Investigating ingroup bias in an interactive minimal group environment

By

Lavanya Pillay- 211558985

University of Kwa-Zulu Natal (UKZN),
Pietermaritzburg,
January 2014

Declaration

Submitted in partial fulfilment of the requirements for the degree of Master of Arts Coursework (MA-CW), in the Graduate Programme in Research Psychology, University of KwaZulu-Natal, Pietermaritzburg, South Africa.

I…….. declare that

1. The research reported in this thesis, except where otherwise indicated, is my original research.

2. This thesis has not been submitted for any degree or examination at any other university.

3. This thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.

4. This thesis does not contain other persons' writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted, then:
   a. Their words have been re-written but the general information attributed to them has been referenced
   b. Where their exact words have been used, then their writing has been placed in italics and inside quotation marks, and referenced.

5. This thesis does not contain text, graphics or tables copied and pasted from the Internet, unless specifically acknowledged, and the source being detailed in the thesis and in the References sections.

_____

Student Name

_____

Date

_____

Name of Supervisor

_____

Signature

Abstract

Objectives: The general problematic of social science research is located in individualized explanations of social and collectively based phenomena. This is due to methodological issues inherent in the way social research is conducted. Research on ingroup bias via the renowned minimal group studies is an exemplar of this general problem and is examined in this study. This research argued that explaining ingroup bias in terms of individuals' psychological needs is insufficient. This is because the original paper and pencil test failed to account for the effects of social interaction and how the interaction unfolds over time. Consequently, the old problem of ingroup bias was revisited using a new technology: the Virtual Interaction Application (VIAPPL).

Design: A within-subjects and between-groups experimental design was used.

Methods: VIAPPL was used to replicate the original study but in a way that demonstrated how ingroup bias was produced in interaction over time. This was facilitated by the 'Give and Get' game, where participants allocated tokens to one another in a simulated game-like environment. A repeated measures ANOVA and social network analyses were used to analyse the data.

Results: As predicted, 1) ingroup bias was found most likely to be manifest in social interaction characterised by group categorization, and 2) more ingroup bias was expressed when the group interaction is visible to those participating in the interaction. Ingroup bias did not amplify as the group interaction unfolded over time. However, there was evidence proving that ingroup bias is not static, as was previously thought. Instead, it changed by increasing and decreasing as the rounds of the game advanced. Furthermore, the investigation revealed that 1) participants distributed their tokens fairly when they acted with and without a group membership, 2) observing the interaction informed the way tokens were allocated in both individual and group conditions, and 3) reciprocity was not operant in the interaction.

Conclusions: This study introduced a new framework for studies in the minimal group paradigm (MGP) that allowed participants to interact in a virtual environment and enabled both traditional ANOVA methods and social network analyses. By rendering social interaction visible in the MGP, this study moved beyond an individualized explanation of social interaction by offering a social explanation of the behaviours manifested.

Acknowledgements

Professor Durrheim, you went beyond your duties as a supervisor and provided me with unwavering support, guidance and motivation. I am sincerely grateful for your patience, time, open door policy and the contributions you have made to this project. Thank you.

Dr. Quayle, thank you for your support and assistance during data collection and analysis, as well as introducing me to Social Network Analysis.

The *NRF 'Blue Skies'* grant is acknowledged for making this project possible.

Larry Tooke and Emmanual Dufourq, your technical support with the Virtual Interactive Application is valued.

Thank you to the individuals who participated in this research study.

Finally, I extend my gratitude to my family and friends. You know who you are.

Contents

List of tables

List of figures

Chapter one: Introduction

Social psychology research has mostly resulted in individualized explanations of social phenomena. While there have been groundbreaking attempts for a more holistic approach to the study of group related phenomena; methodological issues inherent in the research are apparent. The study of ingroup bias is an exemplar of this general problem and is the topic of this thesis. This chapter provides an outline of what ingroup bias is as well as the focus and organization of the thesis.

What is ingroup bias?

In *Folkways*, Sumner (1906) referred to ingroup bias as ethnocentrism which was defined as

> a view of things in which one's own group is the center of everything, and all others are scaled and rated with reference to it… Each group nourishes its own pride and vanity, boasts itself superior, exalts its own divinities, and looks with contempt on outsiders. Each group thinks its own folkways the only right ones…ethnocentrism leads a people to exaggerate and intensify everything in their own folkways which is peculiar and which differentiates them from others. (Sumner, 1906, p. 13)

Sumner hypothesized that the distinctions between ingroups and outgroups were culturally based and perpetuated over generations. This definition highlights the essential features of ethnocentrism, including the belief that one's own group is superior to outgroups and the inclination to accept those who are culturally similar and reject those who are culturally dissimilar:

> The relation of comradeship and peace in the we-group and that of hostility and war towards others-groups are correlative to each other. The exigencies of war with outsiders are what make peace inside…. Loyalty to the group, sacrifice for it, hatred and contempt for outsiders, brotherhood within, warlikeness without-all grow together, common products of the same situation.
> (Sumner, 1906, pp. 12-13)

Therefore, the distinction between then ingroup and outgroup and the perceptions that each have of the other, impacts on and grows out of the relation between them. Thus, when interacting with one another, individuals' act in ways where they favour, prefer

and support members of their ingroup to a greater extent than those individuals belonging to other outgroups (Sumner, 1906). The definition outlined by Sumner implies that ingroup bias is always accompanied by discrimination against outgroups as both inform one another. In contrast, Allport (1954) was of the opinion that being biased towards one's ingroup did not necessarily imply hatred or contempt for outgroups as "Hostility toward out-groups… is not required… the out-group may be appreciated, tolerated, even liked for its diversity (Allport, 1954, p. 42).

The disparity between the treatments of outgroups by Sumner and Allport allude to debates about whether ingroup bias involves both pro-ingroup attitudes and anti-outgroup attitudes or pro-ingroup attitudes, exclusively (Bizumic, Duckitt, Popadic, Dru & Krauss, 2009; Brewer, 1999). Some have viewed ingroup bias and prejudice against outgroups as two sides of the same coin, however, it has been argued that "ingroup favouritism and outgroup prejudice are separable phenomena and that the origin of identification and attachment to ingroups is independent of intergroup conflict" (Brewer, 1999, p. 430). Despite pro-ingroup and anti- outgroup attitudes being unrelated under specific conditions, Bizumic and Duckitt (2012) argue that ingroup bias can lead to the development of prejudice, discrimination and ill-treatment of outgroups.

Drawing on the work of Bizumic and Duckitt (2012) the key markers of ingroup bias entail a

> preference for the ingroup over outgroups, the perception of superiority of ingroup over outgroups, the wish to preserve the ethnic purity of one's own group, exploitativeness (pursuit of ingroup interest without consideration for outgroups), the need for group cohesion, and strong devotion to the ingroup.
> (Bizumic and Duckitt, 2012, p. 890)

These exalted notions of the ingroup, inform how individuals relate to their ingroup and other outgroup members. There is thus a differentiation between intragroup and intergroup expressions of ingroup bias (Bizumic et al., 2009). Intragroup ingroup bias is the tendency to consider one's ethnic group with more importance than individual ingroup members. It is expressed as an individual's devotion to their groups in an effort to strive for group cohesion and ingroup positivity. Intergroup ingroup bias on the other hand, is where the

ingroup is considered more important than the outgroup. It is expressed as supporting, self-glorifying and superior attitudes of ingroups, preference for and a readiness to defend the ingroup, a rejection of interaction with outgroups and pursuing ingroup interests at the expense of outgroups (Bizumic et al., 2009). Even though these forms of ingroup bias differ on individual and group levels, they reinforce one another because importance of the ingroup is fundamental in both instances.

This outline highlighted ingroup bias primarily as an attitudinal construct that is manifest in social interaction. Since preference for ingroups over outgroups is the fundamental feature of this phenomenon, it is therefore expressed as a readiness to favour or act in ways that bias the ingroup over the outgroup whatever the situation (Bizumic & Duckitt, 2012). Thus, ingroup bias is conceptualized as such.

The focus and organization of this thesis

This thesis begins by outlining traditional research on ingroup bias and critically examines individual explanations of this social phenomenon. Social theories of ingroup bias are then presented. Of particular interest to this thesis is the pioneering MGP which was formally reported by Tajfel, Billig, Bundy and Flament (1971). This research initially explained ingroup bias in terms of norms operant in the context. But, the theory was later revised and explained in terms of one's psychological need to attain a positive social identity (Billig & Tajfel, 1973). Replicated in numerous studies, the legacy of the MGP is undoubted. However "In the social sciences, works of the highest intellectual quality always repay critical re-examination, for even their limitations and omissions can be revealing…To argue, however, is not necessarily to reject, but to develop" (Billig, 2002, p. 172). In this spirit, this thesis provides a critique of the MGP as a methodology and individualized explanations of ingroup bias. It revisits the original minimal group study to investigate the old problem of ingroup bias with a new technology and provides a social explanation of the behaviours operant in a novel minimal group interaction.

This thesis is organized as follows: Chapter two contains the literature review and it concludes with the research aims, rationale and hypotheses. Chapter three covers the methodology and chapter four, the results. Chapter five includes the Social Network Analysis (SNA) of the data. Chapter six comprises the discussion and conclusion. The

reference list and appendices follow thereafter.

Chapter two: Literature review

This chapter presents a discussion of the main individual and social theories of ingroup bias. It is argued that both are unable to adequately account for this phenomenon due to limitations in their approaches. Consequently an alternative methodology is proposed. The chapter concludes with an outline of the aims, rationale and hypotheses of this research.

Individual theories of ingroup bias

Traditionally, the role of the individual was given prominence in social psychology because "all activities in society- economic, political, artistic- have their center in individuals, in their strivings, needs, and understanding. The individual is the point of intersection of nearly all that is of consequence in the social sphere" (Asch, 1952, p. 4). Accordingly, ingroup bias was initially explained in terms of the individual. This section considers three individually centered explanations of ingroup bias; namely authoritarianism, frustration-aggression and cognition.

Authoritarianism

The 'authoritarian personality' theory ascribed prejudice against others to a pathology or dysfunction in the personality of the individual. It was believed that repression of one's basic instinctual drives, due to constraints of social life, was a normal phase of personality development. In addition, a balance between self-expression and rigidly sticking to the conventions of society was required. However, those individuals' exposed to punitive childrearing rearing practices and whose parents demanded that their behaviour conform to social conventions were unable to develop a normal personality. Instead, they repressed their internal conflicts, hostility and aggression that were directed at the parental authority. Those were then then outwardly displaced onto less powerful others because of a more powerful need to submit to the authoritative figure. As a result, these individuals developed authoritarian traits, expressed in their behaviours of displaying hostility, intolerance and derogation towards outgroups (Adorno, Frenkel-Brunswick, Levinson, & Sanford, 1950).

Evidence for correlates with ingroup bias

In their research on group relations and prejudice, Adorno, Frenkel-Brunswick, Levinson and Sanford (1950) developed the Ethnocentrism (E) scale and concluded that individuals

favoured their ingroups primarily because of their psychological makeup. This behaviour was attributed to how they assimilated their experiences with particular group stereotypes and how they identified with particular groups (Adorno et al., 1950).

The rigid and inflexible way of thinking that was attributed to those who favoured their ingroups was explored by Rokeach (1948). He found that highly prejudiced individuals solved problems in a more rigid manner and showed greater concreteness of thought than individuals who were less prejudiced (Rokeach, 1948). Furthermore Frenkel-Brunswick (1949, as cited in Block and Block, 1951) showed that individuals with an authoritarian personality also displayed an intolerance for ambiguity as they had a need to structure their world. Drawing on this, Block and Block (1951) found a positive association between intolerance for ambiguity and ingroup bias, explained by "the individual's characteristic means of handling or mediating both his internal need tensions and the demands imposed upon him by the external world" (Block & Block, 1951, p. 310). Thus, ingroup bias was explained in terms of the personality-driven need to cope with internal and external demands of one's environment and how information is processed.

Downing and Monaco (1986) used the California Fascism (F) scale, a predictor of ethnocentrism (Adorno et al., 1950) to highlight the relation between authoritarianism and ingroup bias. Their results indicated that under various in- and outgroup contact conditions, those who were regarded as authoritarian displayed higher levels of ingroup bias than those less authoritarian participants, even when groups did not interact. Even though both high and low authoritarian participants were aware of the group differentiation, the lack of a personality-based motivation to show a bias may be the reason why no bias occurred for non-authoritarian participants. It was therefore concluded that "This finding favours personality theory…as most basic to an understanding of in-group/out-group bias" (Downing & Monaco, 1986, p. 451).

Despite this evidence, the authoritarian personality theory was unable to explain how 1) individuals who are not classified as authoritarian or ethnocentric, manifest strong ingroup bias and hostility towards outgroups, 2) ingroup bias does not necessarily result in outgroup hostility, and 3) changes in outgroup hostility can also be related to social and contextual conditions (Brown, 1988). Although Altemeyer (1994, as cited in Perreault & Bourhis, 1999) was able to show that authoritarian individuals rated their ingroup more positively,

the link between authoritarianism and ethnocentrism as a discriminatory behaviour was not explored. In addition to critique of the design and integrity of the F scale (Brown, 1965), Duckitt (1989) highlighted that the authoritarian personality theory was initially developed to explain social phenomena "such as ethnocentrism, prejudice, intergroup hostility" (Duckitt, 1989, p. 68). However, this intention was lost to an explanation focusing mainly on the individual's personality.

Frustration-aggression

The 'frustration-aggression' theory proposed that frustration at the inability to accomplish basic or superordinate goals resulted in the development of aggression within the individual. Since this aggression could not be contained, it was either cathartically released during sporting activities or was redirected onto 'convenient scapegoats' i.e. outgroups. This occurred either because of learned difficulties with challenging authoritative figures or because of the inaccessibility of the original source of the frustration (Dollard et al., 1939, as cited in Brown, 1988). Thus according to this theory, the individual's frustrations caused by the conventions of organized society, resulted in aggression directed toward outgroups.

Evidence for correlates with ingroup bias

At a summer camp, Miller and Bugelski (1948, as cited in Brown, 1988) assessed young mens' attitudes towards two minority groups (pre-test) and thereafter provoked them to become frustrated. Their attitudes were once again tested (post-test) and it was found that prejudice towards minority groups was significantly higher in the post-test compared to the pre-test. They concluded that although the men were angry with the experimenters, their aggression was displaced onto the minority groups, thus explaining the increase in prejudice in the post-test (Miller & Bugelski, 1948, as cited in Brown, 1988). While this study provided evidence in support of the frustration-aggression hypothesis, a replication study conducted by Stagner and Congdon (1955) failed to attain similar results.

