant reaction time (means ±SE) as a function of group condition: out-group vs. in-group.

Interactions

There was no significant overall interaction between task type (joint vs. single) and compatibility of stimulus and response location ($F(1,28) = .17$, $p > .70$, see fig. 5.6 below), i.e. the difference between compatible and incompatible trials was not greater in the joint than the single task, and therefore there was no evidence for an overall 'Social Simon Effect'.

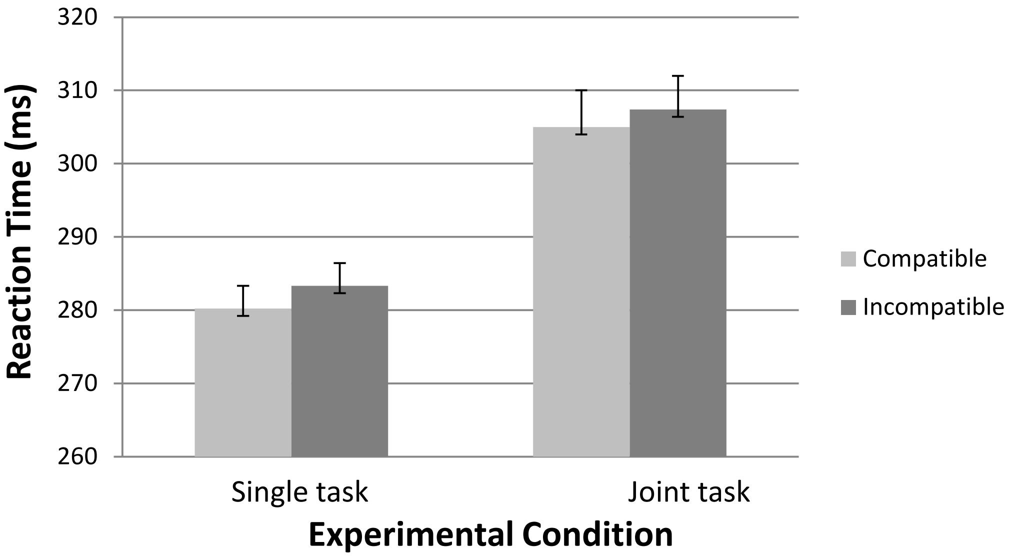


Figure 5.6. Participant reaction times (means ±SE) as function of task type and compatibility of stimulus and response location.

There was, however, a significant interaction between task type, compatibility, and group membership ($F(1, 28) = 4.47$, $p < .05$). This was due to a significant difference in the joint task/in-group condition between compatible (mean = 284.6 ms) and incompatible trials (mean = 290.3 ms, $F(1, 28) = 7.76$, $p < .05$), but not in joint task/out-group condition (compatible mean = 275.9 ms vs. incompatible mean = 276.4 ms; $F(1, 28) = 0.2$, $p > .10$, see fig. 5.7), indicating the presence of a Social Simon Effect in the in-group condition only.

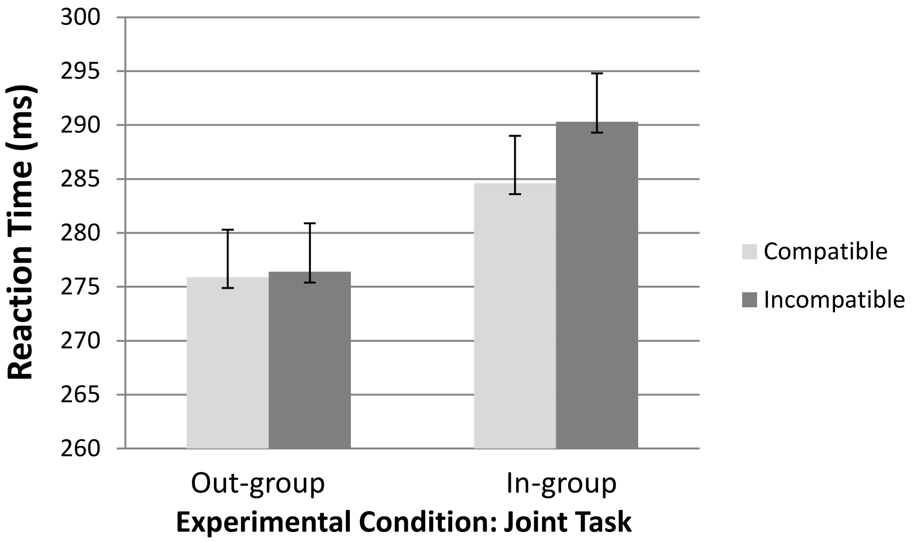


Figure 5.7. Participant reaction times (means ±SE) in the Joint Task comparing in- and out-group conditions as a function of the compatibility of stimulus and response location.

There was no such interaction in the single task condition, i.e. there was no significant difference in the in-group and out-group between compatible and incompatible conditions (in-group/compatible mean = 307.3 ms; in-group/incompatible mean = 308.9 ms, $F(1, 28) = .8$, $p > .1$; out-group/compatible mean = 302.4 ms vs. out-group/incompatible mean = 305.0 ms; $F(1, 28) = 0.4$, $p > .10$, see fig. 5.8).

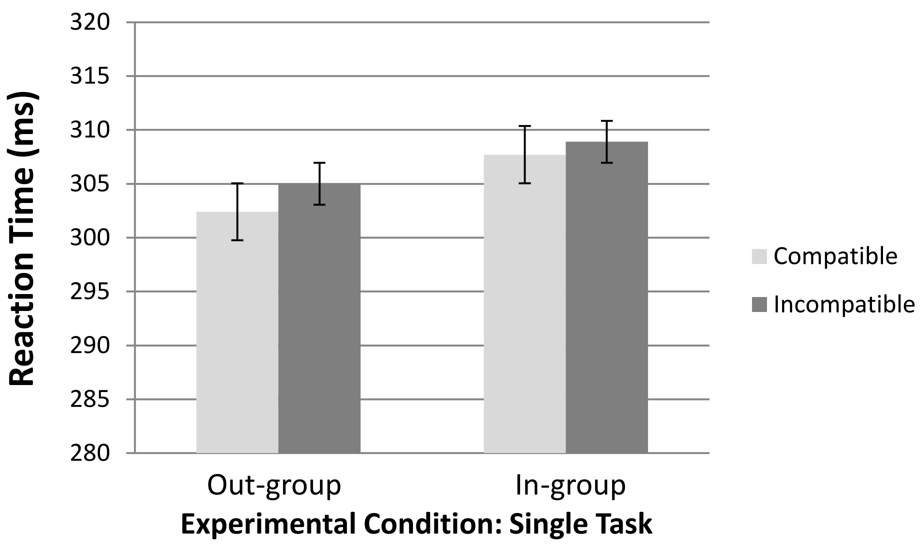
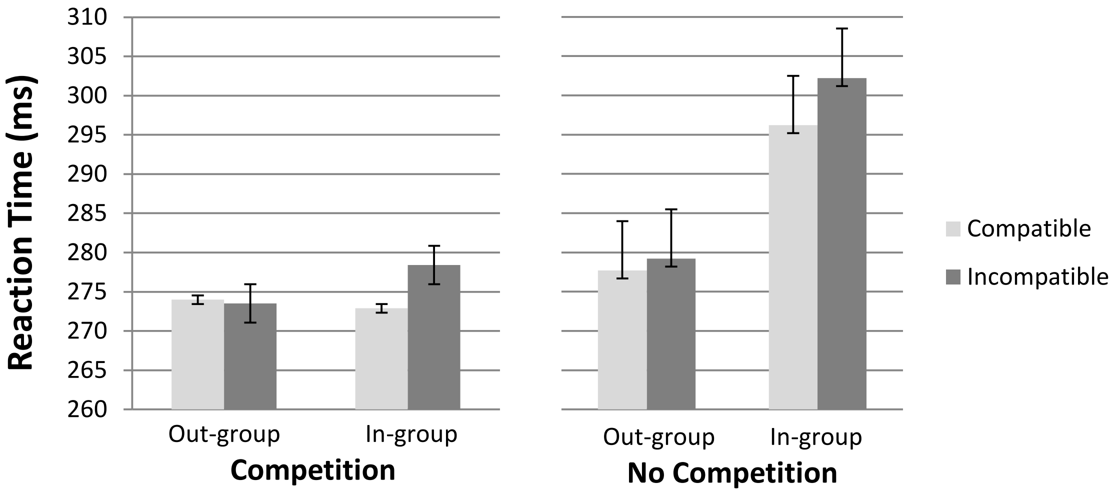


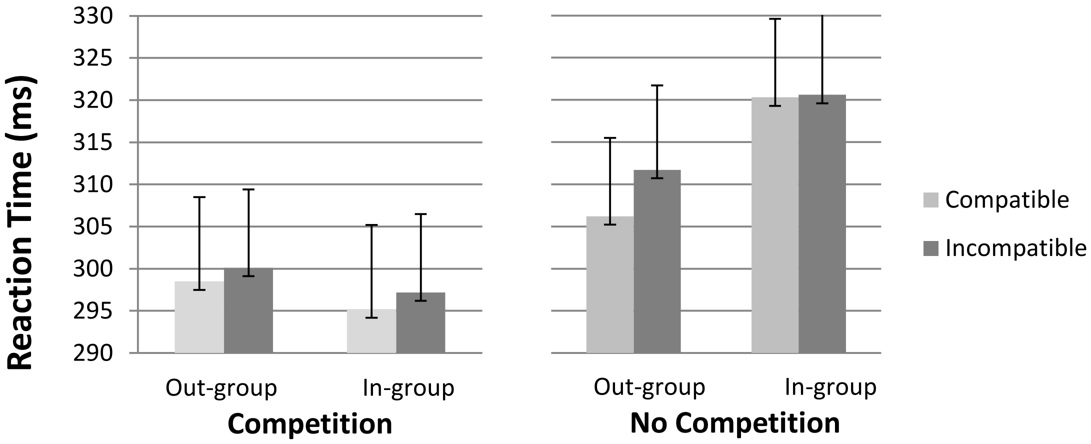
Figure 5.8. Participant reaction times (means ±SE) in the Single Task comparing in- and out-group conditions, as a function of the compatibility of stimulus and response location.

Importantly, the significant interaction did not hold when looking at the effect of competition, that is, there was no interaction between competition and compatibility and group condition ($F(1,28) = .29$, $p > .60$, see figs. 5.9 and 5.10 for single and joint tasks). In other words, no matter the level of competition participants felt, interacting with someone they perceived as an in-group member increased the difference in reaction times on compatible and incompatible trials in the joint task, whereas there was no such difference in participants interacting with a presumed out-group member. There was no such interaction on the single task. Thus, the experiment provided evidence for a Social Simon Effect in the in-group but not the out-group condition. Its existence was unaffected by changes in perceived competition when carrying out the task.



Experimental Condition: Joint Task

Figure 5.9. Participant reaction times (means ±SE) on the Joint Task in the 'competition' (left group) and 'no-competition' (right group) conditions as a function of group membership and compatibility.



Experimental Condition: Single Task

Figure 5.10. Participant reaction times (means ±SE) on the Single Task in the 'competition' (left group) and 'no-competition' (right group) conditions, as a function of group membership and compatibility.

Questionnaire

The questionnaire consisted of four subscales, each with six items (see Appendix 5.5 for full questionnaire). The four subscales were: 1) mental states: general interest in the partner's mental states, 2) similarity/closeness: degree of similarity and closeness they felt to their partner, 3) student identity: the importance of their identity as a student to them, and 4) competition: the degree to which they felt competitive pressure. After reverse scoring the appropriate items, the internal consistency of each subscale was measured by calculating Cronbach's alpha for each subscale. The mental states subscale which sought to gauge participants' interest in their partner's mental states had an acceptable internal reliability ($\alpha = .74$). The similarity / closeness subscale, which gauged participants' sense of closeness and similarity to their partners, also had an acceptable internal reliability ($\alpha = .76$). The student identity subscale gauged the importance of the student identity to participants and was found to have low reliability ($\alpha = .55$), which did not increase with removal of any one item or any combination of items. Given the low internal reliability, the student identity subscale was subsequently dropped as a scale. Lastly, the competition subscale gauged participants' sense of competition during the computer task and was found to be highly reliable ($\alpha = .90$).

Interestingly, on the mental states subscale participants in the in-group reported more interest in their partner's general mental states than did participants in the out-group condition (4.6 vs. 4.0; $F(1,28) = 4.7$, $p < .05$, see fig. 5.11 below). There was no main effect of competition on this subscale (no competition = 4.2, competition = 4.4; $F(1,28) = .67$, $p > .40$), and no interaction between competition and group condition ($F(1,28) = .02$, $p > .90$).

Furthermore, self-reported interest in the partner's mental states did not correlate with participants' reaction times on the joint action task ($r = -.01$, $n = 32$, $p > .90$), nor did it mediate the effect of group membership on the Social Simon Effect, as shown by the Sobel test ($z = .02$, $p > .90$).

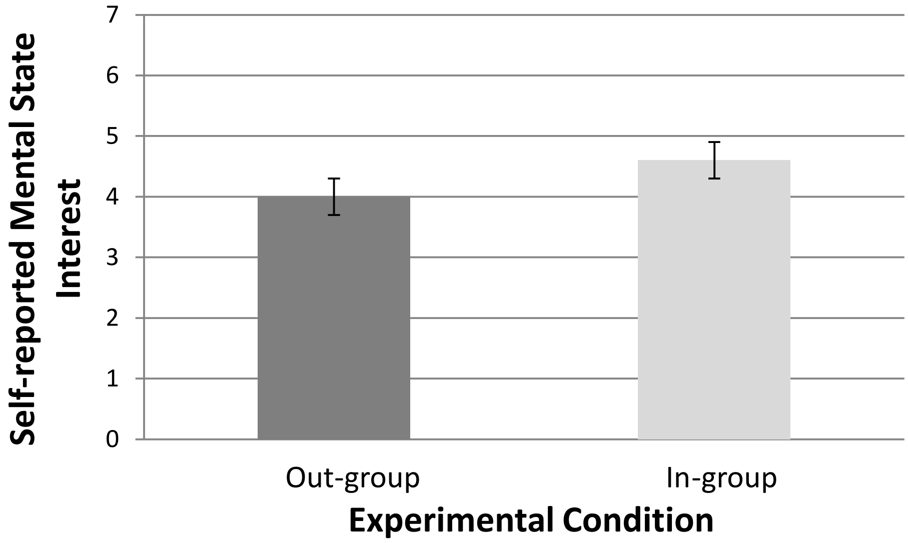


Figure 5.11. Participants' self-reported interest in their partners' mental states (means ±SE) as a function of group membership.

The similarity/closeness subscale assessed participants' feelings of connection to and commonality with the partner. Participants in the in-group condition reported increased feelings of similarity and closeness to their partners relative to participants in the out-group condition (4.8 vs. 4.3; $F(1,28) = 4.2$, $p < .05$, see fig. 5.10 below), but again there was no main effect of competition on this subscale (competition = 4.6 , no competition = 4.5; $F(1,28) = .67$, $p > .4$) and no interaction between competition and group condition ($F(1,28) = .23$, $p > .6$).

Like the subscale on interest in participants' mental states, this subscale of similarity and closeness did not correlate with participants' reaction time output in the joint action task ($r = .11$, $n = 32$, $p > .50$). The similarity/closeness subscale also did not mediate the effect of group membership on the Social Simon Effect, as shown by the Sobel test ($z = .02$, $p > .90$).

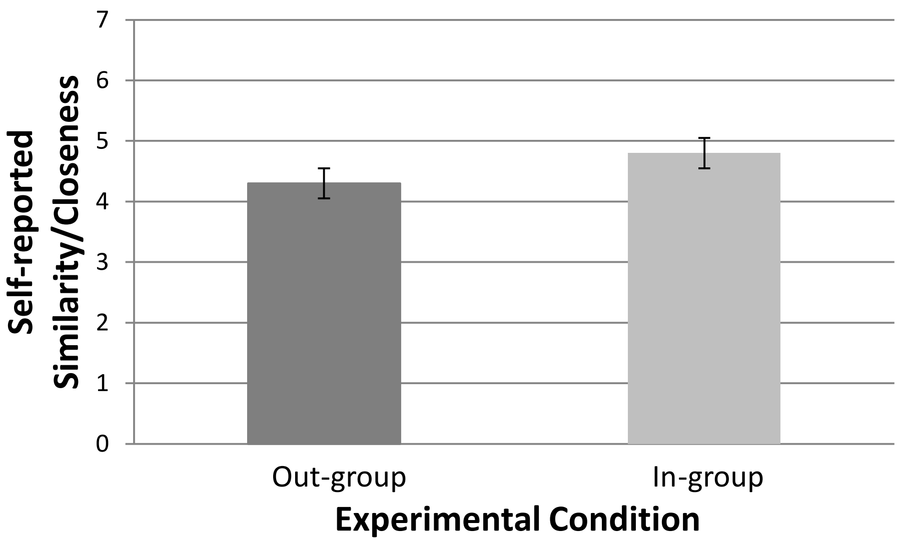


Figure 5.12. Participants' self-reported feelings of similarity and closeness (means ±SE) as a function of group membership.

Interestingly, on the competition subscale, participants in the competition condition did not report a significantly increased sense of motivation or desire to compete relative to participants in the no-competition condition (4.3 vs. 4.0; $F(1,28) = 1.1$, $p > .4$). There was also no main effect of group membership in reported feelings of competition (out-group = 4.2, in-group = 4.1; $F(1,28) = .18$. $p > .7$), nor an interaction between competition and group membership ($F(1,28) = .50$, $p > .4$). This is surprising given the nature of the competition manipulation, and will be discussed further in the discussion section.

Discussion

This study investigated whether participants represented their partners as intentional agents as a function of their perceived group membership and competition. Using the Joint Simon Task (Sebanz et al., 2003b), I sought to determine whether participants' responses were altered when they did the task with in-group members. That is, whether cooperating with an in-group member would lead participants to be both faster on the compatible trials and slower on incompatible trials on the joint task compared to the single task. This would constitute evidence of a Social Simon Effect. A Social Simon Effect in the in-group and not in the out-group condition would indicate that participants were representing their intentional partner's responses simultaneous to their own in the in-group only. Results showed that, similar to the previous study and as expected, participants were overall faster on compatible than incompatible trials, and also faster when doing the task with another person in the joint condition than alone in the single condition. A key modification in this study was that competition was added as an additional independent variable.

Results showed that participants subjected to the 'competition' manipulation were faster overall, demonstrating that the manipulation successfully induced a sense of increased motivation to complete the task. In contrast to the previous study, the participants in this study were not significantly faster overall in the out-group than in-group condition, although a trend in the same direction was visible. This could have been because, in the current study, competition was controlled for. This also resulted in no significant interaction between competition and group membership. That is, in both the in-group and out-group conditions, participants experienced either high or low levels of motivation as a function of the competition manipulation. This external source of competition could have masked the inherent inter-group levels of competition which, in study 2, lead to a main effect of group membership with the out-group being faster. The fact that competition was controlled external to group membership could be why there was no significant overall difference between the reaction times of the in-group and the out-group in the current study.

The second methodological improvement on the previous study is the controlling for handedness. Participants were first instructed as to which hand to use before their first task, and crucially they were reminded between the single and joint tasks to maintain the same hand use that they were instructed to use for their first task. This meant that compatibility was not interfered with on any trial.

Most importantly, this study has provided evidence for a context-dependent Social Simon Effect. When asked to do the single task alone participants experienced no interference from the irrelevant spatial dimension, but participants doing the same task in conjunction with an in-group member next to them were significantly affected, presumably by the computational demands of mentally representing their in-group partner as an intentional agent. These results therefore suggest that the 'Social Simon Effect', reported in various previous studies, e.g. (Sebanz, Knoblich, & Humphreys, 2008; Sebanz, Knoblich, & Prinz, 2005), is not uniformly present but instead is significantly affected by group membership. That is, the Social Simon Effect was only present if participants believed they were interacting with a fellow in-group member while it was absent in interactions with an out-group member. Results are thus consistent with the interpretation that participants did not represent out-group members as intentional agents during these interactions.

Some of these empirical findings were supported by results from the questionnaire. Firstly, participants reported more interest in their partners' general mental states in the in-group than the out-group condition. This self-reported interest covered notions such as a partner's 'thoughts', 'beliefs', 'needs', 'intentions', 'knowledge', and 'aspirations' (see Appendix 5.3 for full questionnaire). Participants who did the Joint Simon Task with a presumed in-group member reported increased interest along all of these domains of mental states. Crucially, they had no opportunity to talk with their partner before completing the questionnaire, which complements the evidence provided as part of study 1. That is, this result also shows increased mental state interest based solely on shared group membership and little else. The results from this subscale of the questionnaire show that participants have an increased interest in their partner's mental states, provided they belong to the same group.

Secondly, results from the questionnaire showed that participants in the in-group condition experienced more feelings of similarity and closeness to their partners than did participants in the out-group condition. This is in line with past research, which has shown that even basic categorisation in the absence of other social factors increases a person's desire to seek physical and psychological closeness to a fellow in-group member (Novelli, Drury, & Reicher, 2010a; Uleman, Rhee, Bardoliwalla, Semin, & Toyama, 2000).

Thirdly, the questionnaire data suggested that the competition manipulation, although it affected participants' overall reaction times, acted on a subconscious level. That is, participants in the competition condition reported no awareness of an increased sense of urgency, motivation, or desire to win than participants in the no-competition condition although they behaved as if they had felt such motivations, in that they reacted more quickly on the computer task. This suggests that the competition manipulation was effective outside participants' conscious awareness. This in turn indicates that the competition manipulation used was successful in instigating a sense of competition in a covert way without drawing too much attention to the artificial nature of the manipulation.

Of further relevance is that, like the competition manipulation, the effects reported here in this study appeared to have been outside participants' immediate awareness. When debriefed at the end of the experiment, participants all reported that they had not consciously considered the categorisation of their partner relative to themselves. Most participants reported that they had responded as quickly as they possibly could, unaware and regardless of the condition they were in.

Controlling for the potential effects of competition was an important addition in this study, mainly because of the potential that any group manipulation has to automatically affect levels of perceived competition in experimental tasks (Tajfel et al., 1971). In the current study, instilling a sense of competiveness led to a main effect in that participants in competitive conditions were faster in their responses than participants in the non-competitive conditions. Most importantly, though, competition acted independently, regardless of all other manipulations, as indicated by the absence of interactions between competition and other factors. In other words, the effects of competition cannot account for the selective presence of the Social Simon Effect in the in-group condition. Similarly, the factor of competition alone cannot explain why participants failed to represent out-group partners as intentional agents.

The current study has therefore extended the results of the previous study to produce evidence that people are more likely to represent others as intentional agents if they are perceived as members of the their own group, even if the effects of competition are controlled for. This further suggests that the differential levels of mental state attribution seen in study 1 are most likely due to a failure to activate basic social cognitive processes in the out-group condition, most importantly perceiving others as intentional agents. This, in turn, may lead to a lack of necessary building blocks for mental state attribution. In other words, if people are automatically failing to perceive out-group members as intentional agents, there is less scope for higher level cognitive processes, including complex representations of others' mental states. This suggests that the differential levels of mental state attribution seen in study 1 are not due to higher-level processes, such as an awareness of social norms, which would affect only the exhibition of the products of theory of mind cognition and not mental state attribution itself.

In the current chapter, I have provided preliminary evidence for the role of the representation of intention in mental state attribution. I have also shown that this process is affected by perceived group membership and that it can have cascading effects that appear to interfere with higher level processes, such as mental state attribution. However, it is still uncertain whether the representation and understanding of another's intent is the primary relevant process that is involved in group-based cognitive assessments. Is representation of intention the 'line in the sand' past which categorisation has no influence, or does categorisation based on group membership also affect even more basic social cognition processes?

A potentially interesting candidate mechanism one could use to answer this question is social learning, or, very simply, the processes by which people learn from others (Whiten, 2000). As outlined in the introduction, social learning processes straddle the line-in-the-sand of intentionality perception: while some social learning processes require understanding another's intent, other similar but more basic processes do not. Whether perceived group membership has an effect on the more basic social learning processes is currently unknown. This issue, which will be addressed in the next chapter, will help answer the question of how deep the effects of group categorisation penetrate to produce differential mental state attribution.

Chapter 6

Study 4: Social learning in an inter-group context

Abstract

Study 3 has shown that representation of others as intentional agents is a function of group membership, and as such it occurs less frequently in interactions with members of a perceived out-group than of a presumed in-group. In the previous study, I have shown that group membership affects the attribution of intent, suggesting that subsequent differential mental-state attribution based on group membership may be a function of this process. It is plausible that the ability to attribute intent is the crucial factor in social cognition processes on which group categorisation acts. Categorisation of a person as 'out-group', in other words, may thus be sufficient to hinder only those social cognition processes that involve the representation of intention. However, the extent to which group categorization affects even lower-level social cognition processes remains unknown. Literature from comparative psychology suggests that the perception of intention is not necessarily the most basic form of social cognition. There is evidence for lower level social cognition processes that do not involve attribution of intention, especially simple types of social learning. It is thus also possible that group membership affects all levels of social cognition, including more basic social cognition processes that do not involve the perception of intentionality. This study is designed to explore the extent to which group categorisation affects even lower-levels of social cognition processes that can operate without the attribution of intention. To this end, this study focuses on a basic form of social learning, 'stimulus enhancement', which involves having one's attention drawn to an aspect of the environment via social means. As in previous studies, a minimal group paradigm was used to create in-group and out-group

conditions with each participant paired with a confederate. The confederate then ‘enhanced’ one of ten objects by manipulating it during a supposed memory task. Participants reacted differently to the enhanced object compared to control objects, by touching the focal object sooner, manipulating it both proportionally and absolutely for longer periods, and by listing it earlier in a subsequent recall test. However, group membership did not have an effect on stimulus enhancement: participants did not differ in their response to the enhanced object as a function of the confederate’s group membership. This suggests that, although stimulus enhancement is active during normal adult social interactions, it is unaffected by the group membership of an interacting partner. The fact that this type of social cognition does not involve the perception of a partner’s intentionality suggests that group categorisation exerts its cognitive effects primarily on processes involving the reading of intention.

Introduction

Results of study 3 suggest that the degree to which people represent others as intentional agents depends on their group membership. That is, even controlling for competition, people interacting with a perceived out-group member in a joint action task react as if they were alone, with no indication that they represent their partner as an intentional agent. However, if subjects are under the impression that they are in the presence of an in-group member then their performance is altered, as demonstrated by the presence of a 'Social Simon Effect', a strong indicator of representing a partner as an intentional agent. In particular, participants carrying out a 'Joint Simon Task' with an in-group partner experienced interference from representations of their intentional co-actor in the joint task.

In the three previous studies I have provided evidence that both the representation of intention and mental state attribution are affected by categorisation of others as 'in-group' or 'out-group'. I have further argued that representing others as intentional agents is a key precondition and cognitive building block of mental state attribution during group categorisation. However, whether or not even simpler processes of social cognition are involved is currently unknown. For example, it is possible that categorising a person as 'out-group' is sufficient to hinder even the most basic social cognition processes, including those that do not involve representation of intentionality. Alternatively, it is possible that perception of a person as 'out-group' only affects higher levels of social cognition that involve representation of intentionality. In the latter case, such basic levels of social cognition would not be affected by group categorisation because they do not require any understanding of another's intent.

Various social learning processes exist both above and below the cut-off line of intention perception. Research into developmental and animal cognition has made considerable progress in recent decades with social cognition playing an important role (e.g. Shettleworth, 2010).

Above the line of attribution of intent, imitation is a process which requires an observer attending to another individual's behaviour to infer their goal or intent. This was shown using classic paradigms in which demonstrations of specific actions were incomplete and therefore the demonstrator's goal had to be inferred for the action to be correctly imitated (Meltzoff, 1995). For instance, 18-month olds who watched a series of object manipulations produced target acts even when an adult demonstrator merely attempted (and failed) to achieve the objects' end states (Bellagamba & Tomasello, 1999). Infants also have a preference for imitating intentional as opposed to accidental actions. This was shown by Carpenter and colleagues who showed that infants preferentially imitated an adult's actions that were marked with vocal cues of intentionality (e.g. 'there!') compare to actions marked as accidental (e.g. 'oops!'), (Carpenter, Akhtar, & Tomasello, 1998).

Conversely, stimulus enhancement occurs merely because a social situation, for example one person fiddling with a watch, draws another person's attention to that object, in this case the watch, with no reading or understanding of the target's intent (e.g. whether to wind the watch or take it off) being necessary. Stimulus enhancement is a process by which an organism's attention is drawn to salient aspects of the environment due to the actions of a social partner, that is, by its manipulating or coming into contact with an aspect of the environment which makes it salient (Thorpe, 1963). Unlike higher forms of social learning, such as imitation or teaching, there is good evidence that stimulus enhancement does not involve an appreciation of the demonstrator's intent (for a review see Want & Harris, 2002).

Although stimulus enhancement alone can lead to social learning, and even produce a match between observer's and demonstrator's behaviour which can look like imitation at first glance, stimulus enhancement is nevertheless a much more basic process devoid of intentionality representation (Charman & Huang, 2002; Tomasello, 1999). Ravens (Fritz & Kortrschal 1999), marmosets (Caldwell & Whiten 2004), and kea parrots (Huber et al 2001) all show evidence of stimulus enhancement in that, after observers watch a demonstrator interact with a physical object, observers focus their attention on the same aspects of the object as the demonstrator did. In infants, stimulus enhancement seems to promote learning more quickly and earlier than non-social processes. For instance, using stimulus enhancement, 18 month old infants were able to focus their attention on specific aspects of a box in order to reproduce the target behaviour of pushing or pulling a box lid, whereas they could not reproduce the target behaviour when it was modelled in a 'ghost' condition in which the object was manipulated automatically in targeted ways without a social demonstrator (Tennie et al 2006). Stimulus enhancement in the form of both touching objects (Horne et al 2009) and moving objects (Huang et al 2002) can even lead infants to produce behaviours at rates that were previously assumed to require imitation. This may be because, in some cases, stimulus enhancement can be sufficient to teach infants enough about the affordances of an object to lead them to produce target behaviours at the same rate as a full demonstration.

Whatever the behavioural output resulting from stimulus enhancement, it does not require an understanding of a target's intent. Stimulus enhancement is thus widely considered more basic than imitation, as it involves social learning about the environment, irrespective of the behaviour or intention of the social model (Huang et al., 2002). Because of this, stimulus enhancement is an ideal social cognition mechanism to test the level at which group categorisation begins to have cognitive effects. That is, whether categorisation affects only higher-level processes involving some degree of representation of intentionality or whether it affects social cognition at all levels.

Heretofore stimulus enhancement has been studied exclusively in non-human animals and infants. So while stimulus enhancement appears to help infants and non-human animals focus their attention on relevant aspects of their environment, it is currently unknown whether this simple form of social learning plays a relevant role in adult social interactions, and whether it is affected by perceptions of group membership.

The purpose of this chapter is to address the following questions: is stimulus enhancement a relevant social cognitive mechanism that is active in adult interactions and, if so, is it affected by a social partner's perceived group membership? Group membership is likely to play a role during social learning as it may be important to be selective about one's choice of demonstrators during social learning. For instance, learning from in-group members may arguably be more beneficial for an individual than learning from a member of another group, as in-group members are likely to have more relevant information for an observer. Based on these arguments, it is reasonable to hypothesise that stimulus enhancement will occur more frequently in interactions with the in-group than the out-group.

The alternative hypothesis is that group categorization does not act at this basic level, and that categorisation acts on social cognition processes at the level of representation of intention and above. According to this second hypothesis, stimulus enhancement should occur in adults regardless of the group membership of the individuals interacting with.

Method

Participants

37 female undergraduate students of the University of St Andrews between 18 and 22 years of age participated in this study. An additional 7 individuals were tested but excluded from the analysis after they disclosed that they had had previous experience with minimal

group paradigms. Participants were recruited using the on-line research recruitment system at the University of St Andrews, and all participants received £3 for their participation.

Design

The current study aimed to determine whether healthy human adults are affected by one of the simplest social learning process described in the literature, stimulus enhancement, and whether this process is affected by group membership. The key manipulation was to employ a memory task as a cover story in which participants were required to learn a set of objects they were presented. Participants first watched a confederate demonstrator manipulate one of the ten objects they were required to learn during a ‘learning phase’, after which participants had their own learning phase in which they were allowed to manipulate any of the objects at will. The presence of stimulus enhancement was assessed by comparing measures of the participants’ behaviour towards the enhanced object with a non-enhanced control object during this phase. Longer-term effects of stimulus enhancement were determined using a measure of participants’ recall of the objects after the task. See chapter 2 for full details.

To instil group categorisation participants were subjected to a minimal group paradigm, the ‘Dot Estimation Task’, e.g. (Howard & Rothbart, 1980). For full details see chapter 2. Participants carried out the ‘Dot Estimation Task’ together with a confederate, after which both were arbitrarily assigned to either the in-group condition (in which both were arbitrarily assigned to be over-estimators or under-estimators) or the out-group condition (in which there was one of each).

In the subsequent memory task participants were confronted with 10 objects that were placed on a table between the confederate and the participant (see fig. 6.1). Prior to the task, two objects were chosen on which the subsequent analyses were based (see chapter 2 for full details). The first object was the one the confederate enhanced by manipulating it for 5 seconds, the 'focal object' (FO). The second object, then 'control object' (CO) was not touched by the confederate. The FO and the CO were always positioned at the centre-left and centre-right of the entire array of objects as in fig 6.1. The FO and CO objects and their positions were counterbalanced across trials to control for saliency of object and location; that is the same two objects were alternately used as either FO or CO in both centre-left and centre-right positions. Each trial took approximately 20 minutes.

Materials

For the 'Dot Estimation Task', the same boards measuring 59cm x 41cm featuring prints of three groups of dots were used as in the previous experiments (see previous chapter for details). For the memory task, 10 different objects were displayed on a table of 45 cm x 45 cm, roughly 50 cm off the ground. The ten objects were all ordinary office items without any intrinsically high relevance (see chapter 2 for full details of object choice). The two objects chosen to alternate as the focal object were the JVC-VHS tape and the empty box of staples, as they were of similar size, colouring, functionality, and pre-determined salience to participants. The participant and the confederate were placed on seats at the table facing eachother (see fig. 6.1). All trials were filmed using a ceiling-mounted X-Vision XSD10ZCPC CCTV system in the developmental lab in the School of Psychology, University of St Andrews.

Procedure

Participants were given appointments through the university's online research participation system. Upon arrival they were greeted in at the main lobby of the psychology building and told that the 'other participant' (the confederate) was already waiting in the developmental lab. They were then taken to the lab where they were given an information form detailing the experiment and then asked to sign a consent form (see Appendix 6.1 for 'Information Form' and 'Consent Form').

Once the participant and confederate had signed the consent form, the experimenter explained in more detail the (supposed) purpose of the research. This was to provide a cover story for the minimal group paradigm. To this end, participants were told that the study was designed to investigate the link between cognitive style and memory (see Appendix 6.2 for Protocol including cover story). Participants were then given approximately the same cover story as in previous experiments with some theoretical background of the 'Dot Estimation Task'. After arbitrary assignment to either the over- or under-estimation category, both the participant and the confederate were then asked to wear a small badge with the appropriate category on it (see figure 6.1). That is, in the in-group condition, both the participant and confederate were given the same badge (either both 'Over-estimator' or both 'Under-estimator' badges), while in the out-group condition the participant and confederate were given different badges to wear. They were told that the badges would 'help remind the researcher' of their cognitive styles, when in fact they were designed to make group membership highly salient.

After this procedure, the participant and confederate were instructed that they would take a memory task which would involve first a learning phase followed by a recall phase (see chapter 2 for full details). They were told the 60-second learning phase would allow them to memorise a set of objects on the table in front of them. During that learning phase they were told they could ‘do whatever they wanted with the objects that would help them learn them’. For the recall phase, they were told, they would be required to do two memory tasks. The first task was to list as many of the objects on the table they could recall. The second task was to write down the name of one object that the experimenter would remove.

After instructions, the objects on the table were uncovered and the confederate was always given the first learning phase to allow her to touch one of the objects first. She manipulated the focal object (the FO), which was either the JVC-VHS tape or the empty box of staples, for approximately 5 seconds and then replaced it in the same location, pretending to study all the objects closely during the rest of her learning phase, during which she touched no further objects. The participant was then given her learning phase, during which she was allowed to manipulate the objects in any way she chose. After both the confederate and participant had completed their learning phase, the objects were covered and both were asked to freely list as many objects as they could recall. Next, the experimenter removed one object (either the FO or the CO, counterbalanced) and asked the participant and confederate to write down the missing object to complete the recall phase.

Figure 6.1. Example of the experimental set up of this study, here illustrating the out-group condition. The focal and control objects were, alternately, the black JVC-VHS tape and the blue box of staples, both roughly in the centre of the circle of objects. No other object was touched before the participant was allowed to engage in her learning phase.

After completion of the behavioural task, the pair was given a questionnaire. The questionnaire consisted of five sections which required answers on a Likert scale from 1 (strongly disagree) to 7 (strongly agree), including both positive and negative items. The five sections were as follows: (1) 'Identity/connectedness': participants' sense of identification with the confederate, (2) 'Identity/centrality': their sense of the importance of their cognitive style, (3) 'Attention': the degree to which the participant paid attention to the confederate, (4) 'Theory of Mind': the degree to which participants were interested in the confederate's general state of mind during the experiment, and (5) 'Difficulty': the degree to which participants found the experiment difficult. The full set of questions is presented in Appendix 6.3. Participants were then fully debriefed (see Appendix 6.4 for 'Debriefing Form'), paid £3, and thanked for their participation.

Data analyses

Due to small sample size, non-parametric tests were used throughout this study. Wilcoxon Signed-rank tests and Mann-Whitney tests were performed on the various measures taken to assess whether stimulus enhancement took place in adult individuals and whether this was mediated by group membership. As these tests are done on medians, box plots are presented instead of bar graphs. N=11 participants moved away from the table during the learning phase and did not engage with the task. Consequently, they did not touch any of the objects at all. Therefore, two analyses were conducted: 1) Entire set of data with N = 37 participants, and 2) Restricted set of data, for which the non-touchers were excluded, resulting in an N = 26 participants.

Results

Section A: All participants

All participants were included in the first analysis, even those who avoided the task by not touching any of the objects. This lead to an N = 37 for this first analysis.

Stimulus Enhancement Main Effects

Learning Phase

To determine whether stimulus enhancement plays a role during adult social interactions in general, I first analysed all participants' responses to the enhanced object, regardless of their group membership relative to the confederate's. Using a Wilcoxon signed-ranks test, behavioural effects of stimulus enhancement were all near-significant trends. Participants showed a non-significant trend to approaching the FO (median = 12.0 sec) more quickly than the CO (median = 27.4 sec; $Z = -1.64$, $p < .10$), and a non-significant trend to spending an increased absolute amount of time touching the FO (median = 1.3 sec) over the CO (median = .4 sec; $Z = -1.4$, $p < .15$). There was also a non-significant trend toward all participants spending a greater proportion of their learning phase touching the FO (median = 40.9%) than the CO (median = 38.5%, $Z = -1.6$, $p < .1$).

Recall Phase

After the learning phase, participants were tested to determine whether the stimulus enhancement participants experienced had a lasting effect. Participants were asked to make an ordered list of the objects that they had seen. All participants showed a significant tendency to report the FO (median place in sequential order = 3) earlier in their lists than the CO (median place in sequential order = 5; $Z = -2.7$, $p < .01$).

Stimulus Enhancement: Effects of Group Categorisation

Learning Phase

Next, I sought to determine whether stimulus enhancement was affected by perceptions of group membership in this set of all participants. Results from the learning phase were analysed using Mann-Whitney tests to determine whether behaviour towards the enhanced focal object was affected by the participant's group membership relative to the confederate.

No effects were found in any of the three behavioural measures. First, participants who interacted with a confederate they thought was a member of their own in-group were not quicker to touch the focal object (median latency = 14.6 sec) than were participants interacting with a confederate they presumed to be an out-group member (median latency = 12.5 sec; $U = 163$, $p > .80$). Second, participants in the in-group condition spent no more absolute time interacting with the FO (median = 1.4sec) than did participants in the out-group condition (median = 1.3sec ; $U = 153$, $p > .58$). And lastly, participants in the in-group condition did not spend a greater proportion of the learning phase interacting with the FO (median = 56.9%) than the participants in the out-group condition (median = 37.6% ; $U = 158.5$, $p > .70$).

Recall Phase

Looking at participants' lists in this data set as a function of group membership, we see the same lack of effect: participants in the in-group condition did not list the FO sooner on their recall lists (median place in sequential order = 3) than did participants in the out-group condition (median place in sequential order = 4 ; U = 138.5 , $p > .33$).

At the end of the recall phase, I covertly removed either the focal or the control object from the full array of covered objects. I then removed the cover to reveal the remaining nine objects on the table and asked the participant and confederate to write down which object they thought was missing. There was no significant difference on this measure given that all participants correctly identified the removed object 100% of the time.

Section B: Restricted data set, Non-touchers excluded

For the following analysis, participants who showed avoidance tendencies by not touching any of the objects were excluded. The following anaylsis was therefore done with an N = 26. In general, stronger main effects of stimulus enhancement resulted using this method, but a similar lack of effect of categorisation was observed.

Stimulus Enhancement: Main Effects

Learning phase

As with the entire data set, I first analysed participants' responses to the enhanced object compared to the control object, regardless of their group membership relative to the confederate's using Wilcoxon signed-ranks tests.

The confederate's demonstration had measurable effects on participants in this restricted data set. First, participants approached the enhanced object significantly more quickly than the control object, illustrated by a faster latency to touch the focal object (median = 6.7 sec) compared to the control object (median = 10.4 sec; Z = -1.64, $p < .05$, see fig. 6.2).

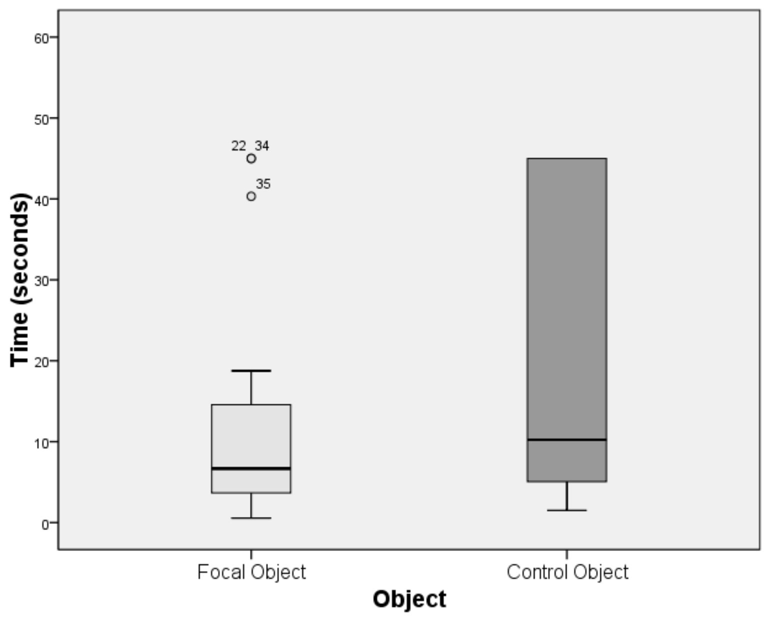


Figure 6.2. Participant latency to objects (medians) as a function of stimulus enhancement. Focal object = object manipulated by the confederate, Control object = object not touched by the confederate.

Second, participants spent more time manipulating the enhanced object, (FO median = 1.1 sec) than the non-enhanced object, although this effect was not significant (CO median = 2.4 sec, Z = 1.4, p < .08; see fig. 6.3).

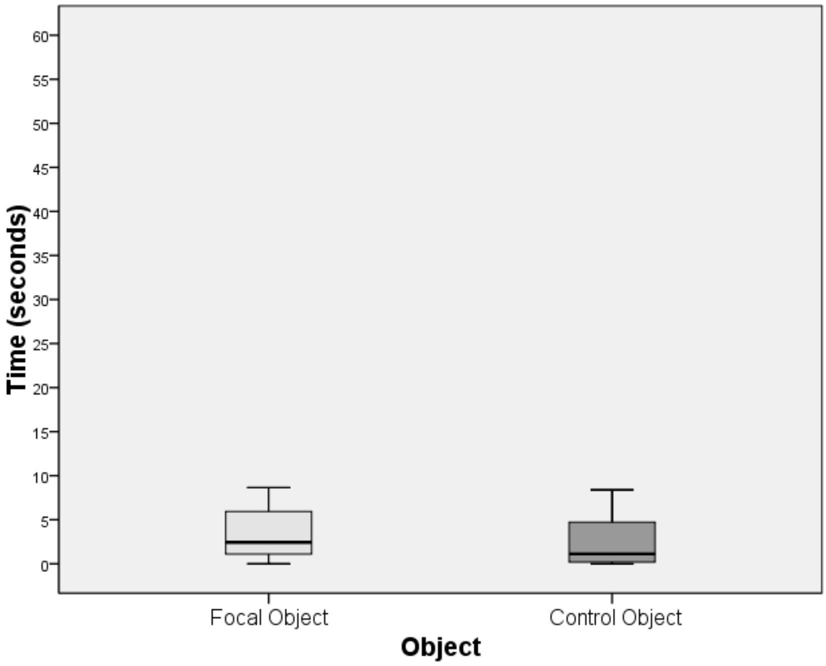


Figure 6.3. Participant total time spent manipulating objects (medians) as a function of stimulus enhancement. Focal object = object manipulated by the confederate, Control object = object not touched by the confederate.

Third, in relative terms, participants spent a significantly greater proportion of the learning phase manipulating the enhanced object than the non-enhanced object ($Z = -1.6$, $p < .05$; fig. 6.4).

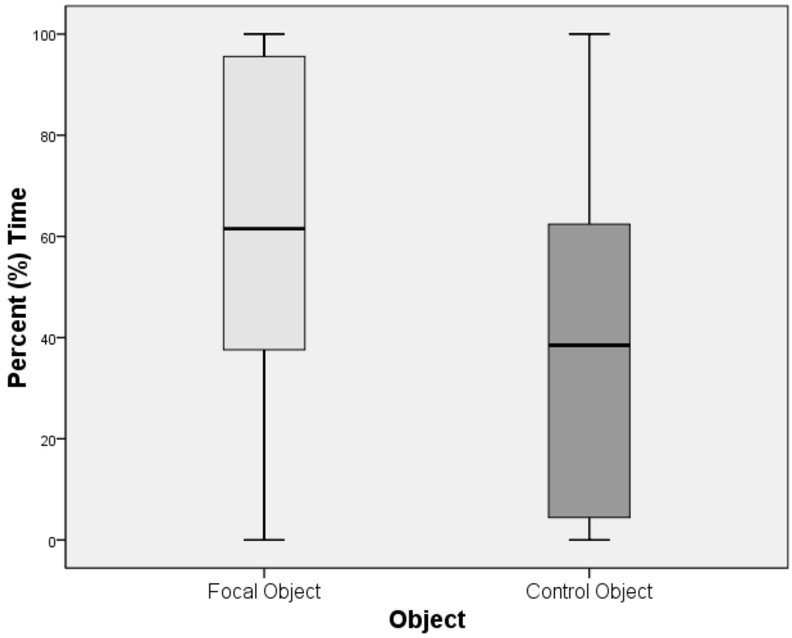


Figure 6.4. Percentage of learning phase spent manipulating objects (medians) as a function of stimulus enhancement. Focal object = object manipulated by the confederate, Control object = object not touched by the confederate.

Recall Phase

Again, after the learning phase, the longer-term effects of stimulus enhancement were gauged using two measures of participants' recall for the various objects.

When asked to freely list as many objects as they could recall, participants in this restricted data set also listed the enhanced focal object (median place in sequential order= 3) significantly sooner than the control object (median place in sequential order = 5) ($Z = -2.69$, $p < .01$; fig. 6.5).