This theory neglects the role of social learning and context in whether aggression is manifest or not (Bandura, 1973 as cited in Berkowitz, 1989). There is also a problem with assuming that frustration is a sufficient and necessary condition for aggression to be manifest (Baron, 1977, as cited in Berkowitz, 1989). Cowen, Landes and Schaet's (1959)

suggested that there are other mediating factors to the expression of prejudice after one experiences frustration and aggression. They found an increase in "anti-Negro feelings following frustration" (Cowen, Landes & Schaet, 1959, p. 36) despite little change in prejudice scores for other minority groups and concluded that "anti-Negro feelings seem to constitute a preferred prejudice in informal conversations of undergraduates at this institution" (Cowen, Landes & Schaet, 1959, p. 37). Thus, the perception of minority groups in a particular context at a particular point in time impacts upon anti-outgroup attitudes as aggression against outgroups is manifest only in contexts where there is social consensus about the legitimacy of aggression in that particular situation (Tajfel, 1978a). The role of the context was addressed by the social dominance orientation. While conflict may be an important factor, the status of the group influences how they are perceived and subsequently treated. In their study Pratto, Sidanius, Stallworth and Malle (1994) proved that high-status groups demonstrated higher levels of ingroup identification and were more ingroup serving than low-status groups, in efforts to maintain distinct hierarchical relations between the groups (Pratto, Sidanius, Stallworth & Malle, 1994). Furthermore, Grant and Brown (1995) found that groups who were more collectively deprived were more likely to engage in social protests and favour their ingroups than non-deprived groups.

This theory was limited in its ability to account for the mediating factors which impact upon whether ingroup bias is manifest or not. Consequently, there was a shift in focus, to address these mediating factors from a cognitive perspective.

Cognition

In order to simplify the vast amount of stimuli to which we are exposed and to follow normative behaviour, Allport (1954) noted that cognitive categories are employed to assist with information processing. Serving both social and cognitive demands, when perceiving information about individuals one categorizes them into specific groups based on their similarities and differences (Hamilton & Trolier, 1986). This is because "The human mind must think with the aid of categories…Once formed, categories are the basis for normal prejudgment. We cannot possibly avoid this process. Orderly living depends on it" (Allport, 1954, p. 20). Supporting evidence by Tajfel and Wilkes (1963) showed that participants exaggerated the similarities in length between a line and the category to

which it belonged and exaggerated the differences in length between the categories. This exaggeration was absent when lines were presented to participants without their denoting categories (Tajfel & Wilkes, 1963). Thus imposition of the line's category impacted upon further judgment of its length and the similarity or difference to its category.

Similarly, stereotypes about ingroups and outgroups impose upon how one relates to these groups. Via categorization one differentiates between groups that one belongs to (i.e. ingroups) and all other groups with whom one does not identify (i.e. outgroups). However, the ingroup-outgroup distinction is sometimes exaggerated. Hamilton and Trolier (1986) argue that one may perceive greater within-group similarities and between-group differences, even if the similarities and differences are unfounded. Accordingly, prejudice was viewed as a normal by-product of everyday thinking since "erroneous generalization and hostility- are natural and common capacities of the human mind (Allport, 1954, p. 39).

Once groups gain social recognition they are given value laden connotations i.e. stereotypes which perpetuate the similarities within groups and differences between them. This particular way of thinking impacts upon how we relate to groups because stereotypes "justify (rationalize) our conduct in relation to that category" (Allport, 1954, p. 191). We favour those we perceive more alike to us "Because of their basic importance to our own survival and self- esteem we tend to develop a partisanship and ethnocentrism in respect to our in-groups…The familiar is preferred. What is alien is regarded as somehow inferior, less "good," " (Allport, 1954, p. 42).

Evidence for correlates with ingroup bias

Doise (1976, as cited in Tajfel, 1978b) studied the ratings of the positive and negative attributes of one's ingroup and outgroup. In the second round of ratings, where participants knew that they would be rating the outgroup immediately after the ingroup, the ratings of the ingroup were significantly more positive than the outgroup. Thus, the presence of an intergroup differentiation, combined with the value laden connotations designated to each group resulted in ingroup bias being demonstrated (Doise, 1976, as cited in Tajfel, 1978b). Similarly Purdue, Dovidio, Gurtman, and Tyler (1990) examined whether group designators ("we" implying ingroup category and "they" implying outgroup category)

enabled an automatic positive or negative association with a particular group. They used positive and negative adjectives to describe categories of ingroups and outgroups and found an automatic association between the ingroup identifier "us" with the adjective "good", and outgroup identifier "them" with the adjective "bad". Reaction times for positive traits associated with the "we" category were faster than positive traits associated with the "they" category, demonstrating a bias for the ingroup. These results demonstrated the automaticity with which group differentiation occurred and its impact upon how ingroups and outgroups were evaluated (Purdue, Dovidio, Gurtman, & Tyler, 1990).

Going a step further, Paladino and Castelli (2008) examined the behavioural and interactional consequences of group categorizations. Based on the notion that intergroup differentiation results in pro-ingroup and anti-outgroup attitudes, these authors hypothesized that after being categorized into groups individuals would be automatically more likely to approach their ingroups and avoid outgroups. They found that approach-like behaviours were performed faster toward the ingroup than outgroup, for already established groups. This was also the case for minimal groups even in the absence of personal interaction. This suggests that prior experience with a group is not necessary to activate approach and avoidance behaviours towards ingroups and outgroups, respectively. The authors proposed that cognitive perception cannot be considered in isolation since there is an activation of the typical behaviours associated with what is perceived. Individuals are also likely to repeat behaviours towards the same targets. Thus, thinking in terms of group categories automatically predisposes one to act in a typical manner towards that group namely, approaching ingroups and avoiding outgroups (Paladino & Castelli, 2008).

The merit of the cognitive approach lies in its ability to address how basic cognitive apparatus and socially derived stereotypical beliefs, together impact upon how groups interact with one another. However, it also presents a limited view of the individual who responds to groups only in the terms suggested and required by their accompanying stereotype. This approach presents a rather pessimistic view of humanity as prejudice is regarded as something that is innate, universal to all and therefore inevitable (Billig, 2002). However, those who view prejudice as a language category, argue that language is used "flexibly and, thus, are not restricted merely to minimizing within-category differences or between-category similarities" (Billig, 2002, p. 176). Evidence where the outgroup is favoured over other ingroups (Noel, Wann & Branscombe, 1995; Brewer & Campbell,

1976) demonstrates how this approach is incapable of dealing with the variability of social contexts and the infinite possibility of how to respond to groups.

The problem with individual based approaches

Individual based theories have been criticized for their psychological and cognitive focus. The emphasis on individual motivations provides a reductionist and individualized view of ingroup bias. It neglects the associated situational and sociocultural factors and individuals' "participation in more complex social behaviour" (Milner, 1981, as cited in Turner & Giles, 1981, p. 104). In addition to not addressing how historical changes contribute to ingroup bias, these theories also overlook the uniformity across different groups prejudice to outgroups, over different times and in different places (Brown, 1988). Their applicability to a social theory of ingroup bias is limited as it provides an "'individualistic' view of a human being's social psychological function" (Tajfel, 1978a, p. 433). Instead, Allport insisted that

> a multiple approach is required…historical, sociocultural, and situational analysis, as well as from analysis in terms of socialization…and finally, but not least important, in terms of actual group differences. To understand prejudice and its conditions the results of investigations at all these levels must be kept in mind. (Allport, 1954, p. 514)

This motivated a change in the way ingroup bias was subsequently researched.

The quest for a social theory of ethnocentrism

Bizumic and Duckitt (2012) assert that most social theories explaining intergroup behaviour are based on identity. This is because when individuals acquire a group membership, they define themselves according to that category and view themselves to be similar to their group members. Over time, the group is considered important resulting in the group's interests surpassing the interests of individual members' and other outgroups' and this informs the relations between groups (Bizumic & Duckitt, 2012). In this section the influence of social norms and group conflict are presented. Thereafter an in-depth discussion of the MGP is provided, articulating the major argument of the thesis.

Social norm theory

Sumner (1906) discussed the concept of 'folkways' which are the appropriate ways of acting in a particular context. He noted that via learning, these actions were taken up, imitated and perpetuated over time. As a result they became established as normative. Sumner described norms as constraints on behaviour which "exerts a strain on every individual within its range; therefore it rises to a societal force to which great classes of societal phenomena are due" (Sumner, 1906, p. 3). To illustrate this, the autokinetic illusion study demonstrated how norms established within a group setting affect group behaviour (Sherif, 1937). When asked to establish the range of movement of a flashing light under individual conditions of the autokinetic illusion experiment, each participant offered their own subjective range. However, under the group condition where there was a pre-established norm for the range of movement; participants' assessments were akin to that of the established group norm (Sherif, 1937).

Further evidence provided by Asch (1956) demonstrated how individuals' judgments were influenced by those belonging to the majority group in a perceptual task. When publically reporting on the similarity between the lengths of lines on two cards, it was found that participants made more errors that were similar to the incorrect judgments reported by the pseudo-participants (majority group members who were secretly primed to report false answers). Reports from the post experimental interview indicated that even though participants knew that the answers were incorrect, they reported them so as to align their responses with that of the majority group (Asch, 1956). These results portray the normative and informational influence that groups have on individuals.

This was also explored by Deutsch and Gerard (1995) in a modified version of the Asch experiment. They found that 1) normative social influence on individuals' ratings were stronger for individuals belonging to a group as opposed to those with no group membership, 2) normative social influence was less when individuals perceived their assessments to be anonymous or when there was no pressure to conform, 3) normative social influence to conform to one's own judgment reduces the propensity to conform to the influence of others, 4) normative social influence to conform to one's own judgment from another and oneself is stronger than the influence from oneself alone, and 5) individuals were more susceptible to normative social influence when uncertain about their

own judgments (Deutsch & Gerard, 1995).

Evidence for correlates with ingroup bias

Hertel and Kerr (2001) argued that ingroup bias occurs because it is a socially sanctioned and acceptable way of behaving in particular contexts. In their study participants were primed to either exhibit loyalty or equality in their allocations to others participants. Their results provide evidence for increased ingroup bias when the norm of loyalty was encouraged compared to the norm of equality. Hertel and Kerr (2001) argued that participants discriminated as such because of it being a "socially approved behaviour" (Hertel & Kerr, 2001, p. 322). Since ingroup identification was also found to be greater when the norm of loyalty was encouraged it was suggested that identification with the ingroup is not something that precedes ingroup favouritism but rather occurs as a result of the norms that guide behaviour (Hertel & Kerr, 2001).

This evidence suggests that individuals favour their ingroups because of the norms that guide behaviour. However, it is a cognitive based understanding of norms since individuals "search their memory for appropriate normative scripts that give meaning to the situation and clear prescriptions for behaviour" (Hertel & Kerr, 2001, p. 317). In as much as Hertel and Kerr (2001) demonstrated how ethnocentric behaviours develop and are mediated by the specific context in which the interaction occurs, the norms delineating such behaviours remain as pre-defined cognitive schema. The explanation for this behaviour is once again centered on the individual. Furthermore, the explanation tends toward circularity as the norm is both the reason for and the explanation of ingroup bias and it does not account for instances where individuals do not act in accordance with the dominant ingroup bias norm (Brewer, 2007).

Realistic group conflict theory

Realistic group conflict theory was based on the notion that intergroup hostility had its basis in the fundamental struggle for survival where groups compete with one another for scarce resources (Sumner, 1906). According to this theory, when groups are involved in interaction with opposing interests, competition incites differing interests between them. This results in the development of conflict. This theory posits that hostility towards the outgroup is what generates ingroup identification and positive attachment to the ingroup. Thus social

conditions resulting in competition, threat and conflict between groups, are the contexts in which outgroup hostility and subsequent ingroup bias is produced (Levine & Campbell, 1972 as cited in Hammond & Axelrod, 2006).

Evidence for correlates with ingroup bias

The 'Robbers Cave Experiment' first conducted in 1953 and fully implemented in 1961, supported the above theory by investigating the effect of intergroup conflict and cooperation on intergroup relations (Sherif & Sherif, 1953; Sherif, Harvey, White, Hood, & Sherif, 1961). Boys attending a summer camp were assigned to two groups based on their commonalities and the groups were formed in isolation from one another. Thereafter the boys were engaged in activities within their own groups. After establishing a sense of group belonging over a few days, both groups then interacted with one another in a series of activities which either necessitated competition or co-operation between the groups (Sherif & Sherif, 1953). When the groups competed against one another for a scarce resource, where there was conflict over which group would win, anti-outgroup attitudes and behaviours were expressed. However, when participating with each other for mutual benefit little difference in the attitudes of, and behaviour towards, both ingroup and outgroup members was found (Sherif & Sherif, 1953).

Sherif and Sherif (1953) stated that intergroup discrimination and enhanced ingroup affiliation occurred as a consequence of the conflict arising out of the competitive conditions of the interaction. They argued that group categorizations created a sense of group identification for the boys which became intrinsic to their "psychological makeup" (Sherif & Sherif, 1953, p. 2). This caused them to act in ways that were similar to their group members, thus resulting in ingroup bias (Sherif & Sherif, 1953, p. 188). Since the "…reactions of the individual members take place within reference frames, to which both internal and external factors contribute in a functionally interrelated fashion", these studies showed how the conflict of interest between groups occurred in the context of a developing social interaction (Sherif & Sherif, 1953, p. 288). Instead of an individuals' psychological makeup being the main determinants of ingroup bias, this behaviour was now considered as a product of the conditions in social settings (Sherif & Sherif, 1953).

To answer the question about whether conflict and competition between groups are necessary conditions for ingroup bias Ferguson and Kelley (1964) explained to the groups

in their study, that the tasks they were to complete, did not involve any competition between the groups. After completing their tasks, participants were asked to rate the products made by both groups. Their results showed that even under non-competitive conditions, participants, both active and non-active group members, attributed a higher value to the products made by their own group and a lower value to those made by the outgroup (Ferguson & Kelley, 1964).