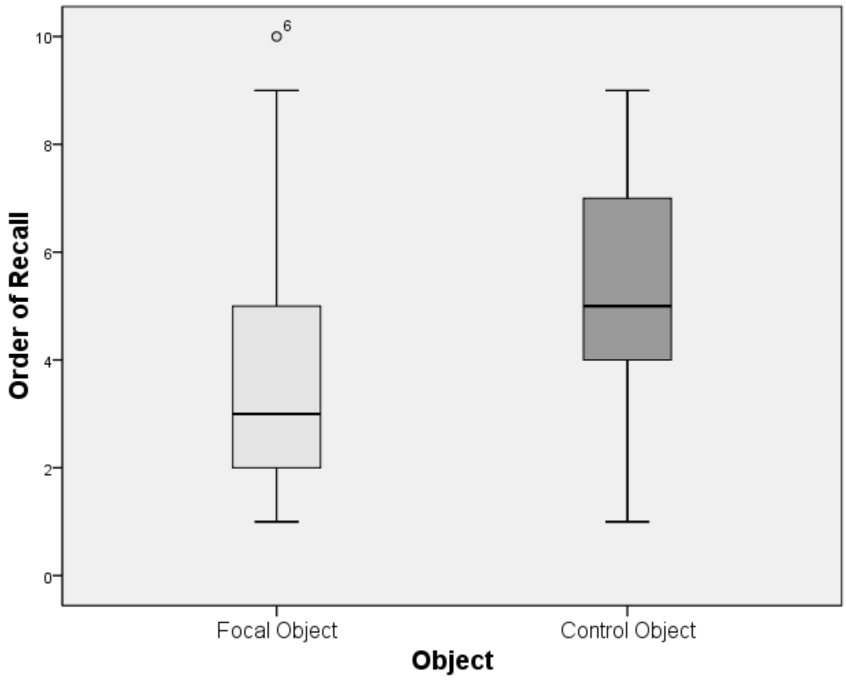


Fig. 6.5. Sequential order in recall list (medians) of objects as a function of stimulus enhancement. Focal object = object manipulated by the confederate, Control object = object not touched by the confederate.

Again, all participants were able to correctly identify the removed object 100% of the time.

Stimulus Enhancement: Effects of Group Categorisation

Learning Phase

As in the previous analysis, I then sought to determine whether stimulus enhancement was mediated by perceptions of group membership in this restricted data set. Results from the learning phase were analysed using Mann-Whitney tests to determine whether behaviours towards the enhanced focal objects were affected by the participant's group membership relative to the confederate.

As in the previous analysis, no effects were found in any of the three behavioural measures. First, participants who interacted with a confederate they thought was a member of their own in-group were not quicker to touch the focal object (median latency = 6.0 sec) than were participants interacting with a confederate they presumed to be an out-group member (median latency = 7.2 sec; $U = 82.5$, $p > .40$, see fig. 6.6).

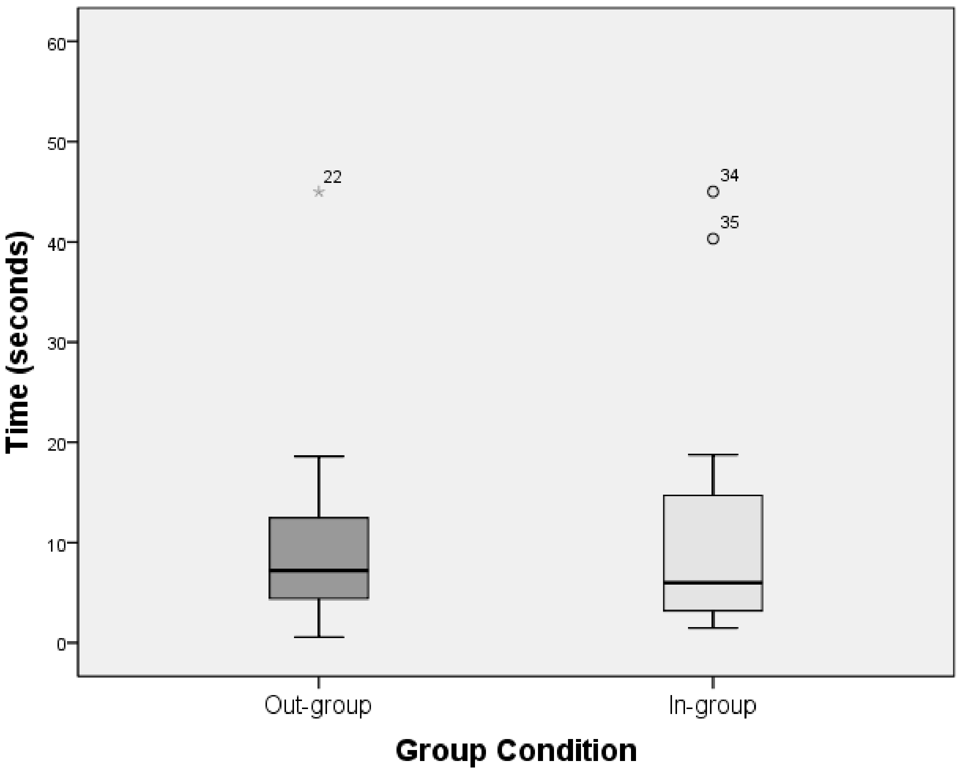


Figure 6.6. Participant latencies (medians) to touch the enhanced focal object as a function of the confederate's group membership relative to the participant: out-group vs. in-group.

Second, participants who interacted with an 'in-group' confederate (median = 4.9 sec) did not spend significantly longer touching the focal object than participants who interacted with an 'out-group' confederate (median = 1.7 sec), ($U = 72.5$, $p > .50$; fig. 6.7).

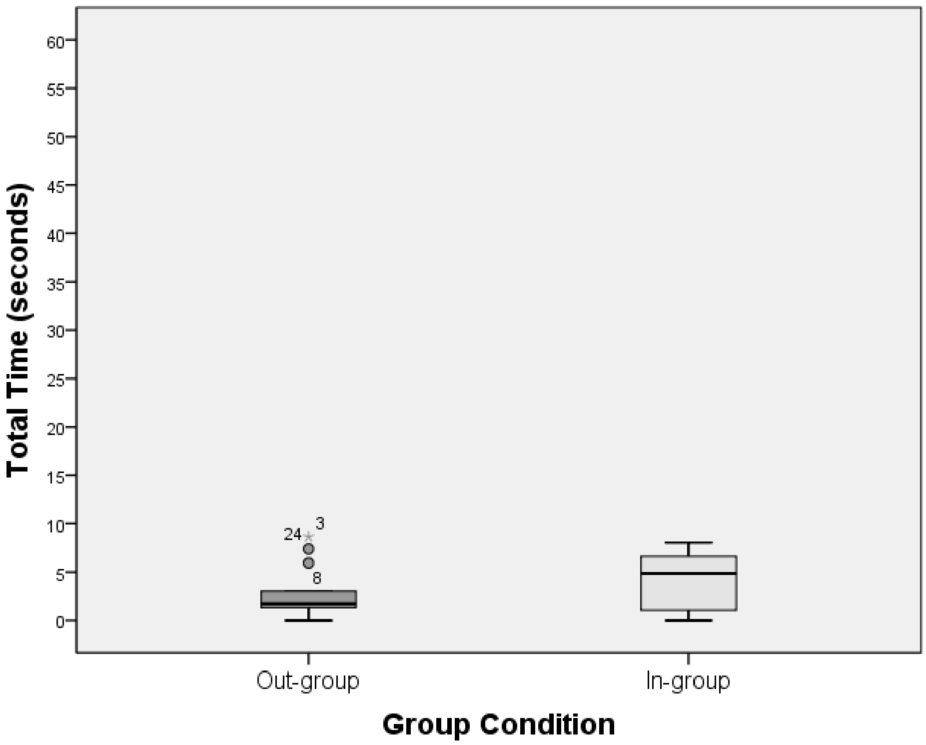


Figure 6.7 Total time participants spent touching the enhanced focal object (medians) as a function of the confederate's group membership relative to the participant: out-group vs. in-group.

Third, participants interacting with an 'in-group' confederate did not spend proportionally more of their learning phase touching the focal object (median = 62.4%) than participants who interacted with an 'out-group' confederate (median = 60.4%; $U = 78.00$, $p > .70$; fig. 6.8).

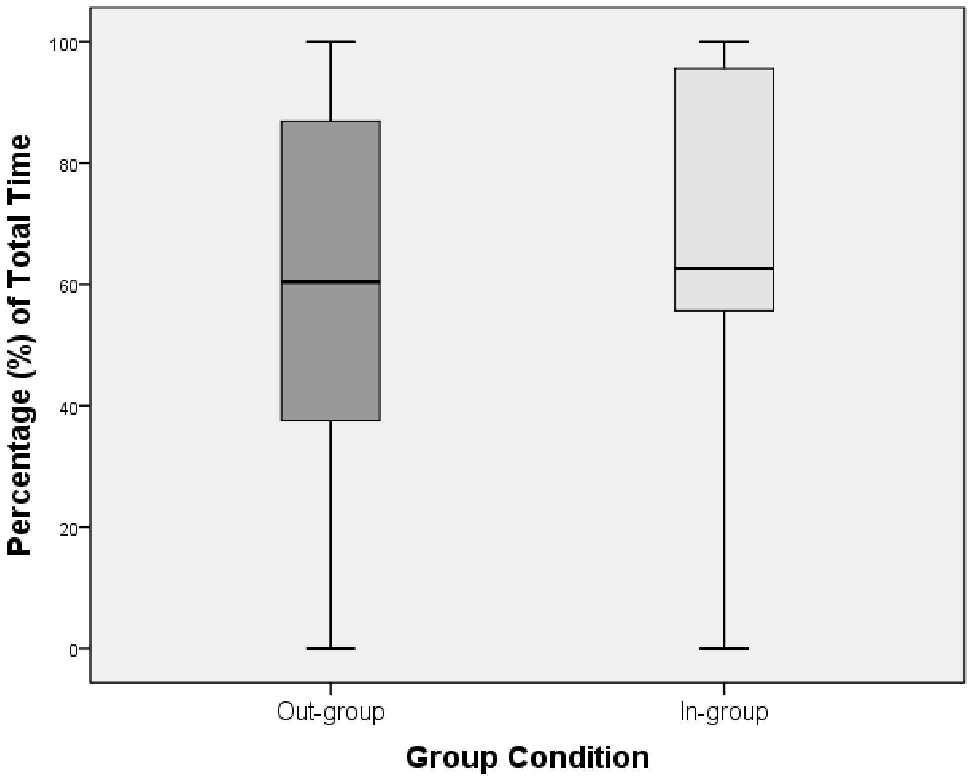


Figure 6.8. Percentage of total time (medians) participants spent touching the enhanced focal object as a function of the confederate's group membership relative to the participant: out-group vs. in-group.

Recall Phase

Similar to the previous analysis, in this analysis on the restricted data set participants who interacted with an 'in-group' confederate did not list the enhanced focal object (median place in sequential order = 3) significantly earlier than participants who interacted with an 'out-group' confederate (median place in sequential order = 4; $U = 68.0$, $p > .40$; Mann-Whitney test, fig. 6.9).

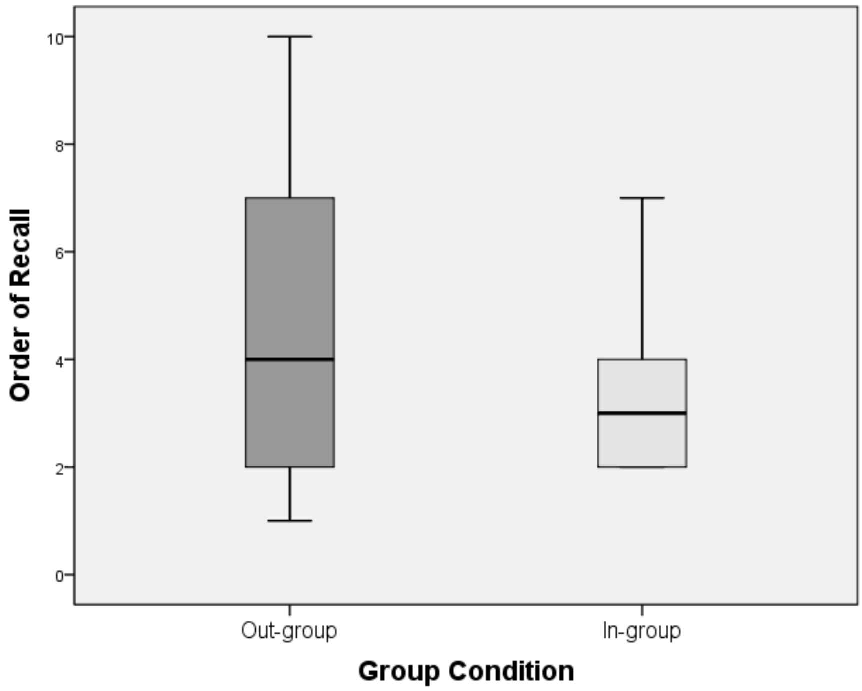


Figure 6.9. Sequential order in recall list of enhanced focal object (medians) as a function of the confederate's group membership relative to the participant: out-group vs. in-group.

Section C: Questionnaire

At the end of the experiment, participants completed a questionnaire. The analysis of the questionnaire results was conducted using the full data set, N = 37, given that there was no behavioural difference in avoidance on this measure. Mann-Whitney tests were used to gauge differences on these measures as a function of group membership condition. The questionnaire gauged participants' perceptions of the Dot Estimation Task, the memory task, and their feelings toward the confederate. It consisted of five sections which required answers on a Likert scale from 1 (strongly disagree) to 7 (strongly agree). All negative items were reverse coded. The five sections were as follows.

(1) Identity / connection: The first section attempted to assess participants' sense of identification and connectedness with the confederate. The three questions in this section had an acceptable internal consistency (Cronbach's alpha = .77). However, no differences were found in perceived identification and connectedness participants reported to the confederate as an in-group (median = 3.7) or out-group member (median = 3.5; U = 77.5, p = .72). This will be discussed further in the discussion.

(2) Identity / centrality: The three questions posed to measure participants' perceived importance of their cognitive styles (as allegedly determined by the Dot Estimation Task) did not have good internal consistency (Cronbach's alpha = .39). Removal of any one or combination of these questions only decreased the alpha. These results were therefore not further analysed.

(3) Attention: The six questions used to assess the degree to which participants paid attention to the confederate also did not have a good internal consistency (Cronbach's alpha = .04). However, the removal of questions 2, 3, and 4 raised the overall alpha to an acceptable level (Cronbach's alpha = 0.75). Questions 2, 3, and 4 were therefore dropped from the scale, resulting in a three-item scale. With this new subscale, participants reported paying significantly more attention to what they thought was an in-group confederate (median = 3.7) than an out-group confederate (median = 2.7; U = 30.5, p = .01).

(4) Theory of Mind: All six questions on the 'Theory of Mind' scale used to gauge participants' interest in the confederate's mental state had high internal consistency (Cronbach's alpha = .88). However, there was no difference in interest in the confederate's general mental states between the in-group condition (median = 3.3) and out-group condition (median = 2.5; U = 63.0, p = .27).

(5) Difficulty: The six questions asked in this section had a low reliability score (Cronbach's alpha = .51). Removing questions 1, 2, and 3 increased the internal consistency to an acceptable level for this scale (Cronbach's alpha = .80). Participants reported a near-significant trend towards finding the experiment more difficult when interacting with an out-group confederate (median = 6.2) than an in-group confederate (median = 5.3; U = 43.5; p = .06).

Discussion

In the current study I attempted to reveal the effect of stimulus enhancement in normal adult social interactions, and to ascertain whether this effect is a function of group membership. In analysing the data, it became clear that a number of participants were reluctant to engage with the task and simply sat back and watched the entire procedure. This withdrawal could have come from two different sources. First, the task was not an overtly tactile task, and subjects were never encouraged or instructed to touch any of the objects. Second, and along these lines, participants were told they were taking part in a learning task, and as such participants would have had individual preferences for different learning modalities. It is possible that participants who disengaged with the task required another mode of sensory input than the task was presented in to learn (i.e. any modality besides touch). Learning in a modality that is not one's preferred modality can cause strong aversion to a task (Oxford 2003). Whatever its source, this type of disengagement with the task was dealt with by conducting two analyses: one with the full data set, and one with these non-touchers removed.

Using the full data set, participants showed near significant trends towards a main effect of stimulus enhancement in their behaviour towards the focal object (approaching it quicker, and increased time manipulating it, both absolutely and proportionally), as well as a significant trend towards listing it sooner. However, this same data set showed no evidence of either behavioural or lasting memory effects of stimulus enhancement as a function of group membership.

In the restricted data set that looked only at participants who engaged with the task, stimulus enhancement was active with stronger, significant effects. This was evidenced when participants approached the focal object more quickly than the control object. Participants also spent proportionally more time interacting with enhanced objects compared to control objects. Interestingly, the effect of stimulus enhancement was not restricted to the immediate interaction between confederate and participant. The effect was longer lasting, in that it extended beyond participants' first interaction and observation of the confederate's manipulations to participants' subsequent recall: when asked to freely list the objects they remembered, participants recalled the enhanced object sooner than the non-enhanced control object.

A slightly unexpected finding was that participants reacted no differently to enhanced objects if they were interacting with an in-group compared to an out-group demonstrator, even in the restricted data set. That is, statistically speaking, participants approached the focal object with the same latency and manipulated it for the same amount of absolute and relative time in both the in-group and out-group conditions. These results suggest that, contrary to what might have been expected from a social learning perspective, in-group members have no more ability to draw an observer's attention to a specific part of the environment over and above what an out-group member could do. That is, there was no evidence that participants in this study took more cues from in-group than out-group members about which aspects of the environment to interact with.

As always, it is difficult to interpret negative results. For a start, the sample size of this study was not very big, and a larger sample could have produced significant effects on the various stimulus enhancement measures as a function of group membership. However, although the sample size was not large, the non-parametric statistics used did reveal very far from significant results, indicating that any seeming difference between the two conditions did not even amount to trends. Further complicating the nature of these 'negative' results regarding the effect of group membership on stimulus enhancement is the questionnaire results, which showed that participants in the in-group condition did not feel more connected to the confederate than participants in the out-group condition. Increased connectedness in the in-group condition would have been an expected result of a minimal group paradigm. However, this scale was not given to participants in the previous three studies. It is thus possible that this scale would also have revealed no conscious difference in how 'connected' participants felt to their in-group partners compared to out-group partners in the previous three studies as well, but that nevertheless there was sufficient subconscious influence of group categorisation to elicit the observed behavioural differences. This is a likely explanation, given that the 'Dot Estimation Task' was not conducted differently in this study than in the previous studies.

Participants also reported paying more attention to an in-group than out-group confederate, and there was a trend towards finding the task easier with her in the in-group condition. This result thus shows that the minimal group paradigm was generally effective in categorising participants, and moreover it underscores the behavioural results. That is, participants reported paying more attention to the confederate in the in-group condition but still showed no evidence of increased stimulus enhancement in this condition, which would have been expected had stimulus enhancement functioned along the lines of group membership. This means that even with the actions of the in-group confederate increasingly attended to, stimulus enhancement still does not increase in this condition, suggesting that group membership truly ceases to have an influence at this level of social cognition.

However, two issues render the nature of the categorisation in this experiment uncertain. First, unlike the previous studies, this study was the only one to be conducted with a confederate. It is possible that the presence of a confederate was somehow picked up on by the participants to produce a different experience compared to when interacting with another naive participant. It is possible that this could have affected their perceptions of the veracity of the minimal group paradigm. This possible awareness of the confederate would have had to occur on a subconscious level, given that no participant mentioned any suspicions when explicitly asked in the debriefing about all aspects of the experiment, and so this is a highly unlikely scenario.

Second and more confusingly, the 'theory of mind' section in the questionnaire provided no evidence of differential interest in the confederate's mental states as a function of her group membership, in contrast to findings in study 3 (see fig. 3.11). This could be evidence that, for whatever reason, somehow the minimal group paradigm in this experiment acted differently than in the previous studies. Still, these are far-fetched possibilities, given that the results show an overall effect of stimulus enhancement that is seemingly unaffected by group membership.

In sum, this study, provides evidence that, alongside non-human animals (e.g. Fritz & Kortrschal 1999, Caldwell & Whiten 2004, Huber et al 2001) and infants (e.g. Tennie et al 2006, Huang et al 2002), human adults are also affected by stimulus enhancement in social interactions. More importantly, there was no evidence that stimulus enhancement acts differentially with group membership; interacting with a presumed in-group member produced no stronger reaction to the confederate's behaviour than interacting with a presumed out-group confederate. A tentative conclusion from these results is that one crucial aspect of social cognition, upon which group categorisation has an effect, is representation of intention. Dipping below intentionality representation to simpler social cognitive processes appears to bring the effects of categorisation to a halt.

Chapter 7

Study 5: Social learning as a function of power

Abstract

Chapter 5 showed that group membership affects the attribution of intent, suggesting that differential mental-state attribution based on group membership, as shown in chapter 3, may be a function of this effect. Results from the previous experiment presented in chapter 6 further suggest that group membership does not moderate the use of stimulus enhancement in social learning situations, suggesting that representation of intentionality may be some sort of demarcating line for the influence of group categorisation. That is, categorisation may only affect social cognition processes which are based on or include representation of intentionality.

In a final experiment, I will focus on a social variable that is closely related to group categorisation, social power, which is inherent to all inter-group dynamics. Given the widespread reality of power differentials in inter-group situations and its previously documented effects, this study investigates whether power, unlike categorisation, has the ability to affect cognitive processes void of representation of intentionality. To address this, participants were first subjected to a social manipulation to make them feel either powerful or powerless. They were then given the same supposed 'memory task', as in the previous study described in chapter 6, to gauge the effect of relative power on the same basic social learning mechanism, stimulus enhancement. The current experiment constituted a 2 X 2 design: powerful vs powerless, and stimulus enhancement vs no stimulus enhancement. Results showed that in the baseline condition with no stimulus enhancement powerful participants avoided the objects in general whereas the powerless participants approached and

manipulated the objects more. By comparison, in the stimulus enhancement condition there was no such difference: the powerful participants approached and manipulated the objects as quickly and as much as the powerless participants did. Interestingly, when comparing the effect of stimulus enhancement on these two different groups, results showed that the powerful participants reacted more strongly to stimulus enhancement in that they showed more behavioural differences between the stimulus enhancement and no-stimulus enhancement conditions than the powerless participants. These results are discussed in relation to the previous study.

Introduction

The previous study, study 4, explored whether a very basic social learning mechanism that has been found across the animal kingdom, stimulus enhancement, was affected by group categorisation. Results showed that, while adult human subjects were affected by stimulus enhancement, this type of social learning was not significantly moderated by categorisation. In the study 4, the group membership of a confederate did not make participants behave differently to the focal object which was enhanced when the confederate manipulated it for 5 seconds. This is possibly because, unlike the other mechanisms of social cognition examined so far in this thesis, stimulus enhancement does not require representing a social partner as an intentional agent. The tentative conclusion thus has been that categorisation based on group membership affects only those socio-cognitive processes which require the representation of another person's intent.

However, it is obvious that there are numerous other social variables that interact with and impact on group membership. A particularly influential factor is social power, which has a well-researched and close relationship with group categorisation. Power relationships both within groups and between them are an inseparable aspect of group life, and interactions between power and categorisation are therefore likely. Many groups are created precisely because of inherent power differentials between two sets of people (Drury & Reicher, 2009). A good example is the British 'working class', whose identity is still based on the contrast to the 'upper class' who are perceived as more powerful by the working class (Sachdev & Bourhis, 1991). While not all groups are overtly formed as a result of power differentials, a difference in power is inherent in many inter-group relations (Sherif, 1966) and is a key factor in inter-group conflict (Jackson, 1993). The prevalence of power as a potentially influential moderating social factor in inter-group relations makes it a promising variable to investigate in any research programme aimed at describing the cognition underlying inter-group relations.

Power has various effects on behaviour. In minimal group settings, members of powerful groups discriminate against the out-group more than do members of powerless groups (Sachdev & Bourhis, 1991). In this study, powerful people gave fewer fictitious 'credit points' to out-group members than powerless participants did, a finding that was interpreted as evidence for a positive relationship between out-group discrimination and power. Furthermore, in this study, power was a better predictor of discrimination than other relevant social factors, such as the social status of a group or its size. The general view is that dominant groups and individuals from them tend to discriminate more than people from subordinate groups because they have the means to do so more effectively, and the motivation to do so to maintain their power (Sidanius & Pratto, 1999).

There is also evidence that power affects basic cognition. For example, people with power can ignore distracting information and focus on a task at hand better than powerless people (Guinote, 2007b). Powerful people can also prioritise relevant tasks better than powerless people (Guinote, 2007c) and they attend more easily to information relevant to a goal (Guinote, 2008). As a recent review showed, people with power approach and attend more to objects that are tied to future rewards than powerless individuals who show more avoidance tendencies (Keltner, Gruenfeld, & Anderson, 2003). These differential cognitive abilities all amount to a strategic increase in attention paid to solving problems at hand in powerful people, and they may constitute the key variable that leads the powerful to achieve goals more quickly and easily than the powerless (Slabu & Guinote, 2010). A related finding is that powerful individuals show increased flexibility in their behaviour, attention, and judgement: that is, as soon as they have reached their goal, they revert instantly to the similar levels of behaviour/attention that powerless individuals show throughout the process of attempting to gain their goal (Guinote, 2007a).

Power can also affect how people judge and assess each other. Some research has provided evidence in relation to how people perceive others' minds, which is perhaps not surprising in light of the previously mentioned evidence that powerful people focus selectively on goal-oriented information. For instance, powerful people use stereotypes more to justify their positions than powerless individuals (Vescio, Snyder, & Butz, 2003). Powerful people also form less individualised impressions of people and instead attend more to information that confirms their previous decisions (Fiske 1993). Both increased stereotyping and decreased individualisation could be a product of the need for cognitive 'short-cuts' in the drive to quickly achieve a goal. However, slightly different patterns are seen in legitimate power-holders: people who hold what is perceived as legitimate power tend to use less negative information to form individual impressions and stereotype less if their cognitive load is decreased (Rodriguez-Bailon, Moya, & Yzerbyt, 2000; Vescio et al., 2003). Legitimate power holders also discriminate less than people who hold illegitimate power (Hornsey, Spears, Cremers, & Hogg, 2003).

Converse patterns are also seen in the behaviour of the powerless. Powerless people tend to approach powerful people more often than vice versa (Mulder, 1977). The powerless also are more accurate when taking other's perspectives and, similarly, stereotype less than the powerful (Vescio et al., 2003). In general, powerless people attend to more varied and detailed information about the powerless than vice versa (Fiske & Depret, 1996).

In sum, power differentials have significant and well-documented effects, both on behaviour and judgement in relation to inter-group dynamics. Since power differentials are a natural part of inter-group relations, it seems reasonable to hypothesise that power affects social cognitive processes related to group membership. A particularly important point in this context is whether power affects basic social learning processes not based on intention representation, such as stimulus enhancement, given that no such effect has been found for group categorisation. For example, as powerful people attend to and process goal-related information more quickly than powerless people, it is possible that such differences in attention will manifest themselves in differences in social learning processes such as stimulus enhancement, one of the most basic forms of attracting attention socially (Thorpe, 1963).

The goal of this study is thus to determine whether, unlike categorisation, stimulus enhancement is moderated by social power. This was considered a useful experiment because of the negative evidence reported in the previous chapter where it was found that group categorisation had no influence on basic social learning processes. In the current experiment, subjects interacted directly with the experimenter (myself) while relative power was manipulated using a cover story about whether participants would either be marked by me in their lab class or be asked to mark me as part of my course requirements. Participants were then subjected to the experimental manipulation as in the previous study (a focal object within an array of items was either enhanced or not when I manipulated it for 5 seconds). This 2 X 2 design (powerful vs. powerless X stimulus enhancement present vs. absent) thus allowed for the comparison of the effect of relative power on intention-free social learning processes, that is, how stimulus enhancement manifested itself in powerful and powerless participants.

Given that powerful people generally pay more attention to relevant on-going events, which facilitates their goal attainment, one prediction was that increased power should lead to increased susceptibility to stimulus enhancement. In other words, the powerful participants should attend more to the experimental manipulation carried out by the experimenter as it was relevant to the situational goals, and therefore powerful participants should show a corresponding increase in orientation to and interaction with the focal object compared to the powerless participants. Also as mentioned above, powerful people show greater variability in their behavioural tendencies, the second hypothesis is that powerful participants will show greater variability between the stimulus enhancement present and stimulus enhancement absent conditions. However, another equally plausible hypothesis is that, since powerless people attend more carefully to powerful people than vice versa, the powerless participants may be more susceptible to stimulus enhancement carried out by a more powerful person. This then could lead the powerless to show more evidence of the effects of stimulus enhancement via increased orientation to and interaction with the enhanced object. The following experiment was conducted to determine which hypothesis would be supported.

Method

Participants

36 undergraduate female students at the University of St Andrews, aged between 18 and 21 years, were tested in this study. Participants were recruited using advertisements posted in the School of Psychology, University of St Andrews. All participants received £3 for their participation. Prior to each trial, participants were randomly assigned to either the 'powerful' or 'powerless' condition.

Design

The current study aimed to determine whether stimulus enhancement is affected by social power. To explore whether social power, a variable that is important in group categorisation, had an impact on social learning I first manipulated the subjects' perceived power relative to myself as the experimenter. The minimal group paradigm was therefore not useful in this study. Instead, participants were first told a cover story to influence their perceived power relative to myself as the experimenter so that the effect of this manipulation on stimulus enhancement could be measured. The test for stimulus enhancement was based on the exact same 'memory task' as in the previous study. The only difference was that, in this study, there was no confederate. Participants instead interacted directly with me as the experimenter. I thus manipulated one of the ten objects participants were required to learn. The effect of stimulus enhancement was assessed by comparing the powerful and powerless participants' behaviours in the learning phase between the stimulus enhancement present and absent conditions. Longer-term effects of stimulus enhancement were determined by making these same comparisons of participants' recall of the objects after the task as in the previous study.

As in the previous study, two objects were chosen prior to the task (focal and control object) on which the subsequent analyses were based (see chapter 2 for full details of object selection). While I delivered the cover story about the memory task I enhanced the 'focal object' by manipulating it for 5 seconds. The 'control object' was not touched. Both objects were always positioned at the centre-left and centre-right of the entire array of objects, as in the previous study (again, see chapter 2 for full details of procedure and set-up). The object chosen to be the focal object and its position were counterbalanced across trials to control for potential effects of saliency; that is, the same two objects were alternately used as either focal object or control object in both centre-left and centre-right positions. Each trial took approximately 20 minutes to complete.

Materials

As in the previous study, the two objects chosen to alternate as the focal object were a JVC-VHS tape and an empty box of staples, as they were of similar size, colouring, and functionality. The participant sat facing the experimenter on the other side of the desk. All trials were filmed using a tripod-mounted Sony Handycam CX 190.

Following the experiment, the participants were asked to fill in a questionnaire (see Appendix 7.4 for questionnaire in full). The questionnaire consisted of 7 sections each consisting of 6 items requiring Likert-scale answers from 1-7, ranging from 'strongly disagree' to 'strongly agree'. The seven sections gauged participants on the following themes: 1) 'Power': their perceived feelings of power, 2) 'Demo Attention': the attention they paid to me as a 'demonstrator', 3) 'Theory of Mind': their general interest in the my own mental states, 4) 'Objects': the perceived saliency/uniqueness of the objects used, 5) 'Experimental Attention': the attention they paid to the experiment, 6) 'Ease of Experiment': how easy they perceived the experiment, and 7) 'Identity': the strength of their identification as a student.

Procedure

Upon arrival in the psychology department, the participant was seated across from me at a desk in an otherwise empty room, with 10 objects arranged under a white cloth cover. Participants were given a brief introduction to the experiment and then asked to sign a consent form (see Appendix 7.1 for Information and Consent Form). After signing, the experimental manipulation of power began. I introduced myself as a post-graduate researcher, who would also be a new 'demonstrator' in the participant's class. I told the participant that, as a new postgraduate demonstrator, I was required to help out in their undergraduate lab courses. In the 'powerful condition', participants were told that new requirements were being put into place, to the effect that undergraduate students (including the participant) would be asked to give me a formal mark for my abilities as a demonstrator (see Appendix 7.2 for exact details of ‘Powerful Speech’ given in this condition). I discussed specific aspects of my teaching ability that they would be asked to consider when assigning their mark. I then asked the participant for their help in guiding my teaching from the outset, specifically I asked them to give me their opinion of what they thought made a good teacher. Participants were then allowed 3 minutes of free speech on this topic. In contrast, in the ‘powerless condition’ I introduced myself as a new demonstrator as before, but then went into some detail about which of the participant’s projects and I would be marking, and the effect these marks would have on the participant’s overall score (see Appendix 7.3 for full details of ‘Powerless Speech’ given in this condition). I then discussed what I would look for when I marked their work and assessed their input in class.

After this manipulation, I delivered the cover story about the supposed ‘memory task’. I told participants that I was studying the effect of object appearance on memory, with very basic information given about how aspects of objects may influence memory (included in Appendix 7.2 and 7.3). After this, participants were told that they would be given a 1 minute learning-phase to ‘memorise’ the objects. They were specifically told they were allowed to ‘do anything [they wanted] with the objects, anything that would help [them] learn them’. During this description of the task the second independent variable was initiated when I either manipulated the focal object for 5 seconds (in the stimulus enhancement present condition) or I touched nothing (in the stimulus enhancement absent condition). I then took out my stopwatch and timed their minute-long learning phase. After the learning phase, I told the participants that the memory task would begin and I covered all the objects. The participants were first asked to list all the objects they could remember in a free-recall format. Next, I removed either the focal object or the control object from under the cover out of the participant's sight. I then removed the cover to reveal the remaining nine objects and I then asked them to identify which object had been removed. Lastly, participants were asked to complete the end of experiment questionnaire (see Appendix 7.4 for questionnaire). Participants were then fully debriefed (see Appendix 7.5 for debriefing form), paid £3, and thanked for their participation.

Data analyses

As in the previous study, non-parametric tests were used throughout this study in view of small sample sizes. Mann-Whitney tests and Wilcoxon signed-ranks tests were performed on the various dependent measures taken to assess whether stimulus enhancement was affected by the relative power participants felt during the experiment.

Dependent variables

As in the previous study, both immediate and long-term effects of stimulus enhancement were measured. Immediate behavioural measurements were: 1) latency to the object: how long it took participants from the beginning of the learning phase to touch the object in any way, 2) frequency of touching: the number of times participants touched the object (i.e. the number of times a participant touched or picked up the object followed by removing her hand or setting it down, 3) total time: total duration in seconds that the participant spent in direct physical contact with the object, which included all touching and manipulation, and 4) percent time: the percentage of the entire learning phase a participant spent touching or manipulating the object. The long-term effects of stimulus enhancement were gauged using measures of participants' recall as follows: 1) order in recall list: the sequential order in which the object was listed from 1 – 10, and 2) object identification: whether the participants could identify which object the experimenter had removed outside their field of vision.

Results

As in the previous study, differences in each of these variables was gauged in two main analyses, one which included all participants (N = 36) and one which included only those participants who engaged with the task by touching at least one object (N = 23), given that N=13 participants did not engage with the task during the learning phase by touching any of the objects.

Section A: All participants included

In the first analysis of all 36 participants, including those who avoided the task by not touching any of the objects, N = 12 subjects were in the stimulus enhancement absent condition and N = 24 in the stimulus enhancement present condition. As mentioned earlier, this study differed from the previous one in that it also had this stimulus enhancement absent condition in which I touched no objects. The first analysis was thus done on this 'stimulus enhancement absent' condition, i.e. when I did not manipulate the focal object. This was to obtain a baseline measure of how perceived power impacted the participants' baseline manipulative behaviour towards the objects. This measure was then used in subsequent comparisons with the stimulus enhancement present condition.

1. Stimulus Enhancement Absent Condition

Immediate behavioural effects: learning phase

Mann-Whitney tests (with two-tailed significance levels reported) were used to determine whether perceived power had some effects on participants' willingness to physically engage with the objects. Generally speaking, powerful participants tended to avoid the objects compared to powerless participants. That is, powerful participants approached the focal and control objects more slowly than powerless participants although these trends were non-significant (FO: $U = 10.0$, $p = .15$; CO: $U = 8.0$, $p = .10$; fig. 7.1a). Powerful participants also touched both the focal and control objects less often than powerless participants, but again these differences did not reach significance (FO: $U = 7.5$, $p = .07$; CO: $U = 10.5$, $p = .20$; fig. 7.1b). Powerful participants also spent significantly less time touching the FO compared to powerless participants and showed a trend towards spending less time touching the CO (FO: $U = 6.5$, $p = .05$; CO: $U = 10.0$, $p = .19$; fig. 7.1c). Finally, there was a similar non-significant trend toward powerful participants spending proportionally less time manipulating the FO and CO in the 'learning phase' than powerless participants (FO: $U = 7.5$, $p = .07$; CO: $U = 10.0$, $p = .18$; fig. 7.1d).

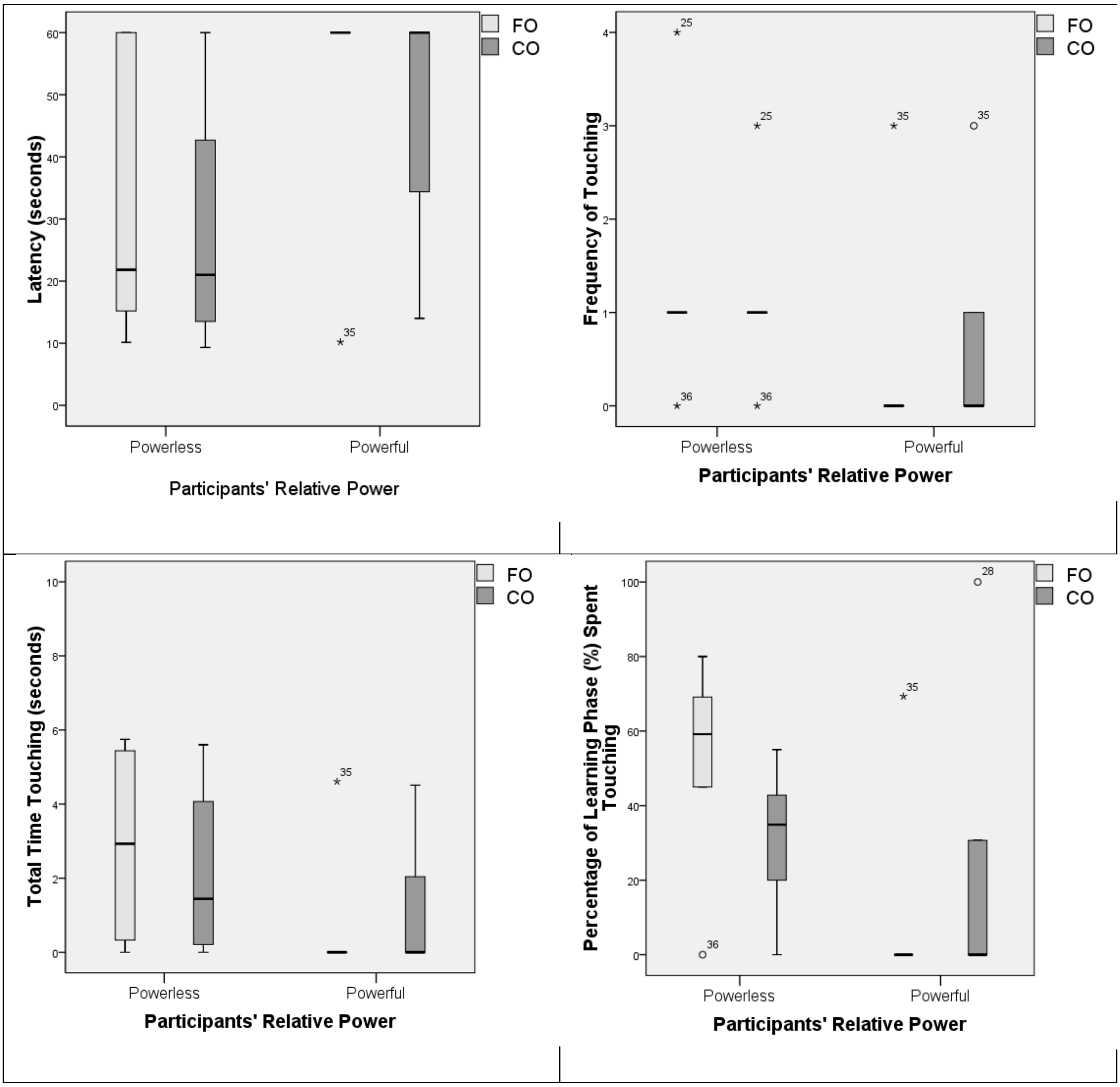


Figure 7.1. Participants response to the focal object (FO) and the control object (CO) in the stimulus enhancement absent condition as a function of perceived relative power showing, clockwise from top left, (a) latency to touch the FO and CO; (b) number of touches

(frequency) of the FO and CO; (c) total time touching the FO and CO; (d) percentage of the learning phase manipulating the FO and CO.

Long-term effects: recall phase

Following the 'learning phase', the 'recall phase' consisted of all participants being asked to list the all objects they could remember. No differences were found in the order in which powerful and powerless participants listed the focal and control objects (FO: U = 9.0, p = .50; CO: U = 10.0, p = 1.0; fig. 7.2).

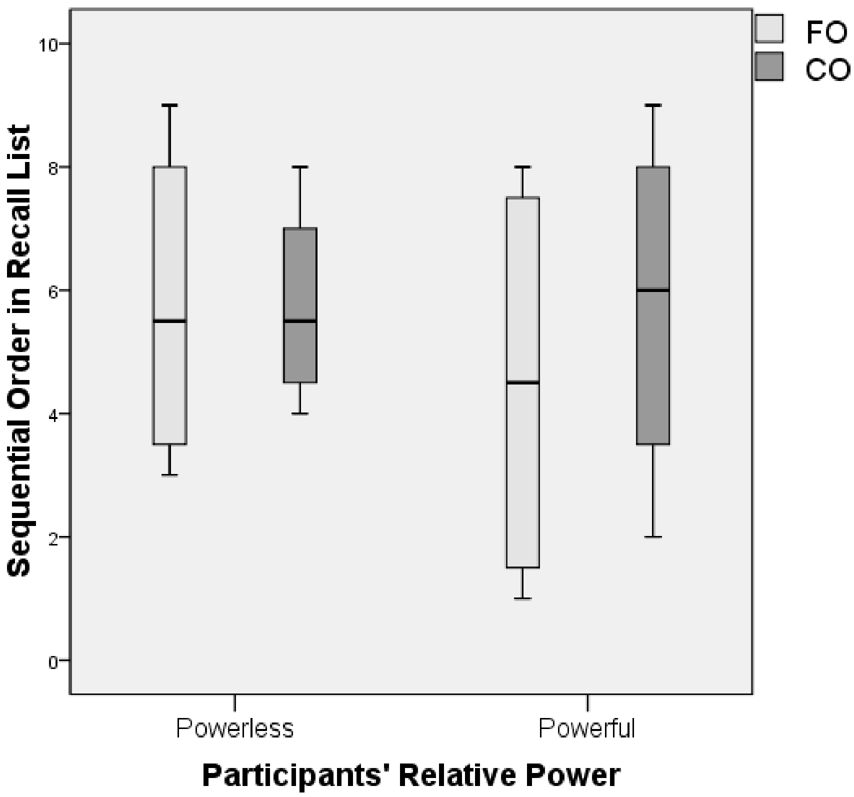


Figure 7.2. Sequential order in which participants recalled the focal object (FO) and control object (CO) in the stimulus enhancement absent condition as a function of the participants' perceived relative power.

After having produced their recall lists, participants were asked to look at the remaining objects and identify which object had been removed out of their sight. There was no significant difference in participants' ability to identify the removed object, as all participants in the stimulus enhancement absent condition correctly identified the removed object, producing a recall rate of 100%.

2. Stimulus Enhancement Present Condition: Overall Effects

Immediate behavioural effects: learning phase

The analysis strategy of this experiment was to compare the manipulative behaviour of participants in the baseline (stimulus enhancement absent condition described above) and test condition (stimulus enhancement present). In the stimulus enhancement present condition, I first checked for any main effects of stimulus enhancement by analysing whether participants generally directed more of their behaviours towards the focal compared to the control object if the experimenter manipulated the focal object. Wilcoxon signed-rank tests (with two-tailed significant levels reported) were used to make within-subjects comparisons for all participants (N = 24).

There were no significant differences in behaviour of all participants toward the objects as a function of whether they had been enhanced (touched by the experimenter). That is, the focal object was not approached more quickly (median = 43.5 sec) than the control object (median = 40.0 sec; Z = -.72, p = .50). There was also no significant difference in the number of times participants touched the focal object (median = 1 time) compared to the control object (median = 1 time; Z = -.33, p = .74). There was no difference in the total time participants spent manipulating the focal object (median = .65 sec) compared to the control object (median = .61 sec; Z = -.40, p = .69), and there was no difference in the percentage of the learning phase participants spent manipulating the focal object (median = 30.6%) compared to the control object (median = 37.3%; Z = -.51, p = .61).

Long-term effects: recall phase

There was also no measureable main effect of the experimenter enhancing the focal object on any of the long-term measures. Participants did not list the focal object sooner in their recall lists (median = 5 in sequential order of recall list) than the control object (median = 7 in sequential order of recall list; Z = -.39, p = .70), nor did they identify the removed focal object any better than the removed control object at the end of each trial, although this result was due to a ceiling effect as each object was identified correctly 100% of the time.

3. Stimululs Enhancement Present Condition: The Function of Power

Immediate behavioural effects: learning phase

Even though there was no main effect of stimulus enhancement on the participants overall behaviour, it is possible that this was because perceived power had opposing effects on their susceptibility to stimulus enhancement. The dataset was thus reanalysed, by comparing participants' behaviour toward the focal object as a function of perceived relative power. Results from the earlier stimulus enhancement absent condition showed that powerful participants baseline behaviour toward the objects differed compared to powerless participants. In general the powerful participants avoided the objects more (fig. 7.1). In the following, Mann-Whitney tests (with two tailed significance levels reported) were used to compare these results from the stimulus enhancement absent condition with the results of the stimulus enhancement present condition, that is, when the experimenter enhanced the focal object by manipulating it, to determine whether there was a difference in how participants behaved towards the focal object as a function of their relative power.

Results showed that some of the previously observed differences between powerful and powerless participants disappeared if the experimenter enhanced the focal object (FO). First, there was no longer a difference in the powerful and powerless participants' latency to touch the FO (U = 72.0, p = 1.0; fig. 7.3a). This lead to a near significant difference within the powerful participants alone between the stimulus enhancement present and absent conditions (U = 20.0, p = .10). No such trend was present within the powerless participants (U = 34.0, p = .85).

Similarly, there was no longer a difference between powerful and powerless participants in the number of times the focal object was touched (U = 69.5, p = .90; fig. 7.3b). This again lead to a trend within the powerful participants towards touching the focal object more frequently in the stimulus enhancement present condition compared to the stimulus enhancement absent condition (U = 21.5, p = .13). There was no such effect within the powerless participants (U = 27.5, p = .40).

Third, there was no longer a difference in how long powerful participants touched the focal object compared to powerless participants (U = 55.0, p = .31; fig. 7.3c). This again mean that within the powerful participants alone there was a near-significant trend towards touching the focal object longer in the stimulus enhancement present compared to absent conditions (U = 21.0, p = .13). Here, a similar trend also existed within the powerless participants, although in the opposite direction. Powerless participants touched the focal object for shorter periods in the stimulus enhancement present than absent condition (U = 21.0, p = .15).

Lastly, there was no longer a significant difference in the proportion of time powerful participants spent touching the focal object compared to the powerless participants (U = 66.5, p = .74; fig. 7.3d). This again lead to a trend within the powerful participants toward touching the focal object for a greater proportion of time in the stimulus enhancement present condition compared to the stimulus enhancement absent condition (U = 20.0, p = .11). There was also a trend in the powerless participants, although again in the opposite direction. Powerless participants touched the focal object less in the stimulus enhancement present condition compared to the stimulus enhancement absent condition (U = 19.5, p = .12).

The results from the stimulus enhancement present condition are presented graphically below next to the results from the previously discussed stimulus enhancement absent condition to facilitate comparison.