Similar results were reported by Rabbie and Wilkens (1971). In their study, participants were divided into groups and were informed to either expect further interaction with or without outgroup members, or to expect no further interaction at all. Participants were asked to rate both the ingroup and outgroup on six evaluative traits prior to and after the interaction. All participants' ratings were biased in favour of ingroups, in spite of expecting or not expecting future interaction with outgroup members. Interestingly, ratings after the interaction indicated a significant increase in bias towards the ingroup for interactions that were both competitive and non-competitive. It was reported that "the effect of actual intragroup interaction was to enhance bias toward ingroup members, but equally so for competitive and independent groups" (Brewer, 1979, p. 313).

In light of the above it was further explored whether bias shown towards ingroups could occur 1) under conditions where individuals did not accrue personal benefit from favouring their ingroups, 2) where there was no competition between the groups and 3) where there was no previously hostility between the groups (Brown, 1988). These questions were examined in what was to become seminal research on intergroup relations.

The minimal group studies and their legacy

In this section of the argument, the original minimal group study is outlined. Thereafter I discuss the manner in which the social norm explanation was equivocated with an explanation rooted in the psychological need for a positive identity. I will then argue that regardless of the legacy of the MGP and popularity of social identity theory, there are methodological problems with the original study. These issues therefore perpetuate individualistically based explanations of ingroup bias. To address these concerns, a new technology which overcomes these methodological issues will be introduced.

The minimal group study

Henri Tajfel was critical of individualistic theories of intergroup behaviour derived from experimental methods. He stated that "Many of the 'individual' theories start from the general descriptions of psychological processes which are assumed to operate in individuals in a way which is independent of the effects of social interaction and social context" (Tajfel, 1978 as cited in Milner, 1981 p. 107). Thus, the object of study for Tajfel, Billig, Bundy and Flament (1971) was on how the norms and values that are relevant to a particular context, guide human action.

Since intergroup discrimination occurred in the absence of group conflict (Ferguson & Kelley, 1964; Rabbie & Wilkens, 1971; Tajfel, 1970), the minimal group study (Tajfel, 1970) examined the lower levels of what was necessary to cause ingroup bias. All socially related references that could result in ingroup bias or outgroup discrimination were removed from the experimental context. This was done in order to isolate the effects of social categorization that could be causally related to ingroup bias. Thus the experimental conditions in the MGP included 1) no face to face interaction between the participants even after being categorized into a group, 2) anonymity of group membership, 3) no link between the criteria for group categorization and the allocation tasks, 4) "the allocation responses having no utilitarian value to the participant making them, 5) responding in terms of intergroup differentiation should be in competition with a strategy based on other more "rational" and "utilitarian" principles, and 6) the response should be made as important as possible to the participant and should consist of real decisions (Tajfel, Billig, Bundy & Flament, 197, p. 154). Since conditions of the interaction were asocial, group belonging was limited to a cognitive conception thereby constituting a minimal group (Tajfel et al., 1971).

Participants were presented with a random cluster of dots and were asked to estimate the number of dots in each cluster. Thereafter they were asked to partake in another study on judgments. Participants were randomly assigned to an arbitrary group but were told that their group designation was based on their performance on the dot estimation task. They then proceeded to a cubicle, were given an allocation booklet and asked to allocate a once off monetary reward or penalty between an ingroup and outgroup member. Each choice was made on carefully constructed matrices that were randomized in each booklet. When making the allocations, participants were isolated from their groups, the rewards and penalties were anonymously allocated and recipients could only be identified by their

group membership. Those who received the reward or penalty were not aware of the allocations they received and the groups did not interact with one another (Tajfel et al., 1971). The results showed that a large majority of participants allocated more rewards to ingroup members than outgroups, when the groups were distinguished from one another as opposed to distributing the rewards fairly when there was no intergroup differentiation. It was concluded that "The only thing we needed to do to achieve this result was to associate their judgments of numbers of dots with the use of the terms "your group" and "the other group" in the instructions and on the booklets of matrices" (Tajfel, 1970, p. 101). The results indicated that even under minimal conditions, participants displayed ingroup bias due to the effects of being categorized into a group.

These consistent and significant results were explored further in a modified version of this study, conducted in 1971. Instead of the dot estimation task delineating group membership, participants indicated whether they preferred images of paintings by artists Klee or Kandinsky. Participants were told that their artistic preferences determined how they were assigned to groups, but they were randomly assigned. Thereafter, they completed the allocation task in the same minimal experimental conditions as the aforementioned study. The matrices that were used are displayed in Figure 1.

Figure 1. Matrices

Table 6. *Matrices in Experiment 2*

Type A	Matrix 1	19	18	17	16	15	14	13	12	11	10	9	8	7	I	O	I	O
		1	3	5	7	9	11	13	15	17	19	21	23	25	O	I	I	O
	Matrix 2	23	22	21	20	19	18	17	16	15	14	13	12	11	I	O	I	O
		5	7	9	11	13	15	17	19	21	23	25	27	29	O	I	I	O
		Version $\frac{I}{O}$: MIP and MD opposite to MJP																
		Version $\frac{I}{O}$: MIP, MJP and MD coincide																
Type B	Matrix 3	7	8	9	10	11	12	13	14	15	16	17	18	19	I	O	I	O
		1	3	5	7	9	11	13	15	17	19	21	23	25	I	O	I	O
	Matrix 4	11	12	13	14	15	16	17	18	19	20	21	22	23	O	I	I	O
		5	7	9	11	13	15	17	19	21	23	25	27	29	O	I	I	O
		Version $\frac{I}{O}$: MIP and MJP opposite to MD																
		Version $\frac{I}{O}$: MIP, MJP and MD coincide																

(Tajfel et al., 1971, p. 164)

Each matrix contained 13 terms and comprised of two rows of values, e.g. $\frac{19}{1}$. Participants could either choose one term, where the values on the top and bottom rows were allocated to an ingroup or outgroup member, depending on the type of choice (i.e. between two ingroup members between two outgroup members or between an ingroup and outgroup member). The matrices were designed to show the decision strategies used by participants such as

- *maximum joint profit*: where the maximum points for both ingroup and outgroup were chosen
- *maximum ingroup profit*: the maximum amount of points were awarded to the ingroup regardless of the amount designated for outgroups
- *maximum differentiation*: allocations that maximize the differentiation between groups where ingroups receive more allocations than outgroups.
    - *fairness*: where the same points are awarded to both ingroup and outgroup members

In type A matrices, when the top row designated outgroup allocations, the decision strategies of maximum joint profit, maximum ingroup profit and maximum difference in favour of the ingroup, were located on the extreme right of the matrix. When the top row designated ingroup allocations, maximum joint profit and maximum difference in favour of the ingroup were located on the extreme left while maximum joint profit remained on the right. Type B matrices were structured such that when the top row designated allocations to outgroup members, maximum joint profit, maximum ingroup profit and maximum difference in favour of the ingroup, were located on the extreme right of the matrix. When the top row designated ingroup allocations, maximum joint profit and maximum ingroup profit were located on the right and maximum difference in favour of the ingroup located on the extreme left (Tajfel et al., 1971).

The results demonstrated that the strategy of maximum joint payoff (i.e. the maximum joint amount for both ingroups and outgroups) barely affected the allocations made. Maximum ingroup profit (i.e. the largest possible amount awarded to the ingroup) was important but was outweighed by maximum difference (i.e. largest possible difference in gain between a member of the ingroup and a member of the outgroup, in favour of the ingroup). Differentiating between the ingroup and outgroup was therefore more important

than awarding the maximum joint amount to both groups. The major conclusions drawn from this study included: 1) allocation strategies of ingroup favouritism and fairness were predominantly used, 2) outgroup discrimination occurred in the absence of intergroup hostility, and 3) the act of categorization was sufficient to cause differential behaviour towards ingroups and outgroups. In his concluding remarks Tajfel (1970) noted that

> the generic norm of outgroup behaviour to which I have referred does exist and that it helps to distort what might have been more reasonable conduct. This norm determines behaviour- as other social norms do- when an individual finds himself in a situation to which, in his view, the norm applies… To behave socially is a complex business. It involves a long learning process; it is based on the manipulation of symbols and abstractions; it implies the capacity for modification of conduct when the situation changes-and social situations never remain static. To behave appropriately is therefore a powerful social motive, and attempting to do so means to behave according to one best understanding of the situation. (Tajfel, 1970, p. 102).

In this view, ingroup bias occurred as a result of the categorization process *and* the norm of ingroup bias that participants employed in their behaviour. This is because

> social conduct is to a very large extent determined by what an individual deems to be appropriate to the social situation in which he finds himself. His conceptions of what is appropriate are in turn determined by the prevailing system of norms and values which must be analyzed in the light of the properties of the social system in which he lives. (Tajfel, 1972, p.100)

These studies demonstrated how in an asocial, undifferentiated context, where participants' personal interests were not directly related to their actions and where it was possible to maximize the total benefit for all participants, behaviour was based on an ad hoc group categorization. The results were interpreted "in terms of the functioning of a 'generic' social norm which was perceived by the Ss as relevant to the solution of a problem of social conduct with which they were confronted" (Tajfel et al., 1971, p. 176). It was therefore posited that, as a result of being categorized in to groups, participants drew on the expectations of normative social conduct, (in this case differentiating between the ingroup

and outgroup and acting in ways that favoured the ingroup over the outgroup) to cope with the demands of their context. However, this explanation was later revised.

The move from a social norm explanation to social identity theory

A crucial theoretical shift occurred which was informed by a replication study conducted by Billig and Tajfel (1973). They explored the effect of similarity based social categorizations on intergroup behaviour. They argued that since social categorization and similarities between ingroup members were not experimentally isolated, the effect of social categorization on intergroup behaviour could not be properly examined in the original study. Thus this replication study was designed to isolate social categorization and similarity between ingroup members. The results demonstrated significant ingroup bias in how the rewards and penalties were allocated, despite participants knowing that their group distinctions were based on arbitrary criteria.

As a result, Billig and Tajfel (1973) questioned whether the term 'group' could have provoked a normative pattern of behaviour where participants favoured their ingroup. They stated that the group category failed to account for broader sociopsychological factors and suggested that group categorization "can be made to explain almost everything, and therefore they explain very little if anything at all" (Billing & Tajfel, 1973, p. 49). Instead, they focussed on how one defines their own identity in terms of their particular social categorization. Based on the argument that one's group contributes to the positive aspect of a person's image if the group is positively differentiated from other groups on value laden critieria, they suggested that ingroup bias served to differentiate the groups from one another. These "tentative explorations" (Billig & Tajfel, 1973, p. 50) were later formalized as *Social Identity Theory* (SIT).

This theory proposes that during categorization, individuals view themselves similarly to their group members and different from those who belonged to other groups. They act in ways that exaggerate the differences between groups and minimize the differences within them in order to maintain an acceptable and meaningful self-concept. This is because individuals define themselves according to both their individual and group identities. Thus when group membership is salient, individuals strive for their groups to be positively distinctive from others, because of its positive implications on their identity. Hence, the more individuals identify with their ingroups the more they act in ways where they show

preference for and favour their own groups over outgroups. This is because of the individual's aim to enhance their own and group members' self-esteem to achieve a positive social identity (Tajfel & Turner, 1979).

In accounts for why the norm theory was no longer sufficient, Brown, Tajfel and Turner (1980) stated that initially the generic norm explanation seemed viable due to intergroup discrimination being "so pervasive in our societies that it 'spilled over' even to the highly artificial and restricted situations which we were using in our experiments" (Brown, Tajfel & Turner, 1980, p. 410). But, it was insufficient as "it tended towards circularity and was unheuristic" (Brown et al., 1980, p. 410). In addition, Turner (1980, as cited in Brown et al., 1980, p. 410) was of the opinion that a normative account "fails to offer a useful account of psychological processes". In addition, difficulty with specifying the norm that resulted in ingroup bias was raised by Hertel and Kerr (2001). Normative explanations of ingroup bias were thus supplanted with individuals' psychological quest for self-esteem (Condor, 2003) and the explanation of ingroup bias was thus reverted to the individual and psychological level once more.

The popularity of social identity theory and individualistic accounts of ingroup bias

Numerous replications of the MGP have confirmed that categorization incites individuals' inherent desire for positive social identity. Categorization is therefore a sufficient condition for ingroup favoritism to be manifest (Billig & Tajfel, 1973; Turner, 1975, as cited in Brewer & Silver, 1978; Doise & Sinclair, 1972; Brewer, 1979; Diehl, 1990). The supporting evidence suggests that group norms do not cause individuals to favour their ingroups, but rather it is the effects of categorization at the individual level which result in ingroup favouritism. These explanations have been most popular and SIT is a key theoretical tool that has been extensively used to understand many socially related phenomena.

However as Spears, Jetten and Doosje (2001) assert "there is no natural or universal condition of either ingroup or outgroup bias independent of social circumstances" (pp. 333-334). Supporting evidence from Brewer and Campbell (1976, as cited in Brewer, 2007) found that those ethnic outgroups who were viewed as having more resources and status, in terms of achievement and status related traits, were rated more favourably compared to

ingroups. In addition, Noel, Wann and Branscombe (1995) reported that more negative judgment of outgroups were displayed in the presence of central ingroup members, as opposed to less negative judgment of outgroups in the absence of other ingroup members. These findings highlight the importance of the context and conditions of interaction since "derogation of comparison outgroups can sometimes be a mere public display and is not necessarily accompanied by privately held negative attitudes toward the outgroup" (Noel, Wann & Branscombe, 1995, p. 136).

While there have been attempts to explain outgroup bias using SIT, in terms of the social context which legitimates its expression, the ideological content of group norms evident in naturally occurring groups could not be addressed in the MGP (Spears, Jetten & Doosje, 2001). Thus, it is argued that this approach is not sufficient to explain the instances where there are different norms for how outgroups are treated as "Sometimes there is socially shared bigotry; sometimes there is not; sometimes an ideology of tolerance might be widespread" (Billig, 2002, p.178). Billig refers to Tajfel (1981, as cited in Billig, 2002, p. 174) who alludes to the problem "that all men can and do display hostility towards groups other their own...there is also no doubt, however, that under other conditions this hostility either does not appear or can be modified". Other evidence also suggests that the degree of identification and whether outgroup favouritism is considered and accepted as a legitimate practice, impacts upon whether ingroup bias is manifest or not. This is because "social reality" constrains the expression of ingroup bias and discrimination" (Spears, Jetten & Doosje, 2001, p. 352). This theory is therefore limited in its ability to account for how ingroup bias is dependent on the context for its expression. Furthermore, there are problems with the foundation on which this theory was developed.