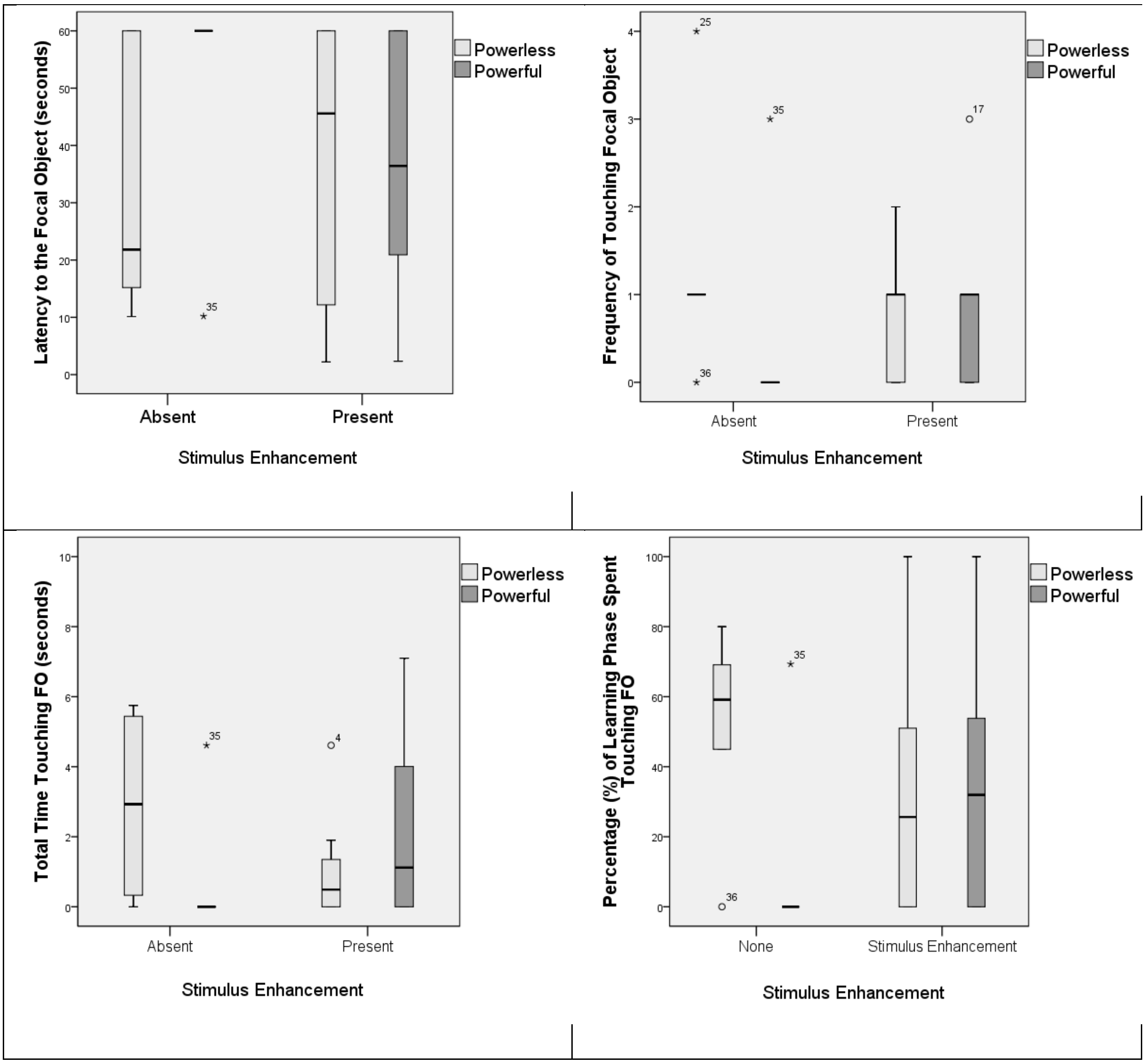


Figure 7.3. Participants' responses to the focal object (FO) and the control object (CO) in the stimulus enhancement present condition compared to the stimulus enhancement absent condition as a function of perceived relative power, clockwise from top left: (a) latency to touch the FO and CO; (b) number of touches (frequency) of the FO and CO; (c) total time touching the FO and CO; (d) percentage of the learning phase spent manipulating the FO and CO.

Long-term effects: recall phase

As shown before in the baseline condition, the recall phase in the stimulus enhancement absent condition showed no difference in the orders in which powerful and powerless participants listed objects from memory (fig. 7.2). The stimulus enhancement present condition provided similar results, in that powerful participants did not list the focal object any sooner (median = 5.5 sequential order) than powerless participants (median = 5.5 in sequential order; U = 51.5, p = .55; fig. 7.4). Within the powerful participants, however, there was also no difference in sequential order in which the focal object was listed in the stimulus enhancement present compared to absent conditions (U = 21.5, p = .5), and the same held true within the powerless participants (U = 27.5, p = 1.0).

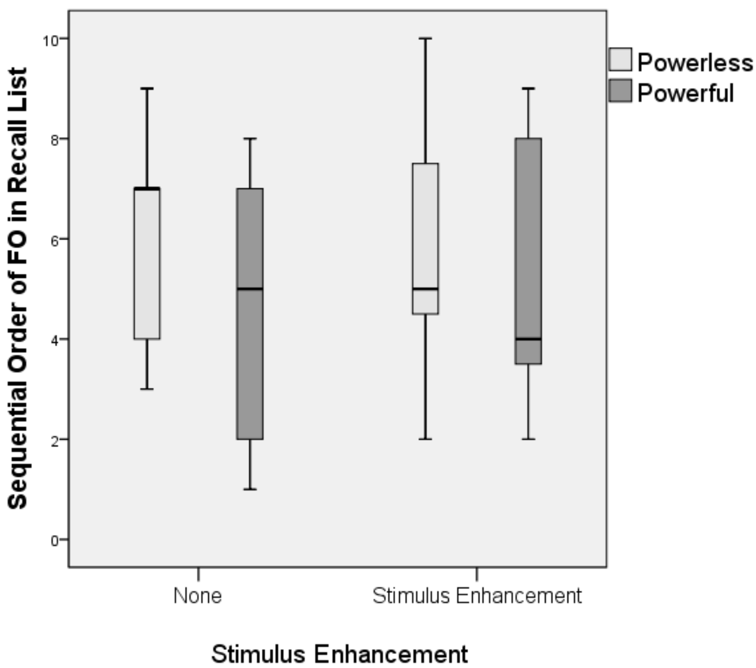


Figure 7.4. Sequential order in which participants listed the focal object in the stimulus enhancement absent condition and the stimulus enhancement present condition as a function of participants' relative power.

Section B: Restricted data set with non-touchers excluded

As previously mentioned, N=13 participants did not engage with the task sufficiently, as they did not touch any of the objects. If these subjects were excluded this resulted in a restricted dataset of N = 23 participants with N = 7 in the stimulus enhancement absent condition, and N = 16 in the stimulus enhancement present condition. The same analyses done on the full data set were performed on this restricted data set.

1. Stimulus Enhancement Absent Condition

Immediate behavioural effects: learning phase

As before, to obtain a baseline of behaviour towards all objects in the stimulus enhancement absent condition, comparisons were performed using Mann-Whitney tests (two-tailed significance levels reported) to determine whether participants differed in their baseline behaviour toward the objects as a function of their relative power. Unlike in the full data set, in this restricted dataset, the powerful participants did not differ in their latency to touch the focal object (median = 35.1 sec) compared to the powerless participants (median = 15.6 sec; U = 4.5, p = .85). Similarly, there were no differences in responses to the control object (powerful: median = 24.2 sec, powerless: median = 19.0 sec; U = 4.0, p = .67). There also was no difference between powerful and powerless participants in the frequency of touching the focal object (powerful: median = 1.5 times; powerless: median = 1.6 times; U = 4.0, p = .67). Similarly, there were no differences in frequency of touching the control object (powerful: median = 2.0 times; powerless: median = 1.4 times; U = 3.5, p = .46). Furthermore, there was no difference in the absolute amounts of time spent touching the focal object between powerful and powerless participants (powerful: median = 2.3 sec; powerless:

median = 4.6 sec; U = 3.0, p = .44). There was also no difference in amount of time spent touching the control object (powerful: median = 3.3 sec: powerless: median = 2.6 sec; U = 4.0, p = .67). Finally, there was no difference between the powerful and powerless participants in the proportion of the learning phase they spent manipulating the focal object (powerful: median = 34.7%; powerless: median = 61.1%; U = 4.0, p = .67) or in the proportion of learning phase spent touching the control object (powerful: median = 65.3%, powerless: median = 38.9%; U = 4.0, p = .67).

Long-term effects: recall phase

Similar to the previous analysis, there was no difference in how soon the focal and control objects were listed. Powerful participants (median = 5 in sequential order) did not list the focal object sooner than powerless participants (median = 5.5 in sequential order; U = 3.0, p = .64). Similarly, powerful participants did not list the CO (median = 6 in sequential order) sooner than the powerless participants (median = 5.5 in sequential order; U = 3.5, p = .81). Finally, the participants in this restricted data set also correctly identified the removed object 100% of the time, so no difference was observed in this variable.

2. Stimulus Enhancement Present Condition: Overall Responses

Immediate behavioural effects: learning phase

As in the previous analysis which included all participants, the strategy in the analysis of this restricted data set was to compare the participants' behaviour toward the focal and control objects in the stimulus enhancement present condition to determine whether there were any main effects of stimulus enhancement. Wilcoxon tests were performed on the dependent variables (with two-tailed significance levels reported).

Similar to the analysis on all participants, excluding the non-touchers provided no evidence of a main effect of stimulus enhancement. There was no significant difference in behaviour toward the objects as a function of whether the focal object had been enhanced or not. Specifically, the focal object was not approached more quickly (median = 20.9 sec) than the control object (median = 18.2 sec; $Z = -.72$, $p = .50$). There was also no significant difference in the number of times participants touched the focal object (median = 1 time) compared to the control object (median = 1 time; $Z = -.33$, $p = .74$). There was no difference in the total time participants spent manipulating the focal object (median = 1.5 sec) compared to the control object (median = 1.5 sec; $Z = -.40$, $p = .70$). There was also no difference in the percentage of the learning phase participants spent manipulating the focal object (median = 40.5%) compared to the control object (median = 59.5%; $Z = -.51$, $p = .60$).

Long-term effects: recall phase

There was no measureable main effect of stimulus enhancement on the long-term measures. Participants did not list the focal object (median = 4.5 in sequential order of recall list) any sooner in their recall lists than the control object (median = 7.0 in sequential order of recall list; $Z = -1.3$, $p = .20$), nor did they identify the removed focal object any better than the removed control object at the end of each trial (each object was identified correctly 100% of the time).

3. Stimulus Enhancement Present Condition: The Function of Power

Immediate behavioural effects: learning phase

As in the previous analysis, the next analysis used Mann-Whitney tests (with two-tailed significance levels reported) to analyse the influence of perceived power on stimulus enhancement in this restricted dataset (N = 16 participants). In the previous analysis, the interaction between the two power conditions and the two stimulus enhancement conditions was shown by presenting results from the stimulus enhancement present condition jointly next to results from the stimulus enhancement absent condition as a function of power. This comparison was not useful here because there were no differences in behaviour between the powerful and powerless participants in the stimulus enhancement absent or present conditions, and therefore no interaction to display. Instead results in this section are detailed below.

In general, there were no differences in how powerful and powerless participants behaved toward the focal object in this restricted data set. Powerful and powerless participants did not differ in (a) how quickly they approached the focal object (powerful: median = 25.4 sec; powerless: median = 13.5 sec; $U = 22.0$, $p = .32$), (b) the frequency with they touched the FO (powerful: median = 1 time; powerless: median = 1.3 times; $U = 24.5$, $p = .33$), (c) the amount of time spent manipulating the focal object (powerful: median = 2.1 sec; powerless: median = 1.3 sec; $U = 24$, $p = .43$), or (d) the percentage of the learning phase that powerful participants spent manipulating the focal object (powerful: median = 36.8%; powerless: median = 44.1%; $U = 27.5$, $p = .67$).

Taking the two conditions of power separately, that is, looking within the powerful participants and within the powerless participants, there were no differences in the different behaviours directed at the focal object in the stimulus enhancement present vs. absent conditions (latency to touch FO: powerful: $U = 7.5$, $p = .72$; powerless: $U = 13.0$, $p = .47$, frequency of touching FO: powerful: $U = 9$, $p = 1.0$; powerless: $U = 17$, $p = .92$; total time touching FO: powerful: $U = 8.5$, $p = .91$; powerless: $U = 11.5$, $p = .33$; proportion of the learning phase spent touching FO: powerful: $U = 7.5$, $p = .72$; powerless: $U = 10.0$, $p = .22$).

Long-term effects: recall phase

When checking for long-term effects, there were no statistical differences in the order in which powerful and powerless participants listed the FO (order: powerful: median = 3.7 vs. powerless: median = 5.7 in sequential order; U = 14.5, p = .22). As above, there were also no differences on this measure when looking separately within the powerful and powerless conditions, that is, between the stimulus enhancement present and absent conditions within the powerless participants (U = 7.5, p = .90) and within the powerless participants (U = 12.0, p = 1.0). Finally, all participants correctly identified the removed object 100% of the time, leading to no differences on this measure.

Section C: Analyses of questionnaire data

Internal consistency

At the end of the experiment, all participants completed a questionnaire that consisted of seven sections with questions on perceived feelings of 1) power ('Power'), 2) attention paid to the experimenter ('Demo attention'), 3) interest in the experimenter's mental states ('Theory of Mind'), 4) perceived saliency/uniqueness of the objects ('Objects'), 5) attention paid to the experiment ('Exp Attention'), 6) perceived difficulty of the experiment ('Ease of Exp'), 7) and strength of their identification as a student ('Identity'). The first analysis concerned the internal reliability of each of the seven scales, which was determined by calculating Cronbach's alpha for each scale.

1) Results showed that the 'Power' scale had very poor internal reliability (α = .13) and the removal of any combination of items increased the alpha level to no more than α = .40. The scale as a whole was thus removed from further analysis. 2) A similar result

emerged for the second scale, 'Demo Attention', which also had a very poor internal consistency score ($\alpha = .12$), which could only be increased to $\alpha = .30$ if item no. 5 was removed. The scale as a whole was also also removed from further analysis. 3) The third scale, 'Theory of Mind', initially had a fairly poor internal consistency ($\alpha = .50$), but this was increased to $\alpha = .80$ if the first item of the section was dropped from the scale. This scale was therefore altered to include items 2-6 only and retained for further analysis. 4) The fourth scale, 'Objects' also had a low internal consistency ($\alpha = .45$) which could only be increased to $\alpha = .53$ with the removal of item 2 on this section. The scale as a whole was thus also removed from further analysis. 5) The scale 'Exp Attention' had a low internal reliability ($\alpha = .48$) which was increased to $\alpha = .80$ when item no. 5 was dropped. This scale was therefore altered to include items 1-4 and 6 only, and retained for further analysis. 6) The scale 'Ease of Experiment' had a fair internal consistency ($\alpha = .69$), which was not increased with the removal of any items. The scale was therefore retained for further analysis in its present state, despite slightly low internal reliability. 7) The scale 'Student Identity' had an initial low internal reliability ($\alpha = .54$), which was raised to $\alpha = .70$ after the removal of item 4. The scale was therefore altered to omit item 4 and used in further analysis.

The Effect of Power

Mann-Whitney tests (with two-tailed significance levels reported) were carried out on the remaining scales: 3) Theory of Mind, 5) Exp Attention, 6) Ease of Experiment, and 7) Student Identity, to determine whether powerful and powerless participants perceived these factors differently. For scale 3) Theory of Mind, powerful participants reported a non-significant trend toward less interest in my own general mental states (median score = 3.7) than powerless participants (median score = 4.0; $U = 106.5$, $p = .12$). Regarding scale 5) Exp

Attention, there was no difference between powerful (median score = 6.8) and powerless participants (median score = 6.7; U = 126.0, p = .23) in self-reported attention they paid to the experimenter. For scale 6) Ease of Experiment, similarly, there was no difference in perceived ease of the experiment between powerful (median score = 6.3) and powerless participants (median score = 6.5; U = 153.0, p = .77). Lastly, on scale 7) Student Identity, participants reported no difference in the importance of their student identity as a function of power (powerful: median score = 5.3, powerless: median score = 5.4; U = 157.0, p = .87).

Discussion

In this study, the goal was to understand the influence of social power on basic social learning abilities in adult humans. This was important because results in the previous chapter have shown that group categorisation processes have a limited influence on social cognition. That is, categorisation does not seem to affect basic processes such as stimulus enhancement that do not rely on representation of others as intentional agents. To further test whether stimulus enhancement was unaffected by social variables that would be active in inter-group contexts, it was decided to manipulate another social variable that is closely related to group categorisation, social power. In this experiment, subjects were exposed to a simple stimulus enhancement experience, in which I manipulated one object from an array to see if this experience changed subjects' behaviour towards this object. The key manipulation involved making participants perceive themselves as powerful or powerless relative to myself as the experimenter. Participants were then tested in two conditions, a stimulus enhancement absent condition and a stimulus enhancement present condition.

It was difficult to make clear predications, mainly because previous research suggested outcomes in opposite directions. First, there is evidence showing that powerless people attend more closely and carefully to superiors (e.g. Vescio et al., 2003), suggesting that powerless participants may have paid closer attention to the experimenter in the current study than powerful participants did. Second, there is evidence showing that powerful people attend more closely to the situational problems they are confronted with, e.g. (Guinote, 2008), suggesting that powerful participants may have been more strongly affected by the activities of the experimenter in this particular situation than powerless ones.

In the following, I will discuss results from all participants. In the baseline condition in which stimulus enhancement was absent powerful participants showed a general tendency to avoid the objects much in contrast to the powerless participants. For instance, powerful participants approached objects more slowly, touched them less frequently and spent less time touching them, both absolutely and proportionally. There was, however, no difference in the long-term effects of stimulus enhancement, that is, in how powerful and the powerless participants listed objects on the recall task.

Interestingly when the same analyses were carried out in the stimulus enhancement condition, differences in perceived power did not cause different behaviour toward the focal object. This was because powerful participants in this case no longer showed a general avoidance of the objects in the stimulus enhancement present condition like they did in the baseline condition. So, with stimulus enhancement present, powerful participants no longer took longer to approach the focal object and they no longer touched it less frequently than powerless participants. Furthermore, powerful participants no longer spent less time, absolutely or proportionally, touching the focal object than powerless participants. In essence, stimulus enhancement seemed to remove the previously observed differential behaviours toward the focal object, resulting in, very generally speaking, no differences between how the powerful and powerless participants behaved. In other words, although powerless participants generally showed more object-oriented exploratory behaviour and powerful participants tended to avoid the objects in the baseline stimulus enhancement absent condition, this difference was removed as soon as the experimenter interacted with the focal object before participants were allowed to. From the results presented in fig. 7.3, it seems likely that this was probably because the powerful participants changed their behaviour toward the focal object in the stimulus enhancement condition.

To address this issue, I also analysed both power groups separately to determine whether stimulus enhancement had an effect, albeit differential, on these conditions. In the powerful condition, participants were affected by stimulus enhancement in that they touched the focal object sooner, more frequently, and for longer periods of time both absolutely and proportionally compared to the stimulus enhancement absent condition. Interestingly, stimulus enhancement did not have the same effect on the powerless participants, who showed no difference in how quickly they approached the focal object or in how frequently they touched it compared to the stimulus enhancement absent condition. Strikingly, the powerless participants actually touched the focal object for shorter periods of time, in both absolute and proportional terms, in the stimulus enhancement condition compared to the stimulus enhancement absent condition.

So, generally speaking, in the baseline condition in which stimulus enhancement was absent, the powerful participants avoided the objects, while the powerless participants approached them more. Conversely, with stimulus enhancement present, participants did not behave differently to the focal object as a function of their relative power. However, the powerful participants approached and touched the focal object more under the influence of stimulus enhancement compared to baseline, whereas the opposite was true of for the powerless participants. In sum, although differences in power do not seem to affect people's susceptibility to stimulus enhancement, it seems that powerful and powerless participants reacted differently to the stimulus enhancement compared to the lack of it. In line with the hypothesis stated earlier, powerful participants reacted more strongly to stimulus enhancement provided by the experimenter: they approached and interacted with the enhanced object more than in the stimulus enhancement absent condition. However, stimulus enhancement had a minor effect on the powerless participants as well in that they spent less time with the enhanced object compared to the stimulus enhancement absent condition. This fits with previous studies which have shown powerful people attending to and approaching goal-related information more than powerless people (Guinote, 2007b, 2008)

Regarding the questionnaire data, reliability analyses showed that only a few of the scales proved useful. The 'theory of mind' scale revealed a trend towards powerful participants reporting more interest in the experimenter's (my own) general mental states. The other two scales, gauging the attention participants paid to the experiment while doing it and how easy they found it, showed no difference as a function of power.

Together, these results should be taken with some degree of caution for several reasons. First and foremost, all effects were marginal, often only trends and typically not strongly significant. Second, effects were only present in the analysis on the full data set, and not on the restricted data set, which is contrary to the previous experiment. Third, no real manipulation check was possible given that the scale on the questionnaire which could have detected a difference in perceived power in the powerful compared to powerless participants proved too internally unreliable and had to be dropped. However, the theory of mind scale did reveal that powerful participants felt a marginally increased interest in the experimenter's mental states over the powerless participants. This difference is slightly surprising as it is not in line with current literature which typically shows that powerful people have decreased interest in any individuating information (e.g. Keltner & Robinson, 1997). Nevertheless, it does suggest that the powerful participants may have indeed been cognitively distinct from the powerless participants. Fourth, the results from this study did not provide evidence for a main effect of stimulus enhancement as the results from the previous study did, suggesting that the object manipulation itself was possibly not strong enough, especially in interaction with a variable like power, to produce effective stimulus enhancement.

Another possibility is that, while these results seem to suggest a difference in response to stimulus enhancement, they could be revealing a difference in test anxiety. That is, the powerless participants could be reacting to increased anxiety surrounding the supposed test they were about to take compared to the powerful, hence their reluctance to engage with the objects. However, it was of course the powerful participants who were most reluctant to engage with the task in the stimulus enhancement absent condition, so this line of reasoning does not fully explain these results. It is possible, though, that the powerful participants may have been identifying more with me as the experimenter and therefore were more likely to mirror my own actions, leading to an apparent increased reaction to stimulus enhancement in that condition.

In conclusion, while the previous study provided evidence in support of the hypothesis that representation of intentionality is actually a sort of line of demarcation below which the effects of categorisation cease, the current study suggests that not all social variables stop having an influence beneath this level. While the effect of power on stimulus enhancement may not be straightforward as shown by the current results, different levels of power do nevertheless produce behavioural differences in how people respond to stimulus enhancement.

Chapter 8

General Discussion

Summary

The primary goal of this thesis was to elucidate how social factors impact cognition in order to understand the cognitive bases of some relevant inter-group phenomena. Specifically, the aim was to explain how group membership affects theory of mind and its precursors. In carrying out five different experimental studies designed to address this issue, empirical data have been generated that together begin to paint a picture of how these aspects of social cognition function in relation to group membership and power.

In study 1, a minimal group paradigm was used (Rabbie & Horwitz, 1969) to put pairs of people into in-group and out-group conditions so that they interacted, respectively, with either a member of their own group or another group. Each pair was then allowed to freely converse. I then analysed these natural conversations for evidence of theory of mind usage, as well as participants' subsequent descriptions of each other. Results indicated that group membership did indeed impact how people manifested their theory of mind. That is, participants referenced their partner's mental states less during conversation if they believed that person to be from another group than from their own. This pattern held for both the reference of simple (first-order) mental states and more complex (second-order) mental states. Results from this study also showed that perception of a person as a mental being was equally affected by group membership. When asked to describe their conversation partners afterward, participants who had interacted with what they perceived to be an 'out-group' member described their partner in less mentalistic terms than participants interacting with a perceived 'in-group' member. In other words, when describing an in-group member participants more frequently referenced their partner's first- and second-order mental states, whereas when describing an out-group member participants concentrated on their physical characteristics or things they had said.

The results from study 1 could have been a product of either a low-level reduction in theory of mind processing itself or, instead, a higher-level active suppression of the products of theory of mind processes. For example, participants could have simply hidden the fact that they had indeed attributed mental states to their partner, possibly due to a desire to conform to social norms about *not* displaying any interest in the out-group. To address these two possibilities, study 2 was conducted.