Critique of the original minimal group study

In this section I will describe two important critiques of the MGP namely, the too minimal nature of the groups and the methodological problem of the matrices. I argue that the groups in the MGP were too minimal as they lacked any sort of realism. This is because, the essential social and interactive context necessary for the study of intergroup relations was not available in the original study. I then argue that, in addition to the self-esteem explanation offered by SIT, the structure of the matrices makes an experimental artefact explanation of the results also possible.

Minimal groups

The theoretical relevance of the MGP findings is the "strong and consistent evidence of intergroup differentiation without involving the forms of interdependence that were previously thought to be essential for such phenomena to occur" (Reicher, Spears, & Postmes, 1995, p. 184). These results showed that ingroup bias was still manifest even in contexts where 1) group categorizations were random, 2) the groups had no history or future interactions, 3) there was no personal interest for group members, and 4) no interaction between fellow group members. Thus, the value of the minimal social context is indeed recognised as "these very features that supposedly render the context minimal actually provide its psychological power" (Reicher et al., 1995, p. 184).

However, since it is in intergroup interaction that ingroup bias is manifest, Aschenbrenner and Schaefer (1980) question whether ingroup bias is actually based on the aforementioned psychological determinants of self-esteem. This is because social interaction between the participants was absent in the original study. Brown (1988) confirmed this by highlighting

> how sparse this social setting really was. The children were allocated to two meaningless groups on a flimsy criterion. They did not interact with members of their own or the other group. The two groups had no current or past relationship with other. (Brown, 1988, p. 224)

In addition, Bornewasser and Bober (1987) also argued that the minimal context did not account for the structure of the group. They considered the consequences that

> intergroup behavior as an interaction in terms of the actor's group identification is confined to the subject's reference to a similarity criterion…Thus, when carrying out experiments in the minimal group paradigm one has to be aware of a discrepancy between theoretical intention and empirical studies actually done. (Bornewasser & Bober, 1987, p. 273)

What this means is that there is a discrepancy between the conceptualization of ingroup bias and the manner in which it was operationalized. Ingroup bias is essentially a social and interactional feature of social life, but it was studied according to an asocial approach. Participants were isolated when they completed the distribution task and there was no

interaction between them. It is therefore argued that the lack of interaction made the context so minimal that it lost essential features of 'groupness' i.e. how groups interact with one another in the real world.

Furthermore, the methodology was "limited in its ability to illuminate diachronic processes, especially processes taking place over a long period of time" (Tajfel, 1972, as cited in Condor, 1996, p. 292) as the distributions were made on a once-off basis. This limitation represents a "weakness of much experimental research on intergroup relations is… its neglect of the dimension of time" (Spears, Jetten & Doosje, 2001, p. 352) and is problematic because "one cannot exhibit favouritism through a single judgment, but only through a pattern across several separate judgments" (Hertel & Kerr, 2001, p. 320). The basis for this lies in the fact that most behaviour of individuals in a group is not a once off act. Rather, it is a process that requires thought and is shaped by the individual actor, others, the context and the norms which arise out of a particular situation since

> We need to see group forces arising out of the actions of individuals and individuals whose actions are a function of the group forces that they themselves (or others) have brought into existence. We must see group phenomena as both the *product and condition* of actions of individuals. (Asch, 1952, p. 251, original emphasis)

Therefore, the interactions between individuals in a specific context evolve and are modified since the social world and our participation in it, is constituted by the "serial linking of events, and the serial transmission of action and information *between* social actors and local domains" (Condor, 1996, p. 291). Since these key features of social life were not attended to, the possibility for a social explanation of ingroup bias was therefore lost in the design of the minimal group studies. As a result, social reality (according to the MGP) could never be extended beyond a "fixed and external "given"" (Spears, Jetten & Doosje, 2001, p. 353). Consequently, ingroup bias was attributed to a state of 'being' that is universal, inevitable and unchangeable (Spears, Jetten & Doosje, 2001).

However, explaining ingroup bias in terms of "individually ascertained properties" is

conceptually reductive and insufficient as ingroup bias is neither fixed nor only the result of individual or psychological phenomena (Bornewasser & Bober, 1987, p. 268). Instead, individual, situational, relational and temporal factors are implicated in whether it is expressed or not, since ingroup bias likely to be "waxing-and-waning" in different contexts (Billig, 2002, p. 174). As Condor (1996) argues, social life and the relations between individuals ought to be understood as social processes that are negotiated and fluctuate as they are constituted over time, between and within groups. The exclusion of the temporal element of social interaction and social interaction itself therefore screened off ingroup bias as a "process of "becoming"", constituted in interaction and dependent on the circumstances for its expression (Spears, Jetten & Doosje, 2001, p. 352). The BBC prison study conducted by Reicher and Haslam (2006, as cited in Drury & Reicher, 2009) illustrated the importance of including a temporal component to the study of intergroup phenomena as

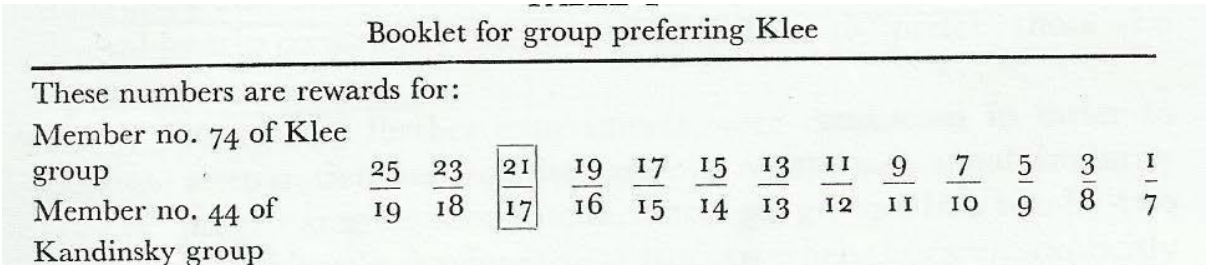
> it extended over 10 days and hence it was possible to investigate interactive dynamics which produced collective action. On the one hand it was possible to see how participants sought to define the meaning of events, the nature of groups and relations between groups, and how this affected what they did. On the other hand, one could analyze the way in which the actions of one group framed the responses of the other which in turn impacted back on the first group. This is in stark contrast to the increasing tendency of laboratory experiments to neglect both the ways in which categories are constructed and contested and also to neglect interaction.
> (Drury & Reicher, 2009, p. 711)

As a result of this neglect, the methodology of the MGP made 1) the universal psychological SIT explanation of ingroup bias seem plausible, and 2) it difficult to study the effect of norms as there was no time over which they could emerge.

Matrices

Aschenbrenner and Schaefer (1980) argued for the possibility that participants made the choices they did because they were inclined to extreme scoring. According to this view, participants would repeatedly choose the extreme decision strategies because of their locations on the matrices, as seen in Figure 1. It is also likely that participants acted according to demand characteristics and social desirability expectations because of the structure of the matrices (Aschenbrenner & Schaefer, 1980).

Figure 2. Ingroup-outgroup choices



Booklet for group preferring Klee

These numbers are rewards for:

Member no. 74 of Klee group	25	23	21	19	17	15	13	11	9	7	5	3	1
Member no. 44 of Kandinsky group	19	18	17	16	15	14	13	12	11	10	9	8	7

Figure 2 illustrates how each matrix differentiated the ingroup from the outgroup. Perhaps this arrangement set up the groups as different and in opposition to one another as "the response dimension of the reward matrices also forces subjects to respond in group terms if they are to make sense of an otherwise meaningless task" (Reicher et al., 1995, pp. 184-185). Moreover, participants were verbally instructed to allocate rewards or penalties to a member of either the Klee or Kandinsky group, further differentiating the ingroup and the outgroup. The group significations could have consequently made participants more attuned to group differences, resulting in their interpreting the purpose of the experiment as such.

This thesis therefore proposes that the features of the matrices ensured that participants favour their ingroup over the outgroup, as the MGP "allowed for little other than this group-based response" (Spears et al., 2001, p. 336). This is because the matrices were constructed in way where the only means to attain positive group distinctiveness would be to show bias towards ones ingroup. It seems that the ingroup versus outgroup choices delineated by the matrices were therefore set up to achieve to the desired results. Consequently, it is possible that individuals favoured their ingroups not only because of their psychological quest for self- esteem, but also because of the experimental artefact inherent in how the matrices were structured (Aschenbrenner & Schaefer, 1980).

The impact of intra- and intergroup interactions on ingroup bias in the minimal group paradigm

The "properties of groups and the consequences of membership for individuals" were not addressed in the original study because 1) social interaction between groups, 2) how interaction creates connections between individuals and 3) how the interaction develops and is produced over time, were absent (Sherif 1966, as cited in Tajfel, 1978b, p. 436).

Therefore, this thesis introduces a new method for studying ingroup bias in the MGP that enables 1) social interaction between participants, 2) a temporal element of the interaction and 3) the behaviours of participants to be visible to all in the interaction.

The methodological strength of this novel interactive minimal group environment, is that participants are not required to make a between group allocation compared to the original study. Here, participants are at liberty to choose to whom they allocate tokens. Furthermore, by enabling a context for developing social interaction that is visible to those within the interaction, this method provides the platform to extend the universal and psychologically based explanation of ingroup bias. This thesis proposes that it is not only cognitive schemas which inform how one acts but also the norms that emerge in interaction in a specific context. This is because the ideologies of a particular context inform how groups perceive one another which impacts upon their subsequent relations (Billig, 2002, p. 174). Therefore VIAPPL allows the study of the effect of norms as the interaction unfolds over time because the interaction is rendered visible. Such a technology surpasses the need for a post-hoc imputation of a normative explanation and allows for an emergent explanation that accounts for ingroup bias as 'becoming', in conditions that fulfill the requirements of social interaction.

Research aims, rationale, questions and hypotheses

The rationale for this thesis is twofold. The original minimal group study neglected the fundamental features of how social interaction unfolds over time and the methodology was critiqued for setting up the experiment in a way that ensured the desired results. The main aim of this research was to therefore revisit Tajfel's original minimal group study using a new technology which overcomes the problems of neglecting social interaction and the temporal features of interaction, as well as requiring a between group allocation.

The overall research question is: "Under what conditions of interaction is ingroup bias most likely to be manifest?" There are two hypotheses of this research which are outlined in Table 1. In terms of the minimal group hypothesis, it is expected that ingroup bias is more likely to be manifest when individuals interact with one another as members of a group than when they have no group membership. With regards to the second temporal hypothesis, it is

expected that when interacting as group member, individuals demonstrate ingroup bias but this behaviour is amplified as the interaction unfolds over time.

Table 1. Research Hypotheses

Minimal group hypothesis	H_0: There is no difference in ingroup bias between the individual condition and the minimal group condition H_1: Ingroup bias is greater in the minimal group than the individual condition
Temporal hypothesis	H_0: There are no differences in ingroup bias between Trial 1 and Trial 3 of the minimal group condition H_1: Ingroup bias is significantly greater in Trial 3 than Trial 1 of the minimal group condition

Chapter three: Methodology

Method: Virtual Interaction Application (VIAPPL)

VIAPPL is the new method that was employed to study interaction. Abstracted to a virtual environment where situational variables are manipulated, the VIAPPL platform allows for the observable and measurable study of social life that was previously not possible (Durrheim & Quayle, 2012). VIAPPL is an experimental software programme and simulates a game like environment which renders visible the interactions between individuals as they emerge and change in real time. This novel context for social interaction is the 'Give and Get' game.

The 'Give and Get' game

As each participant logs in to the game they are presented with a screen where all participants are represented as small circles, as seen in Figure 3.

Figure 3. The 'Give and Get' environment

Note. Each circle represents a player in the game. Although the players interact with one another the actual identity of the group members is unknown. This screen shot shows the participant (purple dot with black outline, and different circles are outlined at each workstation); one ingroup member (purple dot) and two outgroup members (yellow dots). Each player is allocated a set number of tokens and may distribute these in anyway (i.e. to the ingroup or the outgroup). Thus the ingroup token

balance could change if the outgroup as well as other ingroup members allocated their tokens to the ingroup. These tokens are exchanged between participants in real time. Players can receive tokens, give away tokens and take back tokens to redistribute. This particular condition is assessing the participants tendency to favour the ingroup and discriminate against the outgroup.

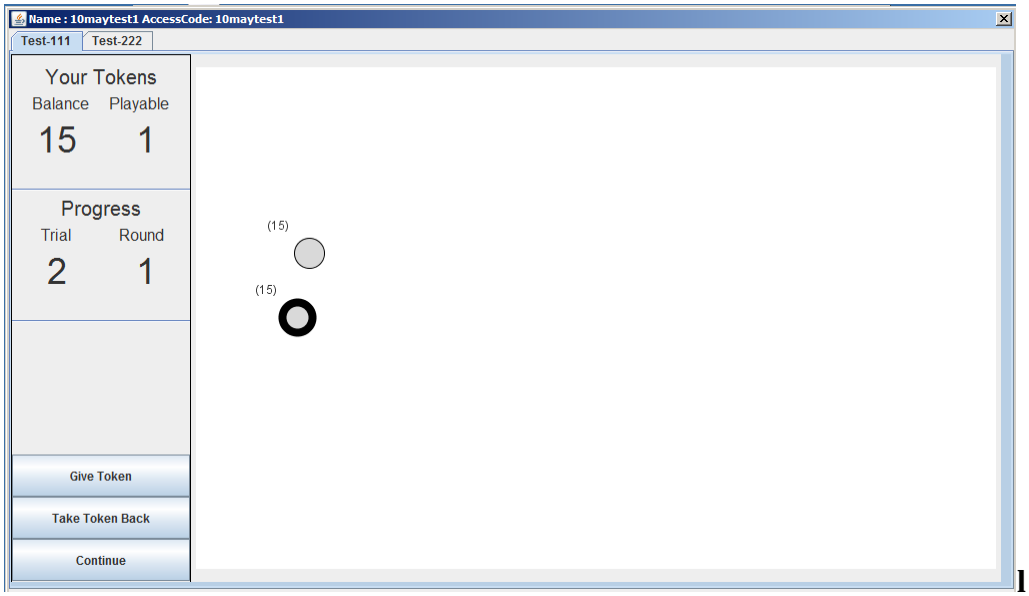
There are a maximum of 14 players per game and participants are required to allocate tokens to other players of their choice. Figure 4 displays a token exchange between two participants.

Figure 4. Token allocation

Note. This screen shot represents the connection that forms between players that allocate tokens to each other.

The game includes both an "individual" and "group" condition. In the "individual" condition, all players are in the same group as seen in Figure 5.

Figure 5. Individual condition



Note. There is no group categorization in this condition of the game. Players act as individuals as they have no group membership.

Figures 3 and 4 display the "group" condition where participants are allocated to one of two groups, and is represented by the colour of their circle. Figure 6 indicates the preference task which participants believe their group assignment is based on, but they are in fact randomly assigned.

Figure 6. Preference task

Note. In order to create a sense of group membership participants were asked to indicate their preferred painting in the preference task. Participants thought that they were allocating themselves into a group but in fact were randomly allocated to one of two groups. Random allocation was achieved by pre-defining the groups in the VIAPPL arena editor software where each circle was allocated to one of the two groups before the start of each game. This information was stored in the database and could not be deduced by participants.

There are two types of 'Give and Get' games. Each game consists of three trials where group membership is either masked or visible in the individual and group conditions, respectively. This manipulation occurs in a specific sequence which is unique to the type of game. Table 2 indicates the two types of games, namely IGI and GIG, each consisting of three trials, where 'I' indicates the individual condition and 'G' indicates the group condition.

Table 2. Two types of 'Give and Get' games

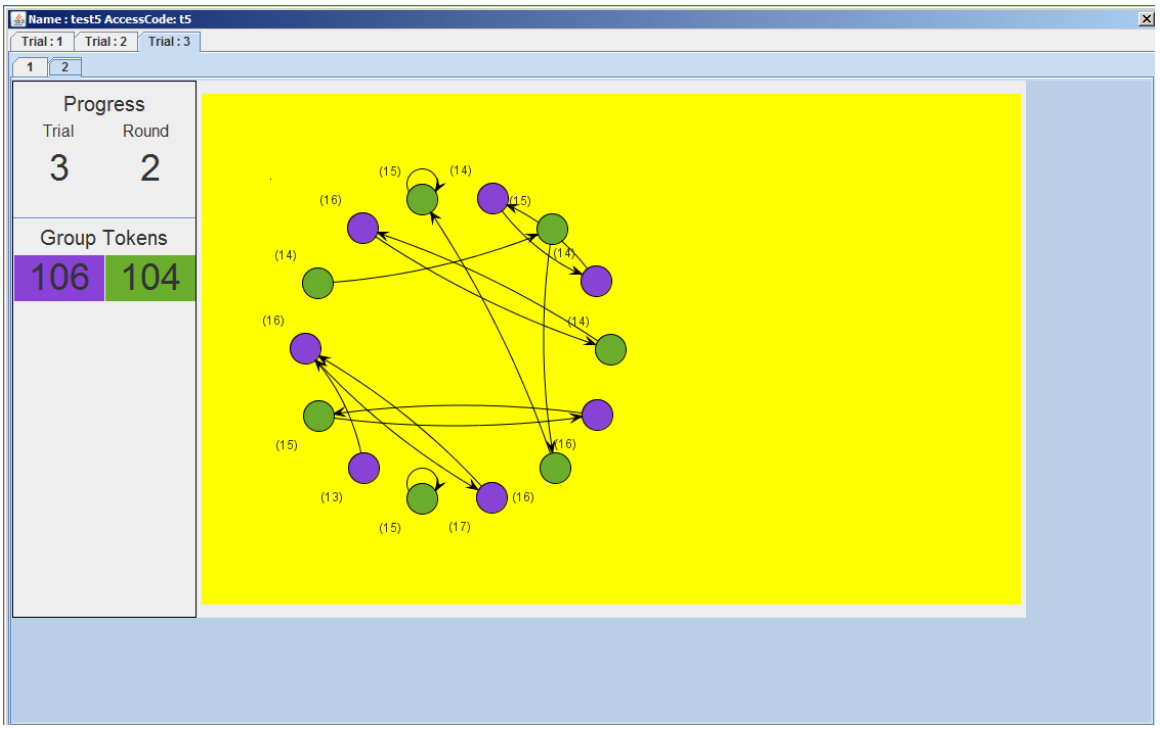
Type of game: IGI	
Trial one	Individual condition
Trial two	Group condition
Trial three	Individual condition
Type of game: GIG	
Trial one	Group condition
Trial two	Individual condition
Trial three	Group condition

There are 15 rounds nested within each trial of the game. These rounds provide participants the opportunity to allocate a token to others as well as facilitating the temporal component of the interaction.

There are two additional experimental constants included in the design namely

- *token balances* (hereafter referred to as balance) which displays the number of tokens players accrue in each round. These balances are shown in Figure 3. They are located alongside each participant as well as on the left of the screen. When visible, participants are able to see their own and other players' balances as well as the changes of these balances as the game advances.
- *ties between players* (hereafter referred to as ties) form as a result of token exchanges between players. Figure 7 displays the ties and shows the connections formed between players.

Figure 7. Visible balance and ties



Note. This screen is presented to players after each round. It indicates how the tokens were distributed in the last round and provides an update of participants' token balances. By displaying this information to participants as the interaction is occurring, VIAPPL renders the developing interaction visible.

Token balance and ties between players can either be visible and or masked in both individual and group conditions. When visible, balance is displayed on the screen and ties are indicated after each round of the trial. When masked, balance is absent and the ties are not displayed after each round of the game.

The minimal 'Give and Get' context

The nature of game is such that it is an undifferentiated context with no competitive conditions between the groups or individual players. Individuals allocate tokens to one another but are not required to make a between group allocation. They are at liberty to decide to whom they allocate their tokens. There is no previous hostility between the groups or individual players. The 'Give and Get' game allows players to observe the actions of others, when ties and balance are visible. Furthermore, token allocations over the rounds of each trial enable the study of the temporal features of interaction. VIAPPL therefore facilitates a context of social interaction occurring over time and is indicative of intergroup

interaction in real life in this respect (Durrheim & Quayle, 2012, p. 1). The visibility and temporal features of the VIAPPL platform allows the study of 1) social interaction between groups, 2) how interaction creates connections between individuals, and 3) how the interaction develops and is produced over time.

Research design

A within-subjects and between-groups experimental research design was employed. Time, the within-subjects factor was comprised of three levels (i.e. Trial 1, Trial 2, and Trial 3). Group visibility was the between-groups factor and comprised of two levels. The first level is referred to as 'GIG' and the second as 'IGI', where "G" denotes the minimal group condition where group membership is visible and "I" denotes the individual condition where group membership is masked. Table 3 displays both the within-subjects factors and between-groups factors.

Table 3. Within-subjects and between-groups factors

	Within-subjects Factor- Time		
	Trial 1	Trial 2	Trial 3
Between-groups Factor- Group visibility	G	I	G
	I	G	I

Note. The number of participants in each trial was kept constant.

<u>The independent variable (IV)</u>
The IV is the group condition (G) and the individual condition (I).

<u>The dependent variable (DV)</u>
An ingroup bias index was measured in terms of *ingroup giving* and *ingroup receiving*.

- *Ingroup giving* was calculated by the ratio of the number of tokens given to the ingroup, to the number of tokens given to the outgroup.
- *Ingroup receiving* was calculated by the ratio of the number of tokens received from the ingroup to the number of tokens received from the outgroup.

The ingroup bias index is a combined measure of these ratios. It was calculated by dividing *ingroup giving* by *ingroup receiving*. It was operationalized as the measure of the degree to which there is more ingroup favouritism in giving than outgroup

favouritism in receiving (Durrheim & Quayle, 2012).

Two research studies

Two different studies were conducted for this thesis. Both were based on the same research design but differed in terms of the conditions of the additional experimental constants, i.e. balances and ties. In Study 1, ties between players were masked, but balance was visible, whereas both ties and balance were visible in Study 2.

Sample

Non-probability sampling was used as generalization was not the main aim of this investigation. The total sample comprised 248 UKZN undergraduate students of both genders and all race groups over the age of 18 years.

Ethics

Ethical issues in sampling

UKZN students were invited to participate in the study (see Appendix A). Participants were given an information sheet and they signed an informed consent document providing agreement to their participation (see Appendix B). These documents stated that participants were free to withdraw from the study at any time and that their participation was voluntary. Participants' personal records were not required for the study. Participants' were over 18 years of age. They were not mentally or legally incompetent. There were neither language barriers nor factors of the study that increased participants' vulnerability or susceptibility to harm. The only cost to participants was a loss of their time, which was compensated for by a twenty rand cash incentive. Participants signed a form confirming receipt of the incentive after their participation (see Appendix C). The research gained from the study did not benefit participants personally but they did receive a direct monetary benefit.

The research was conducted in the PsycLab (Psychology Computer Laboratory) since it is equipped with computer facilities to accommodate the number of participants required for each experiment. Low risk deception was used in the study. Participants were told that their group allocation was based on their preference between two paintings. However, they were randomly assigned to a group. This form of low risk deception was warranted, as the research explores the effects of group membership on individuals' behaviour. Participants

were debriefed after the experiment to manage the deception.

Ethical issues in data collection

Ethical approval was granted for this research study (see Appendix D). There was no need for a registered professional to carry out the procedure. Participants had to provide their student numbers and email addresses when logging into the game. Confidentiality of this information was maintained, as participants' responses were not associated with their identifying details provided during the registration. Participants remained entirely anonymous and their participation confidential. The data were electronically stored, indefinitely in the VIAPPL database for further research purposes. Permission for the further use of participants' data was obtained in the consent form.

Data analysis

The VIAPPL software recorded and saved each token allocation that was made per round of the game. Details of the sender and receiver were recorded in terms of their group membership and whether they received or allocated the token. Quantitative, ratio data was produced. The VIAPPL platform summarised both the data produced for each trial and for each round for a game. Since participants' token allocations were repeated over the three trials of the game, a repeated-measures analysis of variance (ANOVA) was conducted on the trial data. The trial data was imported into the Statistical Package for the Social Sciences (SPSS) and organised in a multivariate format. This method of analysis facilitated the comparison of ingroup bias in terms of the two group design, i.e. between the IGI and GIG experiments.

In addition, social network analysis (SNA) methods were employed for further analysis of the data in Study 2. This method allowed for the study of the evolution of the repeated token allocations over time. The unit of analysis in SNA is the relation between interacting entities and includes the exchanges between participants in the 'Give and Get' game. This method was therefore appropriate as it relied less on averages and revealed the patterns of relationships between those in the interaction. A detailed discussion of SNA is provided in Chapter 5.

Chapter four: Results

This chapter presents the results from the repeated measures ANOVA.

Repeated measures ANOVA

Study 1

Study 1 compared the effects of ingroup bias between the individual condition and the minimal group condition over the three trials of the game. The IV is group visibility, i.e. the individual condition (where players act with no group membership, i.e. as an individual) and the minimal group condition (where players act in terms of their group membership, i.e. as a group member). The DV is a measure of the degree to which there is more ingroup favouritism in giving than outgroup favouritism in receiving, where higher scores indicate a high degree of ingroup bias being manifest. The DV was also calculated for the individual condition for comparative purposes. Participants were randomly assigned in the individual condition. Their group assignment was masked yet still recorded in the on the VIAPPL database.

The experimental conditions of the game were such that

- token balances for both individual and group conditions, were visible in all three trials of the game, and
- the ties between players were masked in all three trials of the game.

This study addressed the minimal group and temporal hypotheses outlined in chapter two i.e. that:

- ingroup bias is greater in the group condition than the individual condition, and
- ingroup bias will be greater in trial three than trials one and two, in the minimal group condition

It is expected that there will be a significant interaction effect between group visibility (IGI and GIG) and time (trial one, trial two and trial three) and that this effect is stronger as the trials progress.

Method

Procedure

Upon arrival, participants were greeted by the experimenter who was dressed in a white lab coat. Once all participants were seated, the information sheet was discussed and the consent forms were then signed and collected. The experimenter then assisted participants' in creating an account and logging onto the system. Brief instructions were provided to participants. All participants were presented with the same type of game (i.e. IGI or GIG sequence) in a single experimental setting. Table 4 indicates the number of experimental settings of each condition. Participants then followed the screen prompt asking them to indicate their preferred Klee or Kandinsky painting and were told that their group allocation would be based on their preferences. However, participants were randomly assigned. Thereafter the experimenter explained how the program operates by using the first round of the game as an exemplar. On completion of the experiment participants were thanked for their time and then reimbursed with the cash incentive.

Sample

57 participants were included in this study. The total number of participants in the IGI experiment was 24 and there were 33 participants in the GIG experiment. Participants were randomly allocated to the IGI and GIG conditions. A further breakdown of the sample is outlined in Table 4.

Table 4. Sample: Study 1

Experiment	**IGI**	**GIG**
No. of replications of experimental setting	2	3
Total no. of participants per condition	24	33
Total no. of participants in study	57	

Note. No. of replications refer to the number of times the same experiment was conducted. So, the IGI and GIG experiments were conducted twice and thrice respectively.

Analysis

A mixed within-subjects and between-groups repeated measures ANOVA was conducted. There is one between-groups factor (with two levels: individual, and group) and one within- subjects factor (with three levels: trial one, trial two, and trial three).

Assumptions

To manage the violation of independence of observations a general linear model was used for this repeated measures analysis, as it accounted for the dependence of observations. Levene's test of equality of error variances was used to assess the assumption of homogeneity of variance. Table 5 displays the results.

Table 5. Levene's test: Study 1

	F	df1	df2	Sig.
Trial 1	8.822	1	55	.004
Trial2	18.358	1	55	.000
Trial3	1.001	1	55	.321

It is evident that homogeneity of variance was violated in Trial 1, $F(1,55) = 8.822$, $p = 0.004$ and Trial 2, $F(1, 55) = 18.358$, $p = 0.000$ but not in Trial 3, $F(1, 55) = 1.001$, $p = 0.321$. To account for the violations the first two trials, Box's method of comparing $F_{obtained}$ to F_{α} with altered degrees of freedom, was employed to adjust for the heterogeneity of variance (Box, 1954a, as cited in Howell, 2010). According to Howell (2010) if the comparison is significant: "then the means are significantly different regardless of the equality, or inequality, of variances" (p. 335), thus confirming the result. Since the assumption of sphericity was not violated, Mauchly's $W= 0.999$, $p = 0.974$, the tests of within subjects effects output was interpreted.