Study 2 was based on the premise that one of the most important building blocks of theory of mind is the ability to understand and represent other people's intentions (Tomasello et al., 2005). Given its importance in many aspects of social cognition, representation of intention is considered the cornerstone on which myriad other social processes are based, from basic cooperation to the functioning of governments (Tomasello & Carpenter, 2007). In this view, the representation of intention is thus the next step down the ladder of social cognition, and therefore ideal to examine whether group membership affects the cognitive forerunners of theory mind in a similar way. The reasoning behind study 2 was that if the differential mental state reference shown in study 1 was a function of low-level processes that stopped theory of mind cognition altogether, then these same processes would likely hinder the cognitive forerunners on which a theory of mind was built as well. In this case, people should represent the out-group as intentional agents less than members of their own group. On the other hand, if the differential mental state reference in study 1 was a result of higher-level processes, possibly stemming from a compliance with social norms, then the cognitive forerunners upon which a theory of mind was built should remain intact. In this case, there would be no theoretical reason to predict a difference in representation of in- vs out-group members as intentional agents.

To examine these two possibilities I used the same minimal group paradigm as in study 1, but this time in combination with a standard joint action task, called the ‘Joint Simon Task’ (Sebanz et al., 2003b), a standard paradigm to gauge representation of partners as intentional agents (Sebanz et al., 2003a). The task reveals representations of others as intentional agents in the form of a so-called ‘Social Simon Effect’. The Social Simon Effect is, in essence, altered reaction times due to cognitive interference resulting from the representation of a partner’s intended acts (Knoblich & Sebanz, 2008). Results from study 2 were ambiguous and as such did little to confirm or reject either hypothesis. In particular, I found no evidence for a Social Simon Effect in the in-group condition, which would have supported the hypothesis that different representations of intentionality were the cause of different manifestation of theory of mind in study 1. It was therefore not possible to determine whether the lack of theory of mind activity in study 1 was the product of low-level social cognition processes in the out-group condition or instead of high-level normative processes.

However, study 2 was also plagued with some methodological issues, particularly unexpected problems with handedness, and interactions with social competition, which is potentially applicable to any interaction with the out-group. To address these issues I designed study 3. Study 3 used the same Joint Simon Task, in which people were first subjected to a minimal group paradigm, which assigned them to in-group and out-group conditions. Participants were then subjected to a manipulation designed to standardise competition as either high or low. Because study 3 also controlled tightly for handedness and regulated competition, results were more relevant to the hypotheses. First, I found no overall ‘Social Simon Effect’. More interestingly, I found the presence of a Social Simon Effect in the in-group condition alone, regardless of the level of competition participants experienced in this condition. That is, study 3 provided direct evidence that participants represented others as intentional agents if they perceived them as members of their own group, and failed to do so with members of a perceived the out-group. This, then, suggests that the differential mental state attribution seen in study 1 was not a product of higher-level processes, such as adherence to norms about behaviour toward the out-group, but instead a result of categorisation acting directly on lower-level social cognition processes, which in turn provided participants with a diminished foundation upon which to then build mental state attribution. Of course, it is possible that high-level processes like adherence to social norms were also at work in producing lower mental state reference with out-group members. However, these low-level processes identified with study 3 involving the curtailment of representing the out-group as intentional agents is a strong force, and could well provide sufficient explanation for a lack of theory of mind activity with out-group members. Future research could discern whether high-level forces are at all implicated in the type of differential mental state attribution seen in study 1.

Study 3 thus provided evidence that group membership affects social cognition below the level of theory of mind processes, specifically the representation of others as intentional beings, which is likely to be the cause of differential theory of mind processes themselves in inter-group situations. However whether group membership affects even more basic social cognition was still unkown. On the one hand, it is possible that group membership only affects processes which include or are based on the representation of intentionality, as shown in the previous study. If this is the case, then more basic social cognition processes that do not involve representation of intention should not be affected by group membership. On the other hand, it is possible that the ability to represent intentionality is just such a line of demarcation. Possibly, since in-group bias leads people to attend more closely to socially relevant in-group members (Mullen, 1983; Mullen et al., 1992), basic social cognition processes below the level of representation of intent such as those based on the simple directing of attention may also be affected by differential group membership conditions.

To test these hypotheses, I selected a social cognition mechanism that is known to operate in the absence of representing intentionality, stimulus enhancement, arguably the simplest social learning mechanism described to date (Huang et al., 2002). Stimulus enhancement is a process by which an organism's attention is drawn to some aspect of the environment by social means. Although social in nature, stimulus enhancement requires no representation of intent in the process (Horne et al., 2009) which makes it an ideal social cognition mechanism in this context.

Using the same minimal group paradigm as in the previous three studies, study 4 additionally employed a customised method to test for the presence of stimulus enhancement as a function of group membership. Participants were allowed a 'learning phase' during which, they were told, they were required to memorise a set of objects. During this learning phase they watched a confederate manipulate one of an array of ten objects on display (the 'focal object'). Results revealed a main effect of stimulus enhancement, in that participants more quickly approached the focal object, spent more time, both proportionally and absolutely, manipulating the focal object, and listed the focal object sooner in a recall list than the control object. However, results also showed that stimulus enhancement was not affected by group membership. Participants who did the memory task with an in-group confederate reacted no differently to the focal object than people who did the task with an out-group confederate. These results therefore provided initial support for the tentative hypothesis that group membership affects only those social cognition processes that are based on representing intention.

To further test the hypothesis that intention is an important demarcation line in the social cognition underlying inter-group relations, I designed study 5 with another relevant social factor - social power. Power differentials are inherent to many inter-group interactions (Sachdev & Bourhis, 1991), suggesting that social power, unlike categorisation, may exert some influence on sub-intentional social cognition processes, such as stimulus enhancement. In study 5, people were made to feel either powerful or powerless relative to the experimenter, and then asked to complete the same memory task as in study 4, in this case with or without stimulus enhancement. While there was no main effect of stimulus enhancement, participants who felt powerful reacted more strongly to stimulus enhancement provided by the experimenter compared to powerless participants. With stimulus enhancement, powerful participants showed a greater tendency to approach the focal object and to manipulate it for longer periods, both proportionally and absolutely, than without stimulus enhancement. There was no such pattern within the powerless participants. These results suggest that, unlike categorisation, power can influence social cognition processes that do not involve representations of intention, such as basic social learning processes. In sum, the demarcating line of representation of intentionality may only be relevant for processes relating to group categorisation, but not for related processes, such as perceptions of relative social power.

Appraisal and critique of Methodology

While these studies have made some progress towards understanding the effect of group membership on social cognition, conclusions must remain tentative due to a number of methodological problems and caveats.

Study 1. It is important to note that, prior to this research, very little systematic work had been done on the normal adult theory of mind. In the meantime, important paradigms have been developed and some of them have used elegant measures to examine the automaticity of false belief reasoning. A good illustration is a study in which adults were subjected to a cartoon-strip test of their false belief understanding. The procedures followed the standard Sally-Anne task in which a participant was required to track both an object's location and a target's false belief about its location. By interjecting unexpected questions, Apperly and colleagues showed that normal adults did not necessarily reason about a person's false belief about an object's location as automatically as they tracked its actual location in reality. That is, participants took longer to answer unexpected questions about the target's false belief than questions about reality (Apperly et al., 2006).

Apart from such recent examples, there is still little known about how theory of mind processes, as a whole, are used in daily situations of normal, healthy adults engaged in real-life social interactions. Questions remain surrounding how people regard, perceive and process the range of others' mental states, from desires to knowledge and beliefs, and moreover, what factors determine whether people consider the mental states of people they interact with. My strategy was to begin at the most basic starting point possible, by analysing natural conversations for evidence of spontaneous theory of mind usage. This tactic has been used before to understand children's developing theory of mind, e.g. (Furrow et al., 1992; Shatz et al., 1983), but never before applied to adult speech.

As discussed in the first chapter, much research on the developmental and pathological theory of mind has utilised paradigms based on cartoons and stories which require people to correctly attribute a character's mental states (e.g Frith & Corcoran, 1996). Indeed, the first empirical test of false belief understanding in children -- on which the classic Sally-Anne task was based -- required children to impute mental states to a character called

‘Maxi’ (Wimmer & Perner, 1983). The simplicity of the methodology in the first study is precisely what made it unique: with it, online, spontaneous manifestation of natural theory of mind usage between actual people could be gauged without having to prompt participants.

However, with this benefit came a certain draw-back. As other authors have noted, it is impossible to tell from the presence of words that reference mental states whether the person who produced the word actually has a coincident mental representation of that precise mental state (Shatz & O'Reilly, 1990). While the analysis of natural speech provides a clear read-out of what one could presume is mental state reference, only by asking people directly about each instance of mental state reference could I have ruled out the possibility that they were using these words colloquially rather than with an intent to reference actual mental states. Nevertheless, given that this is the case for both in-group and out-group conditions, it can at least be noted that, this disadvantage notwithstanding, there were still distinct differences in how people in the two conditions used these reference words in their conversation.

Studies 2 and 3. In study 2, I employed the Joint Simon Task, a classic joint action task which had been used previously to assess people’s ability to represent other as intentional agents. Somewhat surprisingly, this task did not reproduce significant effects or standard results, most likely due to issues of handedness and confounding effects of social competition as discussed in chapter 4. Study 3 therefore was designed to correct these issues, with the effect that the usual Social Simon Effect was reproduced. Results in essence showed that people’s reaction times were affected because they were representing their partner’s intended acts.

Study 3 further showed that the Social Simon Effect was moderated by group membership and that in the presence of categorisation only in-group members were represented as intentional agents. With these results, study 3 extends previous research using the Joint Simon Task. A relevant study conducted after the completion of this research by Müller and colleagues (2011) investigated the effect of group membership on the Social Simon Effect and showed that when Caucasian participants did the task with a simulated white hand the Social Simon Effect was present, but not when they did the task with a simulated black hand (Müller et al., 2011). Although these are interesting findings, they do not address the question of whether group categorization has an effect on the representation of others as intentional agents. Specifically, it remained unclear if participants reacted differently to the white and black hands because of actual categorisation or because of some other factor relating to the complex histories of these two specific groups. Real-life group interactions can result in avoidance and anxiety (Stott & Reicher, 1998). Inherent power differentials (Mullen et al., 1992), and the implicit associations and stereotypes attached to these two racial groups (Fazio et al., 1995; Greenwald et al., 1998), as well as differences in perceived competition could all have affected reaction times to produce something akin to a Social Simon Effect.

Study 3 improved upon Müller and colleagues' design by controlling for competition and by using groups created on minimal and arbitrary characteristics. This allowed me to disentangle the effect of group-based categorisation itself from the history and power relations that stem from real-life categorisation. This meant that any behavioural effects could be attributed to actual group categorisation and not inherent properties of the individual groups themselves.

Studies 4 and 5. The methodology used in studies 4 and 5 was specifically developed to study stimulus enhancement, one of the most basic social cognition processes. As detailed in chapter two, stimulus enhancement has been studied extensively in infants and non-human animals, necessitating a new paradigm that was suitable to study the mechanism in adults. While previous paradigms typically focused on documenting the manipulation of a certain aspect of one object, e.g. (Charman & Huang, 2002; Fritz, Bisenberger, & Kotrschal, 2000), the paradigm used in studies 4 and 5 instead gauged whether stimulus enhancement was active if one in a set of objects was manipulated.

Results suggested that while stimulus enhancement was not affected by categorisation it was conversely affected to some degree by social power. However, the method developed to investigate these interactions had certain weaknesses. Most notably, participants who never touched or engaged with the task in any way contributed to a ceiling effect on some measures. It is possible that the task was not sufficiently tactile enough to encourage manipulation. Indeed, participants were only told that they were 'allowed to do anything they wanted' with the objects in order to 'learn them', and they did not receive any specific instruction to rearrange or manipulate them. All previous attempts to gauge stimulus enhancement exploited physical problem solving skills, e.g. (Zuberbuhler, Gygax, Harley, & Kummer, 1996). The fact that participants in these studies were neither instructed to manipulate the objects nor implicitly encouraged by a more tactile task could have been why so many failed to engage with the task. Future studies of this social learning mechanism should take into account the need for obviously tactile tasks if the dependent variables themselves are to be measures of tactile involvement.

Furthermore, the method used to ascertain the long-term effects of stimulus enhancement were not very effective. While participants showed little variation in how they recalled objects when asked to list them as a function of stimulus enhancement, there was no variation in participants' ability to identify the object I removed at the very end of each trial as a function of its enhancement. This procedure involving the removal of one object could therefore be dropped in any future studies of stimulus enhancement or the memory requirements would have to be made more challenging.

Study 5 improved upon study 4 with the addition of a baseline condition, which enabled me to gauge participants' baseline behaviour towards the objects in the absence of stimulus enhancement. By adding this condition, it was possible to compare the differences between the stimulus enhancement present and absent conditions within the powerful participants and the powerless participants respectively. This allowed for another measure of participants' behavioural responses to stimulus enhancement in addition to their comparative behaviour toward the focal object versus the control object.

Study 5 did have the weakness, however, that I as the experimenter was involved in the powerful manipulation. Claiming to be one of their tutors, I would have necessarily been in an inherently more powerful position than the participants, regardless of the power manipulation. Given that, it is possible that the powerful participants were simply identifying with me and hence doing as I did in the experiment. Future research should instead use a power manipulation that does not involve a person with an inherent power relation to the participants. In sum, these two studies provide a new methodological tool for the study of stimulus enhancement, but certain alterations should be made to increase its effectiveness for future research.

Theoretical Implications and Future Directions

This thesis had two goals: first, to determine the extent to which group membership affects theory of mind cognition and its cognitive precursors in order to better understand the quotidian functioning of theory of mind, and to a lesser degree, to shed some light on the cognitive processes that are involved in inter-group situations.

As noted previously, state-of-the-art research has provided extremely rich sources of information about how a human theory of mind develops, and what it looks like when it develops abnormally (as in the case of pathologies) or differently (as in the case of non-human primates). From these fields some invaluable paradigms and theoretical approaches have arisen. However, possibly in some part because of this focus on the non-normal-adult theory of mind, the actual functioning of theory of mind has been a relatively neglected area of research. For instance, because the Sally-Anne task is such a perfectly honed and concise test for gauging false belief understanding, it has come to be the norm to simply modify the context in which its given and the participants who take it rather than the method itself. Consequently, with this litmus test to hand, testing for the presence of theory of mind, rather than how the mechanism operates, has become standard.

This approach to studying theory of mind as an all-or-nothing mechanism has lead, however inadvertently, to the detriment of the study of the normal and fully developed mechanism itself (Apperly & Butterfill, 2009; Apperly et al., 2009). While we might know the cognitive steps required to develop a theory of mind, we do not know much about what it looks like once developed. Furthermore, while we know a considerable amount about non-human theory of mind abilities, we do not know much about our own limitations to be able to make true comparisons. And lastly, while we understand in some detail how the abnormal brain produces abnormal theories of mind, we know little about what the normal brain would do in the same circumstances, and whether we too would even make mistakes given the same paradigms and tasks. While some recent work has made some in-roads into the study of the normal functioning of the mechanism (for a review see Apperly et al., 2009), we are still in the early stages of understanding this process.

Some research, discussed in detail in chapter one, has begun to show that mood (Converse et al., 2008) and cognitive factors like distraction (Newton & de Villiers, 2007) affect performance on standard false belief tasks. Moreover, recent evidence suggests that false belief understanding is anything but automatic (Apperly et al., 2006) and, indeed, requires effortful processing (Apperly, Back, Samson, & France, 2008). The results of the perspective-taking studies by Keysar and colleagues, discussed in chapter one, showed that people fail to equate a partner's knowledge with what they can and cannot see (e.g. Keysar et al., 2000). This shortcoming is the result of the increased cognitive demands involved in theory of mind processes compared to simple reality-tracking (Apperly et al., 2010). These results all indicate that, when it comes to actually putting our theories of mind into practice, normal adults show more variation in performance than previously assumed, and most likely this variation changes with situational pressures.

Group membership has been seen to affect all kinds of processes related to mental state attribution, from empathy (Stürmer, Snyder, Kropp, & Siem, 2006) to perspective-taking (Wu & Keysar, 2007). Consequently, categorisation based on group membership was the social variable chosen to begin the study of theory of mind in its actual environment: daily social interactions. Study 1 showed that group membership does affect how people manifest their theory of mind usage in reality. People were less interested in and commented less on the mental states of members of other groups than their own. Given that study 3 showed that people do not automatically represent out-groupers as intentional agents, it is likely that this difference in mental state attribution in study 1 came not from a conscious effort to suppress theory of mind processes but rather from a largely subconscious inability to represent the out-group's mental states in the first place. That is, with a reduction in the necessary building blocks mentalising would require, specifically a reduction in the ability to understand another person as an intentional agent, understanding more complex mental states becomes impeded. That is, it is likely that in study 1 members of the out-group were not even perceived as potential mental state beings to the same degree as members of the in-group. This is also supported by the fact that, in study 1, people consistently described out-group members afterward as less mentalistic than in-group members. This result makes it less likely that higher-level processes were also at work which would have hindered the display of theory of mind processes due to, for instance, a desire to adhere to social norms.

This evidence is all the more striking if one considers that the results came from interactions between experimentally formed groups based on arbitrary, minimal characteristics. This suggests that social factors, specifically group membership, has a significant impact on how we put our theories of mind to use. Moreover, it also suggests that for real-world groups the difference between how in- and out-group members are perceived as mental beings may be greater still: mental-state attribution may occur to an even lesser degree for members of real-world out-groups. These results should inform both researchers of dehumanisation and inter-group conflict. Clearly, without being perceived as an intentional, mental being, the most fundamental aspect of human uniqueness (Herrmann, Call, Hernandez-Lloreda, Hare, & Tomasello, 2007), there is little hope for a person to then be categorised and dealt with as human. Resulting dehumanisation, in the form of either actual categorisation as non-human (Haslam et al., 2008), or even simple denial of uniquely human emotions (Leyens, 2009), is then unsurprising.

However, all this is not to say that there are not situations in which it would behoove a person to be interested in the mental states of an out-group member. Thinking back to the example presented in chapter one, a Jewish inmate of the Nazi death camps would have benefited from understanding the intentions and plans of his guards. Obviously other social factors, for instance power, would interact with categorisation in real world social interactions when it comes to the motivation to represent others' mental states. The current results do suggest, however, that in the absence of other social factors, the effect of categorisation alone is to decrease interest in the mental states of out-group members.

This inability to view the out-group as mental state agents on par with the in-group also has implications for basic inter-group conflict. If categorisation is the most salient social factor, then these results suggest that a person will be less likely to represent the out-group's mental states. It also seems that this tendency will begin at the basic perception of the out-group member's intent and continue through to their more complex beliefs. In such an atmosphere social interaction is bound to be less successful. For instance, negotiation which is based on understanding and responding to another's intent (Van Kleef & De Dreu, 2002) cannot be expected to occur normally or with any success if a person is not perceived as an intentional agent in the first place.

Furthermore, in the same way that dehumanisation fuels out-group derogation (Castano & Giner-Sorolla, 2006), an inability to understand another person as an intentional agent with corresponding knowledge, beliefs, and desires, may also facilitate maltreatment of the out-group. Dehumanisation is a key component of genocide, which, de Zavala and Adler argue, is brought about by normal, 'ordinary psychological processes' (de Zavala & Adler, 2010, p. 264). While other authors detail the correlation between a person's fanatical, uncritical identification with an in-group and their subsequent hatred and aggression towards the out-group (de Zavala, Cichocka, Eidelson, & Jayawickreme, 2009), it is difficult to find, in this chapter or elsewhere, exactly what these supposed ordinary psychological processes are. In the vast literature on inter-group conflict, the descriptions of stereotyping, aggression, and derogation towards the out-group are all related, at their most fundamental level, to a combination of basic out-group bias (Tajfel & Turner, 1979) and the social norms that then allow behaviour to be directed against the out-group (Sherif, 1967). Rarely are more fundamental cognitive processes identified as the source of these behaviours in the current social psychological literature.

By identifying a difference in how people consider the mental states of out-group members compared to in-group members, this thesis has begun to elucidate the underlying cognitive mechanisms involved in inter-group interactions. Clearly, people who are cognitively normal do not just engage in out-group derogation only because they fanatically glorify their own in-group, or because social norms dictate they must do so. In the end, the inability to view members of other groups as intentional agents, and the subsequent inability to ascribe mental states similar to one's own, may be a more profound factor in how out-group bias is sometimes turned into large-scale out-group derogation.

A slightly different take on these results is the following. The ascription of intentionality is an innate human drive that begins early in life (Blakemore & Decety, 2001) and even extends to perceiving inanimate objects such as moving triangles (Heider & Simmel, 1944) or moving points of light (Dittrich, Troscianko, Lea, & Morgan, 1996) as intentional agents. Given the strength and pervasiveness of this innate human drive, it is possible that, in the out-group condition, people's innate intention-reading system is equally functioning as with in-group members, but instead tuned to the group instead of the individual. This is plausible given that people perceive out-group members as more homogenous and less individualised than in-group members (Ostrom & Sedikides, 1992). The basic suggestion here is that mental states may be ascribed stereotypically to out-group members as a whole instead of to individuals within the group. An example of this would be a Catholic person who assumes that all Protestants think Catholics are rigid and dogmatic, and therefore bases his or her reactions to any Protestant person on these presumed thoughts rather than assessing each individual Protestant. This is something akin to meta-stereotyping, which involves stereotyping another group's stereotypes of one's own group (Torres & Charles, 2004). Whether these processes or similar process are involved in the diminished representation of out-group members' mental states seen in study 1 remains for future research to determine.

At the same time, we have seen that categorisation has a limited influence on cognition. While the methodology may need refinement as discussed earlier, it is possible that the effects of categorisation stop at the level of representation of intention. This is because, as shown in study 4, categorisation does not seem to affect basic social learning processes that exist below this line of demarcation which do not require representation of another person's intent. This further highlights the fact that the cognitive effects of categorisation as 'out-group' may sometimes lead to viewing another as a non-intentional agent, and under some circumstances as less-than-human. With intentionality as the cornerstone of these processes, it seems that representation of intention is necessary both for subsequent mental-state attribution processes and also for the differentiation of in- vs. out-group.

Future research will clarify how crucial intentionality is regarding the effects of categorisation on basic social cognition. It will also be able to expand on social factors and contexts that impact on spontaneous, normal, theory of mind usage, whether through the naturalistic methodologies used here or otherwise. For instance, it is possible that power differentials affect theory of mind usage as well as non-intentional social learning processes. Lastly and possibly most importantly, further research that specifies the nature of the relationship between theory of mind and inter-group conflict will be highly useful. We do not know what causal role a decreased theory of mind plays in inter-group interactions, conflictual or otherwise, nor whether the apparent decrease in perception of out-group members as intentional agents has anything to do with stereotyping the mental states of out-groups as a whole. We also do not know whether the lack of attention to out-group members as socially relevant, intentional beings alters a person's empathy for them which would facilitate brutal treatment, or simply leads to a lack of awareness of their suffering in the first place. While this thesis has contributed to the growing body of research on daily theory of mind functioning, it has only just begun to join paths with dehumanisation and inter-group conflict research, and the paths toward future research are as varied as the faces of theory of mind itself.

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Appendix 3.1

Participant Recruitment Sheet: Study 1

Girls:

Earn £3 for participating in a psychology experiment

and

learn about YOUR OWN Cognitive Style

IMPORTANT!! ** PLEASE SIGN UP NEXT TO A STRANGER (i.e. the most you know about them is their name) ******

NAME	EMAIL & TELEPHONE	NAME	EMAIL & TELEPHONE

Appendix 3.2

Participant Information Form: Study 1

Participant Information Form – Cognitive Styles & Social Interaction Experiment

Thank you for participating in this study on cognitive styles. This study is designed to uncover the relationship between cognitive styles and social interaction. To that end, we will first test your cognitive style and then give you an interaction task. To test your cognitive style we will gauge your perception of a picture you will see and from that we will determine which type of cognitive style you have. Then we will have a brief pause in the experiment to allow you to get to know the person you will be interacting with. This is because many social psychology experiments fail to note the importance of naturalistic interactions, and we want to allow time to make your interaction task as natural as possible. Next you will be asked to complete an interactive task. By comparing the different patterns of social interaction between different cognitive styles it will be possible for us to determine if different cognitive styles cause people to interact differently. After the experiment there will be a question and answer period in which the experimenter will answer any questions about this study you may have.

Your participation in this experiment is entirely voluntary. You are free to terminate your involvement at any point during this experiment without penalty. The data we obtain will be stored on video in a locked filing cabinet for no longer than 5 years at which point they will be destroyed. Only the researcher and her supervisor will have access to the data. All data will be treated confidentially and any published data will be totally anonymous. Thank you very much for your time and help in our endeavour to understand the nature of our social world.