Results

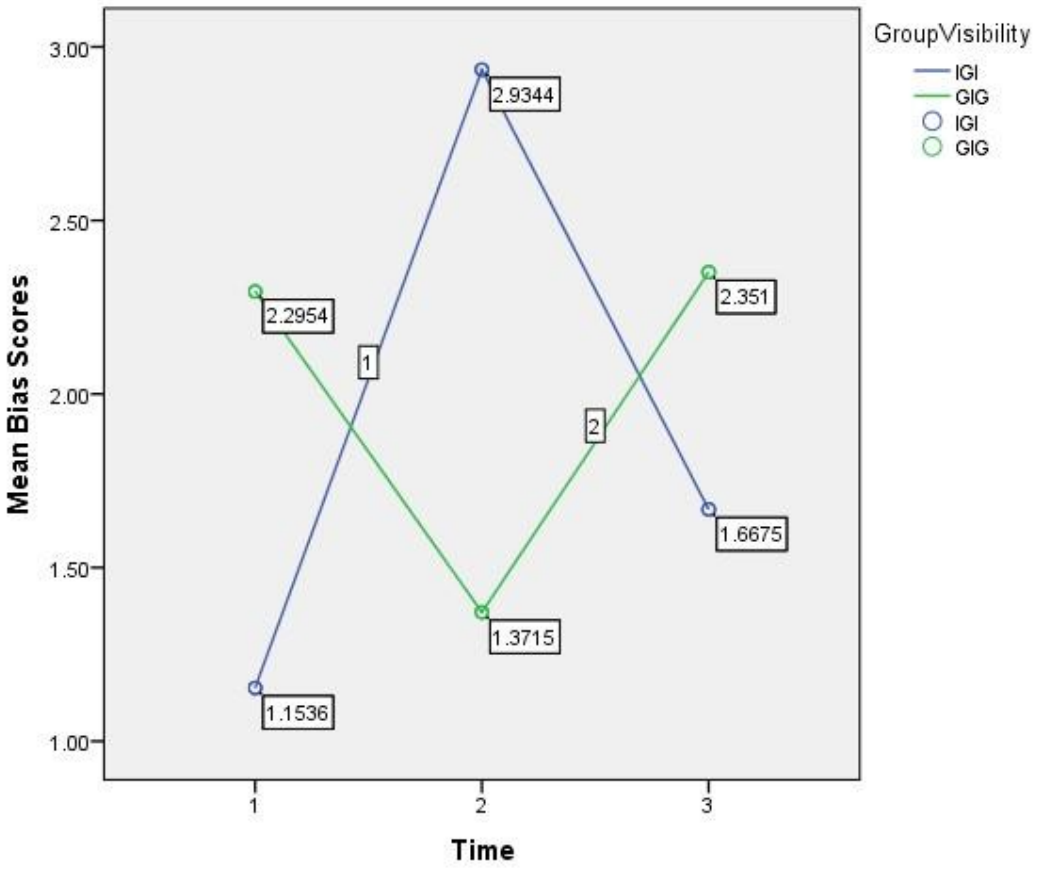
Descriptive statistics

The descriptive statistics are presented in Table 6 and the quadratic trend is displayed in Figure 8.

Table 6. Descriptive statistics: Study 1

IGI			
	Trial 1	**Trial 2**	**Trial 3**
Mean	1.1536	2.9344	1.6675
Standard deviation	.70763	3.78127	2.31392
N	24	24	24
GIG			
	Trial 1	**Trial 2**	**Trial 3**
Mean	2.2954	1.3715	2.3510
Standard deviatio	3.74002	1.31628	3.41191
N	33	33	33

Figure 8. Quadratic trend: Study 1



The scores represent the degree to which there is more ingroup favouritism in giving than outgroup favouritism in receiving. As group membership is not salient in the individual interaction condition, mean ingroup bias is 1.1536 at Trial 1. However, when

group membership is known, bias scores are increased by 1.1418 units to 2.2954 in the group interaction condition. At Trial 2, mean ingroup bias increases to 2.9344 in the minimal group interaction condition and decreases to a mean score of 1.3715 in the individual interaction condition. At Trial 3, the bias index is 1.6675 in the individual interaction condition and increases to 2.3510 in the minimal group interaction condition. Thus, mean bias scores are higher when group membership is salient as compared to mean bias scores when group membership is masked, over all three trials. The quadratic trend indicates that there is more ingroup favouritism in giving in the group conditions as more tokens are allocated to the ingroup than the outgroup. As group membership is masked in the individual condition, outgroups are favoured in terms of the tokens they receive.

Inferential statistics

Main effects

As expected, the main effect for time was not significant, $F = 0.319$, $df = 2$, $p = 0.728$, $\eta^2 = 0.006$ and the main effect for group visibility was also not significant. $F (1) = 0.041$, $p= 0.840$, $\eta^2 =0 .001$. Box's comparison method confirms these results.

Interaction effects

The interaction effect ($F = 3.514$, $df = 2$, $p = 0.033$, $\eta^2 = 0.060$) showed that the mean level of ingroup bias was significantly different across the three trials. These results were confirmed by Box's comparison method. Ingroup bias was shown to be greater in the minimal group condition than in the individual condition, and that there are differences in ingroup bias over the three trials of the game. Consequently, a significant quadratic trend was confirmed for this interaction, $F = 6. 861$, $df =1$, $p = 0.011$, $\eta^2 = 0.111$, represented in Figure 8.

Between-group and within-subjects planned contrasts tests assessed whether the differences in ingroup bias between the group and individual conditions at each trial were significant or not. The results revealed that these differences were not significant at Trial 1 ($t= 1.712$, $df= 35.109$, $p=0.096$). They were marginally significant at Trial 2 ($t= -1.941$, $df= 27.081$, $p= 0.063$) but not significant at Trial 3 ($t= 0.901$, $df= 54.787$, $p= 0.372$).

However, results of the planned contrast for the GIG (between-groups factor) reveal that when group membership is salient, ingroup bias scores at Trial 1 and Trial 3 are not significantly different from one another ($F = 0.004$, $df = 1$, $p = 0.949$). As the increase in ingroup bias at Trial 3 is not significantly different from the lower score at Trial 1, there is no supporting evidence for the temporal hypothesis. The difference in ingroup bias between Trial 2 and Trial 3, when group membership was masked then made salient respectively, was also not significant ($F= 2.316$, $df = 1$, $p = 0.138$).

Planned contrasts for the IGI (between-groups factor) indicate that there are no significant differences in ingroup bias at Trial 1 and Trial 3 ($F = 1.220$, $df = 1$, $p = 0.281$). This result was expected since group membership was masked in both trials. The differences in ingroup bias between group membership being salient in Trial 2 and masked in Trial 3 were also not significant ($F = 1.779$, $df = 1$, $p = 0.195$).

Conclusion

A mixed within-subjects and between-groups repeated measures ANOVA was conducted to test the minimal group and temporal hypotheses. These results support the minimal group hypothesis but not the temporal hypothesis. The results only demonstrated that ingroup bias was manifest to a greater degree in the minimal group condition than the individual condition. There was no evidence for ingroup bias amplifying as the interaction unfolded over time. It was noted that although the overall pattern of means was as expected, a high degree of variance was evident (see Table 6). In addition, the small sample size compromised the power of the study. Consequently, a second study with increased power was conducted.

Study 2

The power of this study was increased in two ways namely, by increasing the sample size and rendering visible the ties between players. It was hypothesized that the interaction effect would be stronger when ties between players were visible instead of masked as players would be able to observe how others behaved in the context. Thus the ties were presented to players after each round of the game.

The IV and the DV remain the same. The former is group visibility, i.e. the individual interaction condition or group interaction condition. The latter is a measure of the degree to which there is more ingroup favouritism in giving than outgroup favouritism in receiving, where higher scores indicate a high degree of ingroup bias being manifest. The experimental conditions of the game were such that

- token balances for both individual and group conditions, were visible in all three trials of the game, and
- the ties between players were visible in all three trials of the game.

This study addresses the same hypotheses, of significant differences in ingroup bias scores between the groups, over the trials of the game, as study one. In addition, it is also expected that the interaction effect will be stronger than the effect found in the first study.

Method

Sample

The size of the sample in this study was increased to 191 participants. There were 94 participants in the IGI condition and 97 participants in the GIG condition. See table 7 for a further breakdown of the sample.

Table 7: Sample: Study 2

Experiment	IGI	GIG
No. of replications of experimental setting	7	7
Total no. of participants per condition	94	97
Total no. of participants in study	191	

Procedure

The same procedure outlined for study one was followed for this study.

Results

The same method of analysis used in the first study was employed. A mixed within-subjects and between-groups repeated measures ANOVA was conducted. Once again, there is one between-groups factor (with two levels: individual, and group) and one within-subjects factor (with three levels: trial one, trial two, and trial three).

Assumptions

Levene's test was used to assess the assumption of homogeneity of variance and the results are displayed in Table 8.

Table 8. Levene's test: Study 2

	F	df1	df2	Sig.
Trial1	32.664	1	189	.000
Trial2	33.824	1	189	.000
Trial3	13.801	1	189	.000

The assumption of homogeneity of variance was violated across all three trials. In Trial 1 $F(1, 189) = 32.664$, $p = 0.000$. In Trial 2, $F(1,189) = 33.824$, $p = 0.000$ and in Trial 3, $F(1, 189) = 13.801$, $p = 0.000$. Therefore, Box's method was used to deal with the heterogeneity of variances. The assumption of sphericity was also violated, Mauchly's $W= 0.899$, $p = 0.000$ thus the multivariate tests output was interpreted.

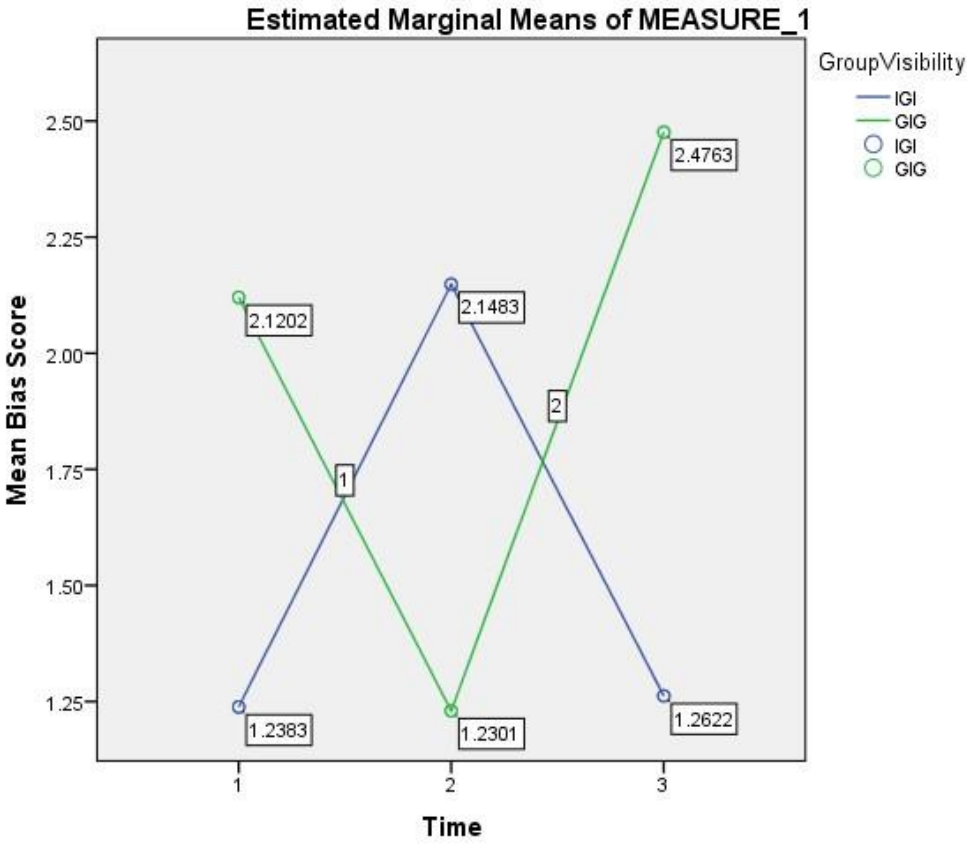
Descriptive statistics

The descriptive statistics are outlined below in Table 9 and the quadratic trend is displayed in Figure 9.

Table 9. Descriptive statistics: Study 2

IGI			
	Trial 1	**Trial 2**	**Trial 3**
Mean	1.2383	2.1483	1.2622
Standard deviation	.95073	2.83180	1.06803
N	94	94	94
GIG			
	Trial 1	**Trial 2**	**Trial 3**
Mean	2.1202	1.2301	2.4763
Standard deviation	2.90690	.78817	4.70307
N	97	97	97

Figure 9. Quadratic trend: Study 2



Once again, the scores represent the degree to which there is more ingroup favouritism in giving than outgroup favouritism in receiving. At Trial 1, mean ingroup bias scores are 1.2383 in the individual interaction condition, and it increases to 2.1202 in the group

interaction condition. At Trial 2, mean ingroup bias scores are 2.1483 in the group interaction condition but decreases to 1.2301 in the individual interaction condition. In the third trial bias is 1.2622 in the individual interaction condition and increases to 2.4763 in the group interaction condition. Similarly to Study 1, mean bias scores are higher when group membership is salient as compared to mean bias scores when group membership is masked, over all three trials. Once again, the quadratic trend indicates that there is more ingroup favouritism in giving in the group conditions as more tokens are allocated to the ingroup than the outgroup. As group membership is masked in the individual condition, outgroups are favoured in terms of the tokens they receive.

Inferential statistics

Main effects

As anticipated, the main effects for time was not significant (Wilks' Lamda= 0.997, F (2, 188) = 0.249, p = 0.780, $\eta^2 = 0.003$). The main effect for group visibility was also not significant (F (1) = 3.005, p = 0.085, $\eta^2 = 0.016$). Box's comparison method confirms these results.

Interaction effects

The interaction effect (Wilks' Lamda= 0.899, F (2, 188) = 10.518, p = 0.00, $\eta^2 = 0.101$) showed that the mean levels of ingroup bias was significantly different across the three trials. As expected, the interaction effect of time and group visibility was greater in this study than in study one where F (2) = 3.514, p = 0.033, $\eta^2 = 0.060$. This result provides further confirmation for ingroup bias being greater in the minimal group than in the individual condition. In addition, it also supports the finding in Study 1 that there are differences in ingroup bias over the trials of the game. A significant quadratic trend for the time and group visibility interaction was found, F (1) = 20.500, p = 0.00, $\eta^2 = 0.098$, as displayed in Figure 8. Box's method confirms these significant effects.

Results of the between-groups and within-subjects planned comparisons reveal that the differences in mean ingroup bias between the individual and group condition for Trial 1 were significant (t= 2.836, df= 116.893, p=0.005). These differences were also significant for Trial 2 (t= -3.032, df= 106.904, p= 0.003) and for Trial 3 (t= 2.477, df= 106.179, p=

0.015). Thus the differences in ingroup bias between the group and individual conditions at each trial were statistically significant.

However, planned contrasts for the IGI (between-groups factor) indicate that there are no significant differences in ingroup bias at Trial 1 and Trial 3 ($F = 0.026$, $df = 1$, $p = 0.873$). This result was expected since group membership was masked in both trials. The differences in ingroup bias between group membership being salient in Trial 2 and masked in Trial 3 were significant ($F = 7.799$, $df = 1$, $p = 0.006$). This effect is stronger than the same contrast conducted in Study 1 (where $F = 1.779$, $df = 1$, $p = 0.195$) which is attributed to the increased power of this study. The planned contrast for the GIG between-groups factor shows that the difference in ingroup bias between group membership being masked in Trial 2 and then visible in Trial 3, was significant ($F= 6.623$, $df = 1$, $p = 0.012$). This result supports the minimal group hypothesis. However, when group membership is salient, ingroup bias scores at Trial 1 and Trial 3 are not significantly different from one another ($F = 0.451$, $df = 1$, $p = 0.504$). As the increase in ingroup bias at Trial 3 is not significantly different from the lower score at Trial 1, this study also provides no evidence for the temporal hypothesis.

To further investigate the temporal hypothesis, a correlation between the 15 rounds of a trial (where group membership was visible) and the number of tokens only allocated to the ingroup in each round (i.e. homogenous ties) was conducted. That is, the trials where group membership was visible, was correlated with the number of tokens only allocated to the ingroup, for that particular trial. This was done in order to explore whether ingroup bias was greater in some trials compared to others (i.e. trial 3 versus trial 1) so as to determine whether ingroup increased over time. Table 10 displays the correlation coefficients for Trial 1 and Trial 3 where group membership is visible in both trials.

Table 10. Correlation coefficients		
Experiment	**Correlation coefficient of no. of homogenous ties per round of Trial 1**	**Correlation coefficient of no. of homogenous ties per round of Trial 3**
1	r = -0.012, n = 15, p = 0.968	r = 0.375, n = 15, p = 0.168
2	r = 0.256, n = 15, p = 0.375	r = 0.506, n = 15, p = 0.054*
3	r = -0.082, n = 15, p = 0.771	r = -0.174, n = 15, p = 0.534
4	r = -0.659, n = 15, p = 0.008*	r = -0.340, n = 15, p = 0.215
5	r = 0.088, n = 15, p = 0.756	r = 0.301, n = 15, p = 0.276
6	r = -0.136, n = 15, p = 0.629	r = -0.163, n = 15, p = 0.562
7	r = -0.359, n = 15, p = 0.189	r = -0.696, n = 15, p = 0.004*

Note. * indicates a significant correlation. n=15 refers to the number of rounds.

Since only three of the correlations were significant, this analysis shows that ingroup bias does not increase in a linear fashion when group membership is visible, as the rounds of the trial progress. Scatterplots of the correlations indicate a similar pattern of how homogenous ties were distributed over the rounds. Figures 10, 11, 12 and 13, are presented as exemplars. Figures 10 and 11 represents Trial 1 and Trial 3 for a single experiment, respectively and Figures 12 and 13 also represents Trial 1 and Trial 3 for a single experiment.

Figure 10. Scatterplot of homogenous ties per round of Trial 1: Experiment 1

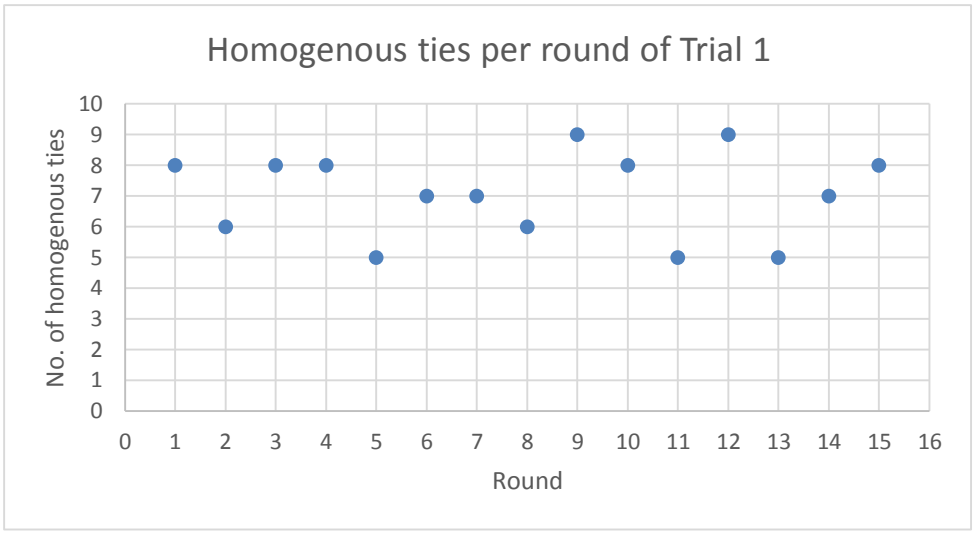


Figure 11. Scatterplot of homogenous ties per round of Trial 3: Experiment 1

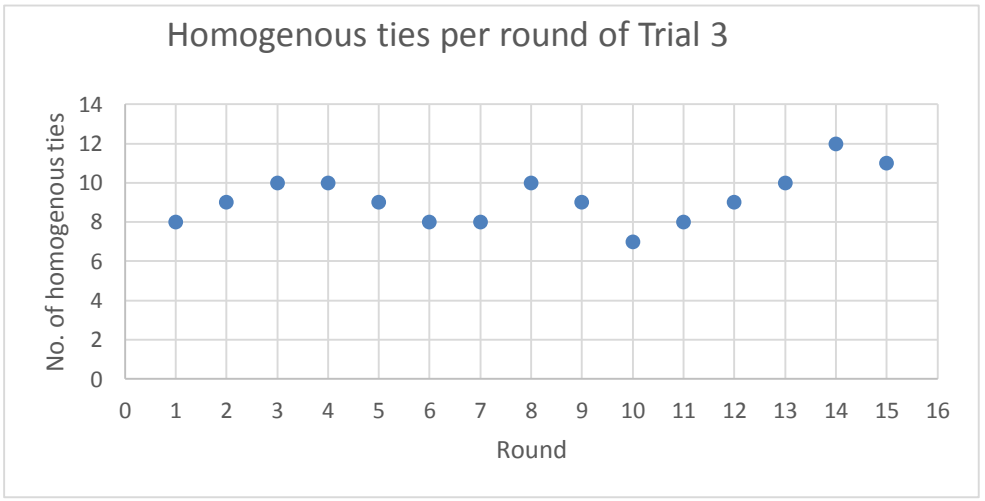


Figure 12. Scatterplot of homogenous ties per round of Trial 1: Experiment 6

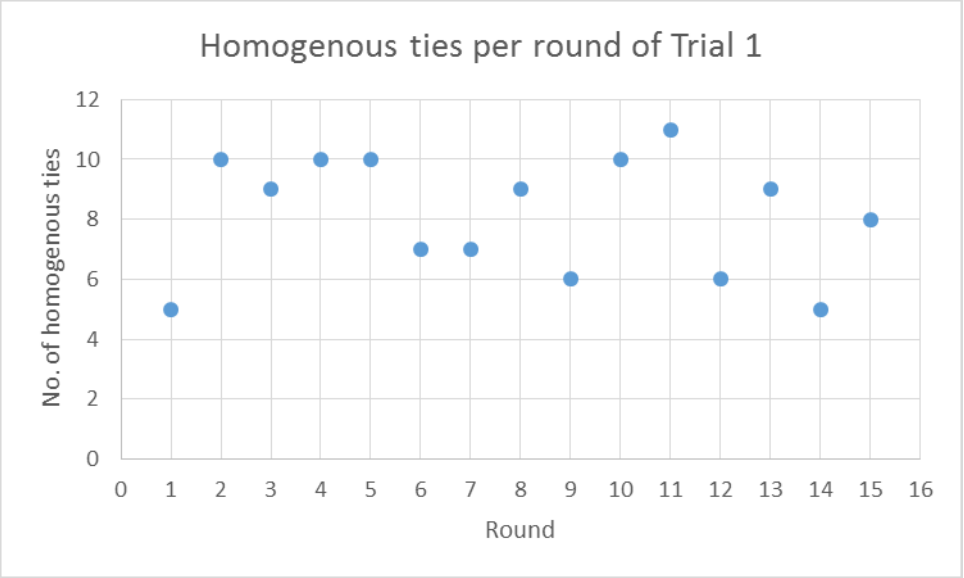
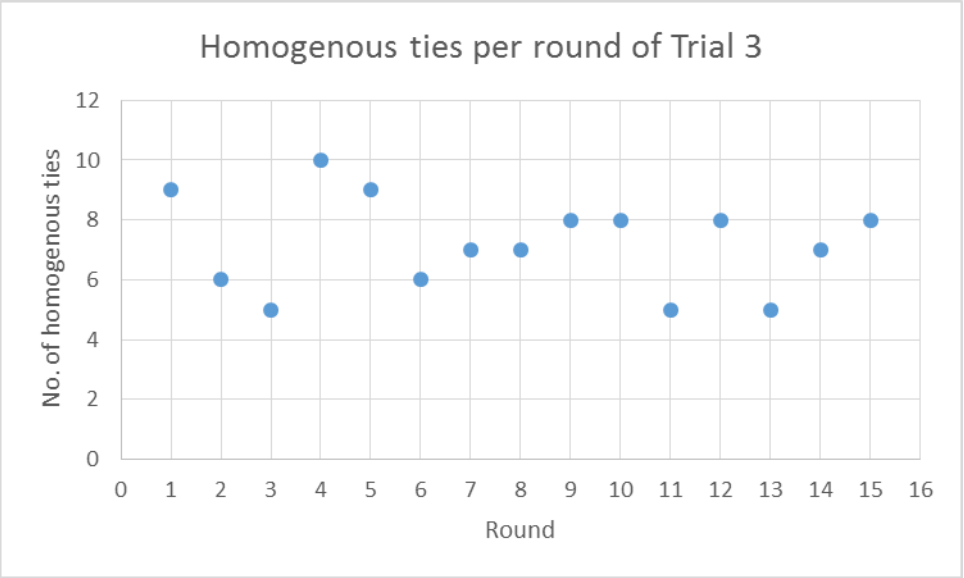


Figure 13. Scatterplot of homogenous ties per round of Trial 3: Experiment 6



These graphs illustrate the distributions where homogenous ties did not increase at a constant rate. Ingroup bias did not amplify linearly when group membership was made salient for the second time in Trial 3, as hypothesized. Rather, it appears from the distribution that it changed as the rounds of the experiment changed thus explaining why the temporal hypothesis was not supported.

Conclusions of the inferential analysis

Once again, a mixed within-subjects and between-groups repeated measures ANOVA was conducted to test the minimal group and temporal hypotheses. As expected, the interaction effect was stronger in Study 2 compared to Study 1, however the results only provide evidence for the minimal group hypothesis. Despite the increased power of this study, the variance in ingroup bias scores is still relatively large (see Table 9). The ANOVA addressed group differences in ingroup bias however individual differences

It was therefore hypothesized that there are other behaviours also operant in the interaction which this traditional method of analysis is unable to reveal. Aschenbrenner & Schaefer (1980) argued that analysis of variance for data that is multimodal is limited, as it masks rather than reveals what is actually going on in the data (p. 396). This limitation was evident in the repeated measures ANOVA being unable to reveal how homogenous ties increase and decrease over the rounds of the trials where group membership was salient. Wellman (1983) also discussed problems with traditional inferential statistics and argued that they explain behaviour in terms of the individual while neglecting the structural relationships that emerge from individuals' social interactions. Furthermore, since it is the evolution of the repeated games across time that is of interest, a form of analysis that relies less on averages and more on patterns of relationships is required.

It is therefore clear that the above analysis did not account for the 1) relations emerging from participants exchanging tokens, and 2) the conditions of the social context in each round of the experiment. The analysis therefore succumbed to the problem of "methodological individualism" (Wellman, 1983, p. 165). In order to attend to this limitation, SNA methods were employed to detect effects in the context of individual differences. SNA enabled the study of 1) the social relations between participants and 2) the patterns of behaviour other than ingroup bias that emerged from their interaction.

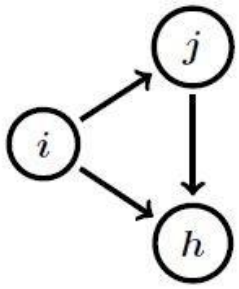
Chapter five: Social network analysis

As SNA is a fairly new method of analysis used in social psychology research, this chapter begins with a basic explanation of social networks. This method is then related to the 'Give and Get' data. Following this is a summary of the results from a content analysis of one experiment. Here, expectations of the other behaviours hypothesized to be operating in the interaction are explored. Evidence of these expected behaviours are then demonstrated via results from the model estimation.

What is a social network?

Knoke and Yang (2008) define a social network as "a structure composed of a set of actors, some of whose members are connected by a set of one or more relations" (p. 8). In other words, a social network is produced when entities interact and form relations with one another. These entities can be individuals and or groups and are referred to as actors or nodes. Their relations are represented by the ties or edges that link them to one another (Borgatti, Mehra, Brass, & Labianca, 2009). Networks are displayed via socio-grams which are two dimensional diagrams. These diagrams display the relations between actors in a given context. A circle represents the actors and a line between them signifies their tie, i.e. their interaction. Edges that are accompanied by an arrow are indicative of a directed graph as the arrow displays who is directing the edge toward whom (Hanneman, 2005). Figure 14 represents a directed network comprised of three actors, *i*, *j* and *h*, where there is a relation between actors *i* and *j*, actors *j* and *h* and actors *i* and *h*.