Appendix 3.3

Participant Consent Form: Study 1

Participant Information and Consent Form – Cognitive Styles and Social Interaction Experiment

Thank you for participating in this study on cognitive styles. This study is designed to uncover the relationship between different types of cognitive style and social interaction. Your cognitive style will first be tested by gauging your perception of a series of pictures you will be shown. You will then be given a task to carry out in order for us to more closely examine the relationship between cognitive style and social interaction.

Your participation in this experiment is entirely voluntary. You are free to terminate your involvement at any point during this experiment without penalty. The data we obtain will be stored on video in a locked filing cabinet for no longer than 5 years at which point it will be destroyed. Only the researcher and her supervisor will have access to the data. All data will be treated confidentially and any published data will be totally anonymous. Thank you very much for your time and help.

I understand the experimental procedure and I confirm that I am participating voluntarily and without duress in this experiment, and I understand I am free to quit at any time.

________________________________ _______________

Signed Date

I agree to being filmed and to have any data from my participation in this experiment stored under lock and key and viewed only by the researcher and her supervisor, and to be treated anonymously in publication.

________________________________ _______________

Signed Date

Appendix 3.4

Protocol: Study 1 Cover Story

‘Ok, first, thank you very much for participating. Ok, to get started, I’ll just run through the stages this experiment involves so you know what to expect. First, I’ll give you a test called The Dot Estimation Task to asses your cognitive style. This test is based on whether you over-estimate or under-estimate the amount of dots in a picture. It is a very reliable diagnostic test we can use to assess cognitive style since estimation abilities correlate with other facets of cognition. For instance, over- and under-estimators use different methods of solving mathematical problems, they perceive the visual world differently, and they have different ways of multi-tasking. Over- and under-estimators even have different social norms. So, this experiment is looking at whether differences in cognitive styles affects how people interact socially.

Once I’ve determined whether you are an over-estimator or an under-estimator, there will be a social interaction task I’ll ask you to do together.

Before the actual social interaction, I’ll give you a chance to chat. This is just to create as natural a setting as possible for the upcoming social interaction task.

OK –so to summarise - the dot estimation task is first, then a brief chat, and then the social interaction task. Any questions at this point?

‘Ok, we’ll jump right in and begin with the Dot Estimation Task. You will see some pictures of dots on that wall there, each very briefly. All you have to do is estimate how many you see. There will be 3 pictures in total with a short pause after each one to give you time to write down your estimate. Here is a FORM you can use. You’ll see each picture very briefly, so look carefully. But at the same time, the aim here is to get an idea of how you perceive and estimate amounts – you will definitely not have time to count all the dots. Don’t worry about that – just write down your best estimate. Any questions about so far?

After I get your average your estimates I’ll be able to tell you which cognitive style you have. Please do give the best estimate you can so I can assess your cognitive style and group you accordingly. And also, please do this alone and don’t discuss your estimates or the pictures so that the results are as individually accurate as possible. Ok, I’ll just start the test now.

Appendix 3.5

Debriefing Form: Study 1

Debriefing Form – Cognitive Styles & Social Interaction Experiment

In this experiment, as you will have noticed, there was no actual social interaction task in which you were involved. This is because, due to the nature of the theoretical question we are asking, a certain cover story was necessary to obtain data without your suspicions or second guesses playing a role your reactions.

In fact, we are studying every-day mind-reading. This simply means our ability, as humans, to determine what other people are thinking, wanting, or intending to do. We do it regularly and without much notice, but surprisingly little is known about this phenomenon. In order to observe how you mind-read on a daily basis we could not have informed you that this was indeed our goal. If we had done so you would have been so conscious and careful about your responses that they might not have been as natural as they are in normal, every-day situations. So, we told you the cover story that we were looking at cognitive styles, when in fact this was done only to divide you into (what were actually randomly formed) groups. This is a procedure called the 'minimal group paradigm' and has been used for over forty years to show that, even in spontaneous, randomly formed groups, people feel a closeness to members of their own group and a distance to members of other groups: that is, they 'identify' with these minimal groups even though they have no history with the people in the group. So in fact, both the number of dots you estimated and your supposed 'cognitive style' were meaningless except in terms of the groups formed for the purpose of this experiment.

We formed these groups in order to test our prediction that group membership might play a role in how we mind-read in every day situations. It is possible that, for instance, you mind-read differently depending on whether the person you were attempting to 'get to know' was a member of another group (an out-group member - different from yourself) or a member of your own group (an 'in-group' member – more similar to yourself). To determine this we will compare data from the 'getting-to-know-you' situation between in-group and out-group conditions to determine if the group membership of the target person effected how much and how deeply you wanted to understand their mental states. In the same way, we will compare data from your written descriptions between conditions to get another measure of how likely people are to perceive others as mental beings based on their group membership.

As you can appreciate, if we had told you the real nature of this experiment at the beginning it would probably have influenced your behaviour. This meant a cover story was necessary to elicit the most natural and spontaneous behaviour possible from all participants. For that reason, we would greatly appreciate it if you would not discuss this experiment or the cover story we have used with anyone else for the foreseeable future as that could completely ruin all results. We will be recruiting participants from all schools within the university, so please discuss it with no one as everyone is a potential participant. Both the experimenter and her supervisor will be happy to discuss any questions or issues you might have with this research and your involvement in it. Thank you very much for your time – your participation is helping to further our understanding of our complex social world.

Researcher: Jennifer McClung (email: jsm10), Supervisor: Steve Reicher (email: sdr)

Appendix 3.6

Example of Transcription & Coding of Natural Conversations: Study 1

TRIAL 24 Talking starts at 4:47	Coding: MS1 = ref. to partner's mental state, first order MS2 = ref. to partner's mental state, second order
(Notes: A = Leslie, took lead B= a bit quieter) A: I'm Leslie, I'm a 4th year physiologist. What do you do? B: I'm 1st year. I'm doing, well, geography is my main one but I'm also doing geoscience and biology. A: cool. B: yeah, it's allright. I'm just doing, I'm in the middle of an essay. A: oh, not your first deadline I presume? B: no, no, we've had a few, but, I don't know, I got a good one back and then a not so good one back, so A: oh B: I don't know which one's which. A: I'm really jealous at the moment. My flat mate got an essay back today and he got a 19. which is… B: that's really good. What is good, do you know? Because I still don't get the scale. A: well um, once you get into honours, basically, above 16 and a half is a 1st, between 13and a half and 16 and a half is a 2.1, and from I think 10, maybe, 11 to 13 and a half is 2.2. B: oh, so that's… A: but I mean, it doesn't mean a lot, in first and second, oh well, second year a bit because obviously you have to get enough to get into honours, but those grades are usually like 10 or 11 in your core subjects. B: oh right A: so um, yeah, first year, just enjoy it. B: yeah A: just enjoy it! There's no point stressing too much. I mean,	

obviously you know to get on with in and get things in and give it your best shot. But really, **you'll enjoy** your first year. Really. I didn't kind of get into enjoying being a student until like the end of 2nd year and I feel like I've missed out because, you know, too busy set at home grumping about being away from home and…..	MS1
B: yeah, yeah. I'm quite looking forward to going home, so it's still a little bit like that.	
A: where you from?	
B: sommerset.	
A: cool.	
B: what about you?	
A: I'm from Kent.	
B: oh right. So…	
A: same kind of distance	
B: yeah, yeah…. so **you know what it feels** like? I guess I mean…..	MS2
A: yeah. It's tough, kind of, until you get used to it and stuff.	
B: yeah	
A: I mean, once you kind of, I mean, I don't know how it's going for you, but I found that, it like all became ok once I kind of got some close friends. Because I mean, in first year I kind of had a lot of friends but no one that I was really close to. So once you get, like, some people… and I think, I'm very close to my family as well so, it was a bit so…'oh, mom!'	
B: yeah, I have a twin brother in edinburgh	
A: oh wow!	
B: so that's kind of good because I have seen him a couple of times	
A: yeah	
B: we're hopefully going down. **did you know** they're doing a german market and stuff?	MS1
A: yeah	
B: ice skating rink and stuff?	
A: mm-hmm	
B: hopefully I'm going down next weekend	
A: oh that'd be nice	

B: so, not this one but weekend after. And he wants to meet up then so…. I'm still missing my family but as you say I've got, I'm in halls and I've managed to find some people so… A: which hall are you in? B: ST Regulus A: that's supposed to be a really nice hall actually B: yeah it is A: I didn't live in halls B: all right A: so I don't know much about hall life, but I mean I've spoken to people about it. I had a friend in Regs in first year B: oh right! A: and she really enjoyed it B: yeah, I'm really liking it A: it always smells nice when I walk past at breakfast time B: oh, the food is quite good. I'm also lazy, and can't cook, so.. A: well, that's a good option! B: yeah, I think it's good as well A: yeah, I think, halls is usually a good option for first years B: yeah, I mean, because it puts you together with a load of people. A: yeah, I mean, you can't fail to kind of get to know people can you? B: yeah A: do you have a room mate? B: yes I do A: do you get along? B: yeah we do actually, it's quite nice. Um, we get along, we're having, not difficulties… she's got a different working pattern to me. She works late into the night and I'm quite a like, not early because It's university and don't seem to be able to get to bed before like 11, A: I know the feeling, I know the feeling! It doesn't get any better. B: I guess you just get used to it. But um, yeah, so that's but I mean, I just like wear one of those flight masks so she can just work	

and then that's fine. A: yeah,yeah B: no, I'm quite glad I share a room in a way because the first night she didn't turn up, well, I got here the day before her. So the first night I went back to my room quite early because everybody seemed to like disappear, so it was like 'oooh!' A: and then there was no one there! B: but it's quite nice really A: I can't imagine like, moving into somewhere for a year, sharing a room with someone you don't know, I mean I have enough trouble sharing a room with my sister, so… and we have done for most our lives but it's still, you know, you still grate at each other, and I can't imagine doing that with someone I don't know. It's just like 'oh my god!' B: in a way, I guess because it's like I used to share a room with my sister and we were full of arguments, usually just about the light being on or off and that was it… A: yeah B: but I guess because I can't quite have an argument with a room mate because I don't know her that well…. A: yeah, you kind of feel a bit funny about like, um, bringing things up B: yeah, definitely. I mean, it's worked for me. It hasn't worked for one of my friends, quite opposites, but thankfully her room mate is moving out anyway, and like, another friend is gonna move in with Fiona, so she's ok now. A: I think it works out for most people. Like most people, at the end of the year, who have a room mate, they're quite glad to be moving somewhere where they don't have to share. But at the same time, I think most people don't find it a bad experience. B: no A: I mean, obviously you're always going to get a few that are really mismatched and just don't get along at all, but, I think in general, surprisingly I guess… B: yeah, you would have thought, I mean none of my friends came anywhere near Scotland basically and, talking to them… A: me, the next furthest north from my school was like in Liverpool I think. B: Newcastle, and Durham I guess. But yeah, that's it, my brother's	

the only one up in Scotland as well, so it's a bit weird, and um, the sharing a room thing, because not many universities do that anymore, A: not many unis even have halls like we do, most of them are kind of like DRA or um, Albany park, where they're kind of arranged in flats B: yeah A: or at least in corridors. My boyfriends at Brunell and um, he kind of, you go into like a huge building, but you kind of, he has 8, there's a door with a lock and 6 rooms, and a kitchen behind it, so it's kind of a flat, not that you talk to each other but… (11:31)	

Appendix 3.7

Example of Transcription & Coding of Written Impression Forms: Study 1

Trial 28 Mental state terms highlighted in bold when found	Coding – X = no mental state reference, MS1 or MS2 = Mental state reference, 1st or 2nd order
Helen seems very independent, confident, and self-assured.	X
She seems very unique and not afraid to do what she wants regardless of what other people think.	MS2
She's well-spoke, out-going.	X
She seems to be very happy here.	MS1
She's much happier than in the states.	MS1
Maybe is finally making friends and figuring herself out away from home.	MS1
I can see her with her language courses actually just staying in Europe and not going back to the US after uni.	X
I like Helen, she comes off as very trustworthy and honest.	X

Appendix 4.1

Participant Information Form: Study 2

Participant Information Form - Cognitive Styles & Reaction Time

Thank you for participating in this study on cognitive styles and reaction time. This study is designed to determine how cognitive styles influence how quickly you react. Much work has been done on the complex cognitive processes involved in forming different cognitive styles, and how different cognitive styles relate to other cognitive processes. However, little is known about how cognitive styles influence how people react. To that end, we will first determine which type of cognitive style you have. Classically, people are grouped into 2 categories of cognitive style based on how they visually perceive the world. To do this, a test will be applied that assesses how you estimate a group of dots to determine whether you are an 'over-estimator' or an 'under-estimator'. You will then be asked to complete a few short reaction time tasks. By comparing different cognitive styles, it will be possible for us to determine if there is indeed a difference in how these two types of people react to the external world. After the experiment there will be a question and answer period in which the experimenter will answer any questions about this study you may have.

Your participation in this experiment is entirely voluntary. You are free to terminate your involvement at any point during this experiment without penalty. The data we obtain will be stored in a locked filing cabinet for no longer than 5 years at which point they will be destroyed. Only the researcher and her supervisor will have access to the data. All data will be treated confidentially and any published data will be totally anonymous. Thank you very much for your time and help in this endeavour to understand psychological forces in more detail.

Appendix 4.2

Consent Form: Study 2

Consent Form – Cognitive Styles & Reaction Time

I understand the experimental procedure and I confirm that I am participating voluntarily and without duress in this experiment, and I understand I am free to quit at any time. I understand that data from my participation in this experiment will be stored under lock and key and viewed only by the researcher and her supervisor, and will be treated anonymously in publication.

_______________________________________ __________________

Signed Date

Appendix 4.3

Protocol: Study 2

So as you read, in this experiment we are trying to uncover the relationship between cognitive style and reaction time. To do that I will first analyse your cognitive style to determine which type of cognitive style you have, and then I'll test your reaction times on these computers. To determine which type of cognitive style you have you'll take this standard test called the 'Dot Estimation Task'.

Over the years the D.E.T. has become the classic test used to analyse cognitive style since it can very accurately and quickly assess your visual perception. It does this by assessing how you estimate amounts, and it then us to classify you as either an '**over**-estimator' or an '**under**-estimator'. A great deal of research in psychology has shown that there is a link between how you estimate and general cognitive style: so we now know that whether you are an **OVER**-estimator or an **UNDER**-estimator will also tell us a lot about how you perceive the rest of the world. This is why today, in cognition research, people are generally divided into these two categories of cognitive style.

These two types of cognitive style are really quite different. I will go into greater detail at the end of the experiment, for now I'll just give you an idea of the types of differences we see. It has been shown, just for instance, that **OVER**- and **UNDER**- estimators both have very different ways of solving mathematical problems, they have divergent approaches to multi-tasking in daily life, and they have almost completely opposite modes of interacting with their visual world. More recent research has even shown that this difference in perception is even linked to how people socialize: by that I mean that that **OVER**- and **UNDER**-estimators have very different social norms, and they even behave quite differntly in normal, every-day interactions.

So clearly this test will tell you quite a bit about your own unique cognitive style, as well as something about how you perceive and interact with the outside world. It is the basis of this difference that we want to pin down in this experiment, which is why we are looking at how cognitive style affects reaction times.

SO, once we determine whether you are an **OVER**- or **UNDER**-estimator, you'll do a very simple task on the computer that I'll explain when we get to it. Right now we'll start the DET task. Any questions before I take you through it?

Appendix 4.4

Debriefing Form: Study 2

Debriefing Form – Cognitive Styles & Reaction Time Experiment

In this experiment you will have noticed you were told you were either an 'over-estimator' or an 'under-estimator'. In fact we have used this as a cover story to allow us to look at how people interact with other people based on their group membership. In this experiment we are studying how people use information about others' intentional actions, and whether group membership affect that usage. We are trying to determine if being a member of the same or different groups will change how people pay attention to other's intentional actions and how they then use that information when completing a reaction time task. So, in order to observe how you spontaneously use information about your partner's intentional actions in group situations, we randomly assigned you to be in either the same group or a different group to that of your partner using the Dot Estimation Task. The groups you were put into actually had no bearing on your cognitive style as they were completely randomly assigned. This is a procedure called the 'minimal group paradigm' and it has been used for over forty years to show that, even in spontaneous, randomly formed groups, people feel a closeness to their group members and a distance to other group members. That is, they 'identify' with these minimal groups even though they have no history with the people in the group. The reason we used this 'minimal group paradigm' is so that we could form meaningful groups whose interactions we could control: most real-life groups have a past history of interaction and antagonism that would not work for this study. We then told you we were looking at how you react. We couldn't have told you that we were watching whether you paid attention to your partner's intentional actions: if we had, you would have been so conscious of your responses and theirs that you might not have reacted as naturally as in normal, every-day situations.

We set the experiment up this way in order to test our prediction that group membership might play a role in how we understand and work with information about people's intentional actions. Typically, in the joint reaction time task, people alter their reaction times when doing the task together because they are subconsciously thinking about what the person next to them is thinking about. Our prediction for this study is that people in different groups won't be as interested in each other's thoughts and actions, and they should therefore do the joint reaction time task as quickly as if they were alone.

As you can appreciate, if we had told you the real nature of this experiment at the beginning it would probably have influenced your behaviour. This meant a cover story was necessary to elicit natural and spontaneous responses. For that reason, we would greatly appreciate it if you would not discuss this experiment or the cover story we have used with anyone else for the foreseeable future as that could completely ruin all results. Everyone within the university is a potential participant, so please discuss it with no one. Both the experimenter and her supervisor will be happy to discuss any questions or issues you might have with this research and your involvement in it. Thank you for participating.

Researcher: Jennifer McClung (email: jsm10), Supervisor: Steve Reicher (email: sdr)

Appendix 5.1

Pariticpant Information Form: Study 3

Participant Information Form - Cognitive Styles & Stimuli Processing

Thank you for participating in this study on cognitive styles and stimuli processing. In this study we will first determine which style of cognition you have. People typically have one of two different types of cognition based on how they visually perceive the world. To give us a general idea of how you visually perceive the world, you will take the Dot Estimation Task that assesses how you estimate the number of dots in a picture. This will allow us to decide whether you are an 'over-estimator' or an 'under-estimator' with regards to your cognition style. You will then be asked to complete a few short tasks on the computer that involve viewing and reacting to some basic stimuli. After the experiment there will be a question and answer period in which the experimenter will answer any questions about this study you may have.

Your participation in this experiment is entirely voluntary. You are free to terminate your involvement at any point during this experiment without penalty. The data we obtain will be stored in a locked filing cabinet for no longer than 5 years at which point they will be destroyed. Only the researcher and her supervisor will have access to the data. All data will be treated confidentially and any published data will be totally anonymous. Thank you very much for your time and help in this endeavour to understand psychological forces in more detail.

Appendix 5.2

Participant Consent Form: Study 3

Consent Form – Cognitive Styles & Stimuli Processing

I understand the experimental procedure and I confirm that I am participating voluntarily and without duress in this experiment, and I understand I am free to quit at any time. I understand that data from my participation in this experiment will be stored under lock and key and viewed only by the researcher and her supervisor, and will be treated anonymously in publication.

____________________________________ ____________________

Signed Date

Appendix 5.3

Competition Protocol: Study 3

So as you read, in this experiment we are studying cognitive style and stimuli processing – we're trying to understand how cognitive style effects how we process stimuli in the real world. First I'll explain how we look at cognitive style and then I'll tell you about the processing bit.

So cognitive style is classically divided into two types: those who over-estimate and those who under-estimate. While this may sound overly simplistic it is actually not: estimation abilities have long been correlated with differences in many aspects of cognition. Just for instance, it has been shown that over- and under- estimators both have very different ways of solving mathematical problems, and that they have divergent approaches to multi-tasking in daily life. These two different types of cognitive styles also lead to almost completely opposite modes of interacting with the visual world. More recent research has shown that this difference in cognitive style is linked to how people socialize: by that I mean that over- and under-estimators have very different social norms, and they even behave quite differently in normal, every-day interactions. So compiling all this research, we actually get a very clear picture of the fact that these different types of cognitive styles lead people to both perceive and interact with the world in completely different ways. This is why we now use these two categories to classify people. To do this, we will give you a test called the Dot Estimation Task

Over the years the Dot Estimation Task has become the classic test used to analyse perception style since it can very accurately and quickly assess how you estimate amounts. We can then classify you as either an 'over-estimator' or an 'under-estimator'.

Once we determine whether you are an over- or under-estimator, you'll do the stimuli processing task on the computer. I'll explain that when we get to it. Right now we'll start the DET task. Any questions before I take you through it?

----------- D.E.T.-----------------------------------

Ok so now we know who is what here, could I ask you to wear these badges – this is just so that when I collect all the data the right cognitive style gets recorded with it.

Now we're going to go ahead with the stimuli processing task. This is a simple task called the Arrow Task and it has two components, one that you'll do separately and one that you'll do together. Given that you're an __________estimator and you're an _______estimator, I'm interested to discover what other effects your cognitive style has. So this is a fairly straightforward task – you will just have to press a certain button depending on which arrow you see, but nevertheless people do tend to get caught out if they allow their focus to wander. Reaction time and accuracy on this test have been shown to correlate strongly with higher cognitive abilities – so, for instance, people with higher IQ's, those with better computational skills, and people who have better hand-eye coordination are faster and more accurate on this task.   What I'm interested in is whether the differences in speed and ability on this task are related to differences in cognitive style. Basically I want to find out if your cognitive style also has an effect on your processing speed and accuracy. By having people with both types of cognitive style - both over- and underestimators - do this task – I will be able to compare accuracy and speed to try to understand where these differences come from. So please make sure you do your best on this task. There are two blocks to the task with a short break in between them.   You'll do part of this task alone and part together. We'll start now, if you'd like to step into this cubicle I'll show you how it works……

---------------------- Arrow Test-------------------------------

Appendix 5.4

No-Competition Protocol: Study 3

So as you read, in this experiment we are studying cognitive style and stimuli processing – we're trying to understand how cognitive style effects how we process stimuli in the real world. First I'll explain how we look at cognitive style and then I'll tell you about the processing bit.

So cognitive style is classically divided into two types: those who over-estimate and those who under-estimate. While this may sound overly simplistic it is actually not: estimation abilities have long been correlated with differences in many aspects of cognition. Just for instance, it has been shown that over- and under- estimators both have very different ways of solving mathematical problems, and that they have divergent approaches to multi-tasking in daily life. These two different types of cognitive styles also lead to almost completely opposite modes of interacting with the visual world. More recent research has shown that this difference in cognitive styles is linked to how people socialize: by that I mean that over- and under-estimators have very different social norms, and they even behave quite differently in normal, every-day interactions. So compiling all this research, we actually get a very clear picture of the fact that these different types of cognitive styles lead people to both perceive and interact with the world in completely different ways. This is why we now use these two categories to classify people. To do so, we will give you a test called the Dot Estimation Task.

Over the years the Dot Estimation Task has become the classic test used to analyse cognitive style since it can very accurately and quickly assess how you estimate amounts. We can then classify you as either an 'over-estimator' or an 'under-estimator'.

Once we determine whether you are an over- or under-estimator, you'll do the stimuli processing task on the computer. I'll explain that when we get to it. Right now we'll start the Dot Estimation Task. Any questions before I take you through it?

----------- D.E.T.------------------------------------

Ok so now we know who is what here, could I ask you to wear these badges – this is just so that when I collect all the data the right cognitive style gets recorded with it.

Now we're going to go ahead with the stimuli processing task. This is a simple task called the Arrow Task and it has two components, one that you'll do separately and one that you'll do together. It is fairly straightforward – you will just have to press a certain button depending on which arrow you see. What I'm interested in is whether different cognitive styles effect how you perceive the various arrows you will see. Given that you're an __________estimator and you're an _______estimator, I'm interested to discover what other effects your cognitive style has. In the real world you process and react to thousands of stimuli in any given day, and that is what we are trying to re-create in the lab. You will see a lot of arrows in succession that you will have to react to. The main thing here is that I want to see your most 'natural' reactions – so that you react almost as you would in the real world. To try and get that kind of natural reaction, I've set this up so you have several sets of practice trials before I begin collecting data – this is basically so that by the time you do the actual experimental trials you're so comfortable with the task that you can do it without thinking. The experimental trials will be slightly different, and I'll give you the instructions for them after we get through the practice sets. To begin with the practice set now I'll take you through the instructions on these computers, and we'll move on only after you're totally at ease with the task. You'll do one part of the practice set alone and one part together, just to help you get used to the experimental set-up. If you'd like to step into this cubicle I'll show you how it works….

---------------------- Arrow Test-------------------------------

Appendix 5.5

End of Experiment Questionnaire: Study 3

Questionnaire – Cognitive Styles & Stimuli Processing Experiment

Please indicate how much you agree with each statement.

Key:

7 = Stongly Agree

6 = Agree

5 = Slightly Agree

4 = Neutral

3 = Slightly Disagree

2 = Disagree

1 = Strongly Disagree

1) GENERAL INTEREST

1) I am interested in what the other participant is thinking.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

2) I don’t really care about what kind of beliefs the other participant has.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

3) I feel little desire to know about the other participant’s personal needs.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

4) I am curious about the other participant’s intentions.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

5) Broadly speaking, I’d like to share in the other participant’s knowledge.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

6) I am not overly concerned with the other participant’s aspirations.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

2) SIMILARITY / CLOSENESS

7) I think I am similar to the other participant.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

8) The other participant and I quite probably have many things in common.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

9) I don’t feel a sense of ‘being connected’ with the other participant.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

10) I don’t feel I would be able to form a bond with the other participant.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

11) The other participant and I may be more alike than we know.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

12) I feel a big gap between myself and the other participant.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

3) STUDENT ROLE

13) I have a lot in common with other students.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

14) In general, I'm glad to be a student.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

15) Overall, I don't feel much connectedness with other students.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

16) Other aspects of my life are more important to me than being a student is.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

17) I am usually not very interested to promote or discuss issues important to most students.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

18) I often think about the fact that I'm a student.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

<u>4) COMPETITION</u>

19) During the experiment I felt like I should go as fast as I could so that I would be faster than the other person.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

20) I wanted to beat the other participant during the experiment.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

21) I did my absolute best on the computer task in order to win.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

22) It didn't bother me if the other participant got a better score on the computer task than I did.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

23) Being the most accurate during this experiment was not important to me.

1 2 3 4 5 6 7

Strongly Disagree Neutral Strongly Agree

24) I thought about who would win during the computer task.

1	2	3	4	5	6	7		
Strongly Disagree				Neutral				Strongly Agree

Appendix 5.6

Debriefing Form: Study 3

Debriefing Form – Cognitive Styles & Reaction Time Experiment

In this experiment you will have noticed you were told you were either an 'over-estimator' or an 'under-estimator'. In fact we have used this as a cover story to allow us to look at how people interact with other people based on their group membership. In this experiment we are studying how people use information about others' intentional actions, and whether group membership affect that usage. We are trying to determine if being a member of the same or different groups will change how people pay attention to other's intentional actions and how they then use that information when completing a reaction time task. So, in order to observe how you spontaneously use information about your partner's intentional actions in group situations, we randomly assigned you to be in either the same group or a different group to that of your partner using the Dot Estimation Task. The groups you were put into actually had no bearing on your cognitive style as they were completely randomly assigned. This is a procedure called the 'minimal group paradigm' and it has been used for over forty years to show that, even in spontaneous, randomly formed groups, people feel a closeness to their group members and a distance to other group members. That is, they 'identify' with these minimal groups even though they have no history with the people in the group. The reason we used this 'minimal group paradigm' is so that we could form meaningful groups whose interactions we could control: most real-life groups have a past history of interaction and antagonism that would not work for this study. We then told you we were looking at how you react. We couldn't have told you that we were watching whether you paid attention to your partner's intentional actions: if we had, you would have been so conscious of your responses and theirs that you might not have reacted as naturally as

We are also interested in whether competition plays a role in how interested people are in each other's mental states. For that reason, people in the 'competition' condition were told that speed and accuracy on the Arrow Task correlated with things like IQ and computational abilities, whereas people in the 'non-competition' condition were not told anything about speed and accuracy. We encouraged people in the competition condition to do the task as quickly and as accurately as possible to increase their sense of competing with their partner. In actual fact, the task is not correlated with any cognitive abilities whatsoever, and there is no type of person who would do better or worse on this task. We simply needed to create conditions under which people either felt the need to compete or did not, in order that we may compare the results in these conditions to determine if the mere feeling of competition affects how people do the task.

We set the experiment up this way in order to test our prediction that group membership might play a role in how we understand and work with information about people's intentional actions. Typically, in the joint reaction time task, people alter their reaction times when doing the task together because they are subconsciously thinking about what the person next to them is thinking about. Our prediction for this study is that people in different groups won’t be as interested in each other’s thoughts and actions, and they should therefore do the joint reaction time task as quickly as if they were alone.

As you can appreciate, if we had told you the real nature of this experiment at the beginning it would probably have influenced your behaviour. This meant a cover story was necessary to elicit natural and spontaneous responses. For that reason, we would greatly appreciate it if you would not discuss this experiment or the cover story we have used with anyone else for the foreseeable future as that could completely ruin all results. Everyone within the university is a potential participant, so please discuss it with no one. Both the experimenter and her supervisor will be happy to discuss any questions or issues you might have with this research and your involvement in it. Thank you for participating.

Researcher: Jennifer McClung (email: jsm10), Supervisor: Steve Reicher (email: sdr)

Appendix 6.1

Information and Consent Form: Study 4

Cognitive Styles and Memory Experiment

Information

The purpose of this experiment is to examine the relationship between cognitive styles and memory. We will first assess your cognitive style using a classic test called the 'Dot Estimation Task'. By determining whether you over-estimate or under-estimate on a regular basis, we can infer what type of cognitive style you have more generally since estimation abilities correlate with most other aspects of cognition. We will then test your memory using two short memory tasks. Before the memory tasks you will be given a short period of time to memorise the set of objects you will be tested on. The experiment will take about 10 minutes in total.

Please feel free to ask any questions now or during the experiment. You are also free to stop the session at any point during the experiment without penalisation. This experiment will be videotaped. The videotape made from this session will be analysed by the researcher herself. The video tapes will be stored in a locked file cabinet. You have the option to withdraw your videotape at any point in time. Data gathered from these sessions will be stored on a password protected computer, possibly published, and destroyed after 15 years. The tapes and data will be viewed by the experimenter and her supervisor Professor Steve Reicher. No one irrelevant to the study will view the videos or the data.

Consent

I understand that I will be asked to memorise some objects that I am presented with. I am aware that the experimental session in which I participate will be filmed and that the data taken from this study will be stored and possibly published. I am aware that my data may be published and will be stored in an anonymous fashion on a password protected computer. I participate in this study voluntarily and I have been informed that I am free to quit the experiment at any time or ask any questions I may have. I understand that the study's purpose will be explained in more detail at the end of the session. All questions I had were answered adequately.

Signed: ________________________________ Date: ______________________

Appendix 6.2

Protocol: Study 4

PROTOCOL

Thanks for coming today. So, just to give you some background, this is experiment is designed to test how cognitive style affects our memory. First we will assess your cognitive style. Cognitive style is classically divided into two types: those who generally over-estimate and those who generally under-estimate. While this may sound overly simplistic it is actually not: we have known for a long time that estimation abilities are correlated with differences in many aspects of cognition. Just for instance, it has been shown that over- and under- estimators both have very different ways of solving mathematical problems, and that they have divergent approaches to multi-tasking in daily life. These two different types of cognitive styles also lead to almost completely opposite modes of interacting with the visual world. More recent research has shown that this difference in basic cognitive style is linked to how people socialize: by that I mean that over- and under-estimators have very different social norms, and they even behave quite differently in normal, every-day interactions.

So by compiling all this research, we actually get a very clear picture of the fact that these different types of cognitive styles lead people to both perceive and interact with the world in completely different ways. This is why we now classify people into these two categories of over-estimators and under-estimators.

To determine which you are, we will give you a test called the Dot Estimation Task. Over the years the Dot Estimation Task has become the classic test used to analyse cognitive style since it can very accurately and quickly assess your basic cognition by gauging how you estimate amounts. We can then classify you as either an ‘over-estimator’ or an ‘under-estimator’. Once we determine whether you are an over- or under-estimator, you’ll do two quick memory tasks that I’ll explain when we get there. Right now we’ll start the Dot Estimation task. Any questions before I take you through it?

----DET-----

Right, so now we know that you're a ____________-estimator and you're a __________-estimator. I'll go into more detail about what it means to be an _______-estimator at the end, but for now we'll move on. We'll do a short memory task to determine how your cognitive style affects your memory. For the memory task we will show you 10 objects and you will be asked to memorise them. To do this you will each get a separate 1 minute 'learning phase' in which to memorise the objects. During your learning phase, you will be allowed to do anything you want with the objects that helps you to memorise them. After that, I'll cover the objects and ask you to write down as many as you can remember. Then, as a last measure of your memory, I'll remove one object and ask you to write down which one I've removed. Any questions?

Right, so, you'll have the first learning phase (CONFED) and then you'll have your turn. You go ahead and start (CONFED) and I'll tell you when your time's up and we'll switch.

Appendix 6.3

End of Experiment Questionnaire: Study 4

End of Experiment Questionnaire

Instructions: Please answer the questions below using the scale under each question. Circle the number that you think best fits how you feel about each statement.

Sec.1 – ID

1) The other participant and I may have a good deal of things in common.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

2) I don't feel any kind of tie to the other participant.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

3) I feel a sense of being 'connected' with the other participant.

I disagree 1 2 3 4 5 6 7 I strongly

strongly agree

4) Overall, my cognitive style has very little to do with me as a person.

I disagree 1 2 3 4 5 6 7 I strongly
strongly agree

5) My cognitive style is something I thought about during the experiment.

I disagree 1 2 3 4 5 6 7 I strongly
strongly agree

6) The type of cognitive style I have will probably rarely enter my mind after doing this experiment.

I disagree 1 2 3 4 5 6 7 I strongly
strongly agree

Sec.2 - ATTENTION

1) I felt I should be aware of the other participant throughout the experiment.

I disagree 1 2 3 4 5 6 7 I strongly

strongly agree

2) I tried to watch the experimenter closely during the experiment.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

3) I thought the other participant should pay attention to me throughout the experiment.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

4) In general, I paid more attention to the other the experimenter than the other participant.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

5) I was interested in what the other participant was doing.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

6) In general, I did not feel like it was worth observing how the other participant responded.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

Sec.3 - ToM

1) I tried to get an idea of what the other participant was thinking during the experiment.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

2) I wonder what kind of person the other participant thinks I am.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

3) I never thought about what might be going on in the other participant's head during the experiment.

I disagree 1 2 3 4 5 6 7 I strongly

strongly agree

4) In general, I would like to 'get inside' the other participant's head to understand her better.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

5) I was never curious about what the other participant was thinking in general.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

6) I had no desire to figure out what the other participant might think about this experiment.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

Sec.4 - OBJECTS

1) I felt the objects in the experiment were all very similar.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

2) I felt the objects in the experiment were very distinct.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

3) I felt some of the objects stood out more than others.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

4) I felt that the recall task in the experiment was very easy.

I disagree strongly 1 2 3 4 5 6 7 I strongly agree

5) I felt the objects in the experiment were very difficult to memorise.

I disagree strongly	1	2	3	4	5	6	7	I strongly agree

6) I felt that the listing task in the experiment was very difficult.

I disagree strongly	1	2	3	4	5	6	7	I strongly agree

Appendix 6.4

Debriefing Form: Study 4

Cognitive Styles and Memory Experiment Debriefing Form

As sometimes happens in experiments, the exact purpose of the study went beyond the details you were given at the beginning of the study. The data taken from these memory tasks will be used to determine whether your social group affects how you learn socially. To that end, we have given you a task called the Dot Estimation Task (DET). In actual fact this test tells us nothing about your cognitive style, but it is a classic task – it is classically used to make people feel like they are interacting with either a member of their own group (e.g. two 'over-estimators' interacting) or with a member of another group (e.g. one 'over-estimator' and one 'under-estimator' interacting). The DET is actually carried out randomly – so you were assigned to be either an over- or under-estimator entirely by random. This manipulation, and the fact that you weren't told its actual purpose, is designed to allow researchers to study the effect this basic categorisation has on subsequent psychological processes and behaviour. So for instance, we want to determine whether being in the same group or a different group as your interaction partner will have an effect on social learning. In this case, to examine social learning we're looking at a mechanism called stimulus enhancement. This is a mechanism by which people attend more to aspects of their environment that others also attend to. In the case of this experiment, the person you did the experiment was in fact a confederate who was instructed to touch a specific object. What we are interested in is whether the confederate's group membership will make you more or less likely to attend to what she has attended to. Therefore, each experimental session will be analysed to determine if participants on the whole were more likely to approach, touch, and memorise the object that the confederate touched during the learning phase. We would predict, based on previous research into categorisation and group membership, that people who interact with what they presume to be a member of their own group will be more susceptible to learning from this presumed in-group member, and that this will be evidenced in participants in the form of more stimulus enhancement only in the in-group condition.

For this study to be effective, we ask that you refrain from discussing the experiment, or any details of it, with your fellow students until after they have taken part: otherwise their participation would be rendered invalid. Thank you very much for your co-operation and your time. You have helped us begin to address some important questions about social learning and how it functions in the real world. If you have any further questions now or at any point in the future, or if you would like to discuss any aspect of this study, please do not hesitate to contact the experimenter at any time. Furthermore, you are now and at any point in the future free to withdraw yourself and your data completely from this study. Thank you very much for your time and participation.

Jennifer McClung - Email jsm10@st-andrews.ac.uk Tel. ext. 1980

Supervisor – Professor Steve Reicher - Email sdr@st-andrews.ac.uk Tel. Ext. 3057

Appendix 7.1

Information and Consent Form: Study 5

Information

The purpose of this experiment is to determine whether memory is related to objects' properties. You will see some objects before you that you will be asked to memorise. You will be given a short learning phase in which you should try to memories the objects to the best of your ability. There will then be 2 short memory tasks followed by a questionnaire. The experiment will take about 15 minutes in total. Please feel free to ask any questions that you may have or to stop the session at any time.

Consent

I understand that I will be asked to memorise some objects that I am presented with. I am aware that the experimental session in which I participate will be filmed and that the data taken from this study will be stored and possibly published. I am aware that my data may be published and will be stored in an anonymous fashion on a password protected computer. I participate in this study voluntarily and I have been informed that I am free to quit the experiment at any time or ask any questions I may have. I understand the details of the study's purpose will be explained to me at the end of the session. All questions I had were answered adequately.

Signed: ________________________________ Date: ______________________

I understand and agree to my experimental session being videotaped. I understand the video will be stored anonymously in a locked file cabinet and that video recordings will only be viewed by relevant researchers. I understand I am free to withdraw my video data at any time.

Signed: _________________________________ Date: ______________________

Appendix 7.2

'Powerful Speech' given to participants in the Powerful Condition: Study 5

PROTOCOL (to read – powerFUL)

Ok, thanks. As you know I'm a new demonstrator in your lab class. We have a couple of minutes before we begin so I thought I may as well take this time to let you know what I'll be doing as a demonstrator here. As part of the requirements for my course I have to get experience of teaching. For this teaching I am evaluated by the students for my teaching skills and effectiveness. So **you will actually be asked to assess me and my performance as a teacher in this module at the end of term. You will be asked to fill out various forms and to mark me on things like my teaching style, my enthusiasm, my ability to communicate, and my effectiveness as a teacher. Your assessment of my teaching style and enthusiasm go towards 15% of my final mark in this teaching module, and what you think of my communicative ability makes 10% of my final mark. How you assess my 'general effectiveness as a teacher' will constitute the other 75%. All of these marks I receive from you are really very important to my success on this course. Without a passing mark on this teaching module I will not be allowed to continue, so I'd ask you to please take this seriously as I am dependent on your judgement.**

Given that**,** I just thought I'd take the time now to get an idea of the qualities you would consider when marking my teaching ability. **Basically, what you think are good qualities for a teacher to have. Would you mind just telling me, off the top of your head, what you think makes a good teacher, what you would like to see personally in a teacher, or any thoughts you may have about past teachers you would consider 'good'?**

3 minutes

So, now that I know what you'll be looking for in a teacher, let's get on to this experiment.

Now I'll give you a bit of background and tell you a bit about what I'm studying and what to expect in this experiment. I'm looking at memory and how different aspects of objects affect our memory. It is possible that, for example, an object's shape or colour make it better remembered, or better retrieved when we think about other things later. So, I've got a few objects for you to take a look at here. They are all randomly chosen and have no inherent meaning in themselves. I'm just interested in how you might think about them and memorise them. There will later be 2 short tasks. But to begin, you'll have a 1 minute learning phase in which to memorise them. During this learning phase, feel free to do whatever you want with them – anything at all that would help you learn them. Just so that you try and memorise them all.

1 min

Ok, that's over, let's get started. The first task is simply to remember as many objects as you can. I'll just cover them and ask you to list as many as you can remember….

Appendix 7.3

'Powerless Speech' given to participants in the Powerless Condition: Study 5

PROTOCOL (to read – powerLESS)

Ok, thanks. As you know I'm a new demonstrator in your lab class. We have a couple of minutes before we begin so I thought I may as well take this time to let you know what I'll be doing as a demonstrator here. As part of the requirements for my course I have to get experience of teaching. For this teaching I am evaluated by the students for my teaching skills and effectiveness. As part of the teaching requirements for my **PhD course I'll be involved in marking all of the written work you hand in. So I will play an important part in your assessment. As you know, this term, to begin with, you have your lab report and your class test. These are important as together they make up 15 % of your final mark. I'll be marking both of these to start with. I will also be marking your stats test, which makes 10 % of your final mark. As you know, towards the end of the term you have your final exams, which are even more important as they count towards 75 % of your final mark. I will also be marking all final exams.**

Considering how dependent you'll be on my judgement, I just thought I'd take the time now to give you an idea of the qualities I'll consider when marking your work**. Really just so that you can get an idea about what sort of things I'll be expecting from you, the sort of standards I set, and most importantly what I'll be looking for in your work. There are really just a few qualities I will consider when I mark your work. The first and foremost is the coherence of your argument. I want to see that you've thought about the problem, whatever it is, from all angles and that you address each accordingly. Even if I don't agree with an argument you make, or even if your answer is in the end incorrect, you will get points for well-thought-out and thorough answers. Second is your understanding of the material, which I will expect to see in how well you integrate all the subject matter. By that I mean how well you can show your understanding of relationships between subjects we will have discussed, and your ability to compare and differentiate them, rather than simply reproduce the theories you have learned. And lastly, your creativity will be what propels you to the highest marks possible. By creativity I mean the creativity of your argument: whether you can see and explain novel aspects of the various theories we will learn or the problems we encounter.**

So, now that I know what you'll be looking for in a teacher, let's get on to this experiment.

Now I'll give you a bit of background and tell you a bit about what I'm studying and what to expect in this experiment. I'm looking at memory and how different aspects of objects affect our memory. It is possible that, for example, an object's shape or colour make it better remembered, or better retrieved when we think about other things later. So, I've got a few objects for you to take a look at here. They are all randomly chosen and have no inherent meaning in themselves. I'm just interested in how you might think about them and memorise them. There will later be 2 short tasks. But to begin, you'll have a 1 minute learning phase in which to memorise them. During this learning phase, feel free to do whatever you want with them – anything at all that would help you learn them. Just so that you try and memorise them all.

1 min

Ok, that's over, let's get started. The first task is simply to remember as many objects as you can. I'll just cover them and ask you to list as many as you can remember….

<u>Appendix 7.4</u>

End of Experiment Questionnaire: Study 5

End of Experiment Questionnaire

Instructions: Please answer the questions below and use the following key where needed:

1 = disagree / not at all, 4 = no opinion, 7 = agree / very much.

Sec.1

1) I felt like I was in control of the situation during the experiment.

2) In general, I feel free to act and speak exactly as I normally would in front of the demonstrator.

3) I felt the demonstrator was in control of the situation during the experiment.

4) In general, I feel that I am constrained in how I act and speak in front of the demonstrator.

5) I think the demonstrator will probably be under some pressure from me in the near future.

6) I think I will probably be under pressure from the demonstrator in the near future.

Sec.2

4) I felt I should pay attention to the demonstrator throughout the experiment.

2) I will probably watch the demonstrator closely over the next few months to learn what she expects.

3) I felt the demonstrator should pay attention to me throughout the experiment.

7) In general, I think it is important to observe the demonstrator.

8) I think the demonstrator will probably watch me closely over the next few months to learn what I expect in a teacher.

9) In general, I think the demonstrator should observe how I respond.

Sec.3

1) I tried to get an idea of what the demonstrator was thinking.

5) I wonder what kind of student the demonstrator thinks I am.

3) I think the demonstrator tried to get an idea of what I was thinking throughout the experiment.

4) I would like to ‘get inside’ the demonstrator’s head to get an idea of what she’s thinking.

5) The demonstrator probably wonders what I think of her.

6) I have a feeling the demonstrator would like to ‘get inside’ my head briefly to see what I’m thinking.

Sec.4

1) I felt the objects in the experiment were all very similar.

7) I felt the objects in the experiment were very easy to memorise.

8) I felt the objects in the experiment were all very different.

4) I felt that the recall task in the experiment was very easy.

5) I felt the objects in the experiment were very difficult to memorise.

6) I felt that the recall task in the experiment was very difficult.

Sec.5

1) I got bored during the experiment.

2) I found myself thinking about other things frequently throughout the experiment.

6) I was not at all bored during the experiment.

4) I felt I did not pay close enough attention during the experiment to succeed at the tasks.

5) I found I thought mostly about what I was supposed to be doing during the experiment.

6) I felt I paid close enough attention during the experiment to succeed at the tasks.

Sec.6

1) I thought the purpose of the experiment was clear.

2) I felt the experimenter went too quickly.

3) I understood what was required of me during the experiment.

7) I felt the experimenter went too slowly.

5) I did not quite understand the purpose of the experiment.

8) I did not understand what I was supposed to do during the experiment.

Sec.7

1) Being a student is very important to me.

2) When issues about being a student are discussed publicly I am always very interested.

3) I do not get very upset when I hear about the difficulties other students face in today's society.

4) Other aspects of my life are more important to me than being a student is.

5) I am usually not very interested to promote or discuss issues important to most students.

6) I get very angry when I hear about the difficulties many students face these days.

Appendix 7.5

Debriefing Form: Study 5

Debriefing

Thank you for participating in this study. The videotape made from this session will be analysed by the researcher herself. The video tapes will be stored in a locked file cabinet. You have the option to withdraw your videotape at any point in time. Data gathered from these sessions will be stored on a password protected computer, possibly published, and destroyed after 15 years. The tapes and data will be viewed by the experimenter, her supervisor Professor Steve Reicher, and possibly other researchers employed to code the videos (to determine the accuracy of the experimenter's analysis). No one irrelevant to the study will view the videos or the data.

As in many psychological experiments, the exact purpose of the study went beyond the details you were given at the beginning of the study. The data taken from these memory tasks will be used to determine if a mechanism called 'stimulus enhancement' effects memory or behaviour. This simply means that you may have been more likely to approach and manipulate the object the experimenter herself manipulated in the instruction phase simply because you saw her do so. Stimulus enhancement is known to work in non-human primates, birds, and infant humans, but this study is attempting to examine adult human interactions for signs of the mechanism. Each experimental session will be analysed to determine if participants were more likely to approach, touch, and memorise the object that the experimenter manipulated during the instruction phase. If this is the case, it suggests that stimulus enhancement is a normal social mechanism at work in humans as well as other animals.

We are also interested in the effects of power on this mechanism, which is why the experimenter told you either that, as a new demonstrator, you would have to mark her teaching abilities or she would have to mark your work in the future. These stories were designed to make you feel, respectively, either powerful or powerless. By comparing these two conditions it will be possible to determine if relative power effects stimulus enhancement. These stories were told only to ascertain the influence of power on stimulus enhancement, and actually have no effect on you or your course. In actuality, the experimenter is a post-grad working towards her PhD in the department here and will not be marking you nor will you be required you to mark her.

For this study to be effective, we ask that you refrain from discussing the experiment, or any details of it, with your fellow students until after they have taken part: otherwise their participation would be rendered invalid. Thank you very much for your co-operation and your time. You have helped us begin to address some important questions about our behaviour as social human beings that have long remained unanswered. If you have any further questions now or at any point in the future, or if you would like to discuss any aspect of this study, please do not hesitate to contact the experimenter at any time. Furthermore, you are now and at any point in the future free to withdraw yourself and your data completely from this study. Thank you very much for your time and participation.

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