Figure 14. A directed network (Snijders, van de Bunt & Steglich, 2009, p.11)



social network analysis and the ‘Give and Get’ data

The social network perspective allows one to study social interaction in terms of the relations between actors. Consequently, this method surpasses traditional analysis methods as the unit of analysis is the relation between actors. In addition, SNA accounts for the context in which the interaction occurs (Wellman, 1983).

SNA is based on three assumptions namely, 1) relations develop when actors interact with one another, 2) the spatial arrangement of these interacting entities has implications for the relations between them, and 3) the nature of the relation is a dynamic process that is subject to continual change (Knoke & Yang, 2008). In addition, an actor’s interaction with other actors connects them to one another and this relation influences how they subsequently relate to and interact with one another. SNA analyses these interactions by fitting a model to the data to describe the salient behaviours in the interaction.

This method is therefore suited to examine the ‘Give and Get’ data. Since actors and their ties are the fundamental elements of a social network, it is clear that social networks are produced in the ‘Give and Get’ game. This is because the actors (participants) exchange tokens between one another and these exchanges form ties or relations between them. By fitting a model that best describes the relations between participants in the game, this method 1) enables an analysis that extends beyond the individual level and, 2) makes it possible for the other behaviours hypothesized to be operant in the interaction, to be revealed.

These other behaviours include fairness and reciprocity. In addition to ingroup favouritism, fairness was also found to be operant in the original study as *"All* of the choices in the experiments can be conceived as tending to achieve a compromise between F [fairness) and the other variables ... all choices hover around distances not too far from the point of maximum fairness" (Tajfel et al., 1971 p. 173, emphasis in the original). Others have also argued against ingroup bias and its related social identity explanation. Instead they propose that participants treated ingroup members favourably as they expected similar favourable treatment in return and hypothesize that reciprocity is operant in the interaction (Yamagishi & Kiyonari, 2000). Fairness and reciprocity were explored in the following content analysis.

Content Analysis

Here, the relations between participants were examined in each round of the experiment. In order to do this, the social networks produced in each round were visualized. In other words, the actors (participants) and edges (token exchanges between participants) were graphically arranged in terms of the token allocations which occurred in each round. This arrangement reveals the deeper structure of the network (Hanneman, 2005). This is of particular interest to this analysis as the structure will indicate whether the relations between participants were based on 1) favouring members of the ingroup over the outgroup (i.e. ingroup bias), 2) equitable token distribution between ingroup and outgroup members (i.e. fairness), and or 3) distributing tokens to ingroup and outgroup members based on the expectation that the exchange will be reciprocated (i.e. reciprocity). The raw data used for this analysis was recorded in a MSExcel format as seen in Figure 15.

Figure 15. Raw data used for SNA analysis

sendFrom	sendTo	timeElapsed	tokens	experimentId
5	4	2.5	1	A
8	6	3.2	1	A
2	1	1.1	1	A
9	1	.8	1	A

Note. The figures in this table are arbitrary.

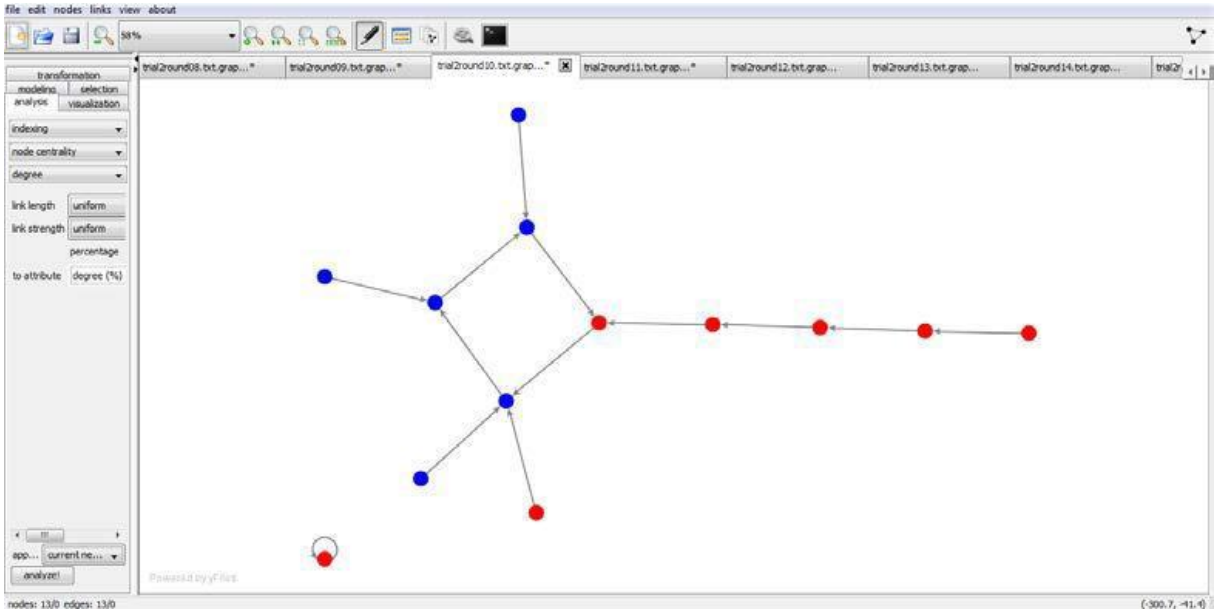
The data included the following information:

- sendFrom: representing the sender of a token,
- sendTo: indicating the receiver of a token,
- timeElapsed: denoting the time taken for the exchange to occur,
- tokens: specifying the number of tokens exchanged, and
- experimentId: showing the experiment name.

This format was imported into a text document, to visualise the data. The text document was then opened in Visual Social Networks (VISONE) which is a SNA software

programme. A separate network was created for each round. The defining attributes or characteristics of each node (group membership in this case) was then added to the data. Subsequently, a network visualisation was created in VISONE, which illustrated the connections between actors as indicated in Figure 16.

Figure 16. Network visualised in VISONE



It is clear that more ties are established between ingroup members than between ingroup and outgroup members. There are four main actors in this network. They connect all but one of the actors who self-allocates their token and is therefore excluded from the giant component.

Results

The conditions of this experiment were such that ties and balances were visible in all three trials. Trial 1 was a group condition, Trial 2 was an individual condition and Trial 3 was a group condition. Token exchanges in each round of the experiment was examined from the network graphs visualized for each round. The analysis showed similar patterns of behaviour common to each round of the experiment which are reported below.

Trial 1: Group condition

- There were more tokens allocated to the ingroup than to the outgroup, for both

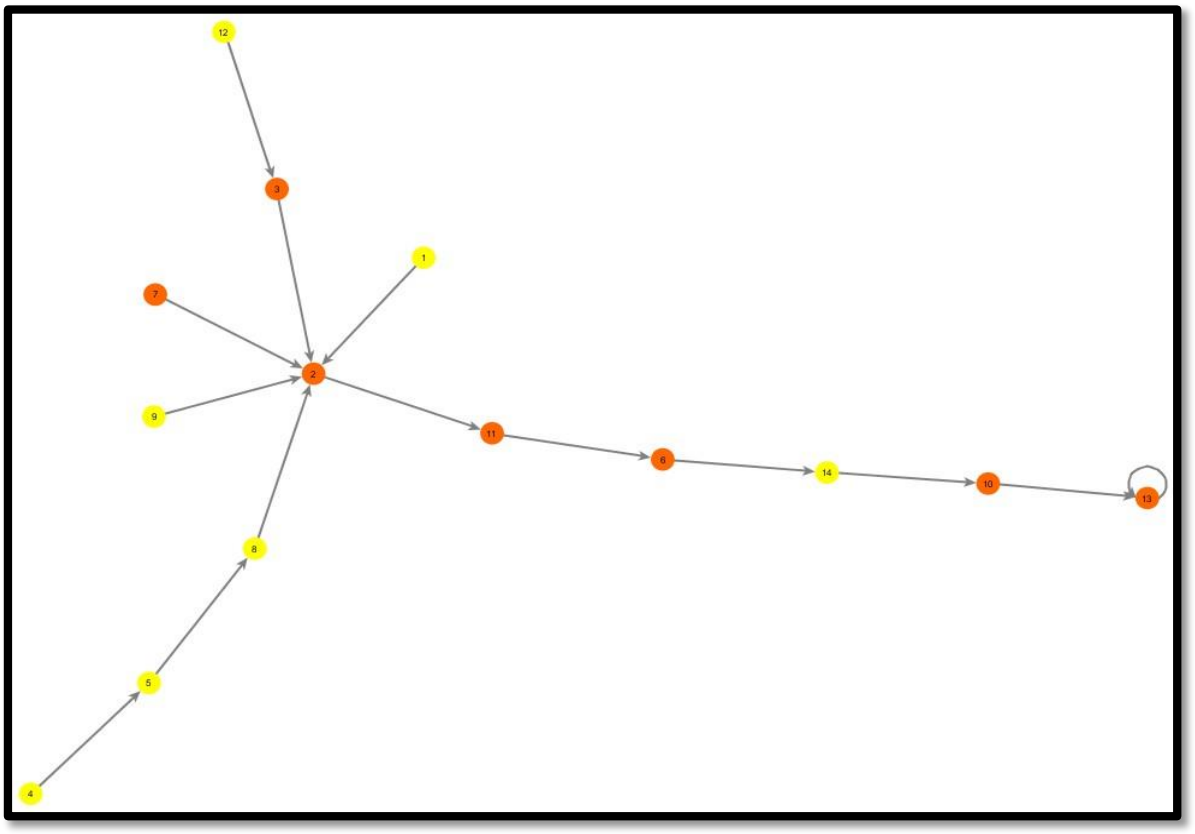
groups. This supports the significant results for ingroup bias from the repeated measures ANOVA.

- There were particular participants who exchanged tokens between one another exclusively. This occurred from previous rounds into subsequent rounds for both within group and between group token exchanges. It suggests that reciprocity may be operant in the interaction.

- Participants allocated tokens to themselves, even though they were not explicitly made aware of this possibility. Once the first self-allocation occurred, it was taken up by two more participants who subsequently self-allocated their tokens intermittently in the remaining seven rounds. Three other participants also self-allocated but, only once. Self-allocation served the interest of the group. This suggests that visibility of the interaction is important as it enables salient behaviours to be taken up and enacted.

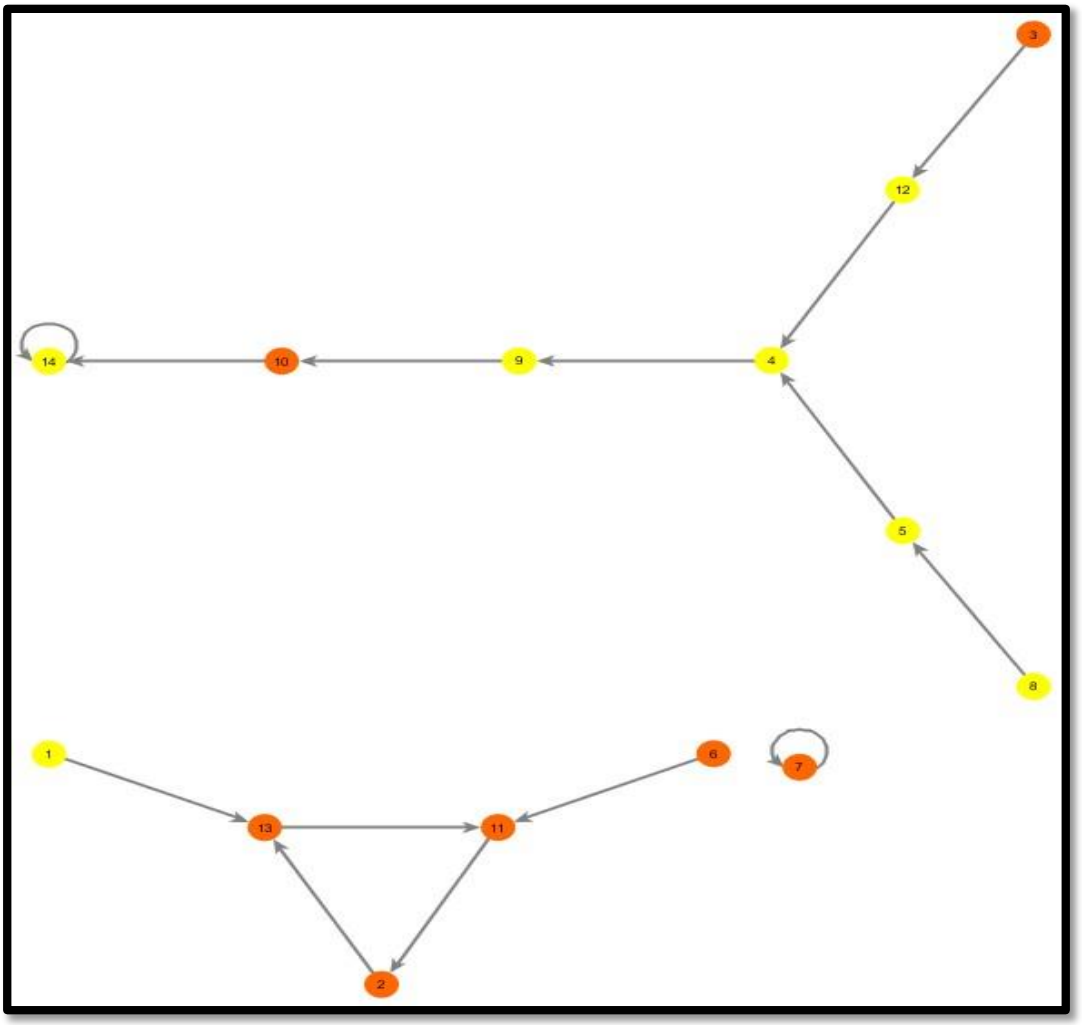
- Figures 17, 18, and 19 provide exemplars of the behaviours manifested in this trial:

Figure 17. Trial 1 round 4



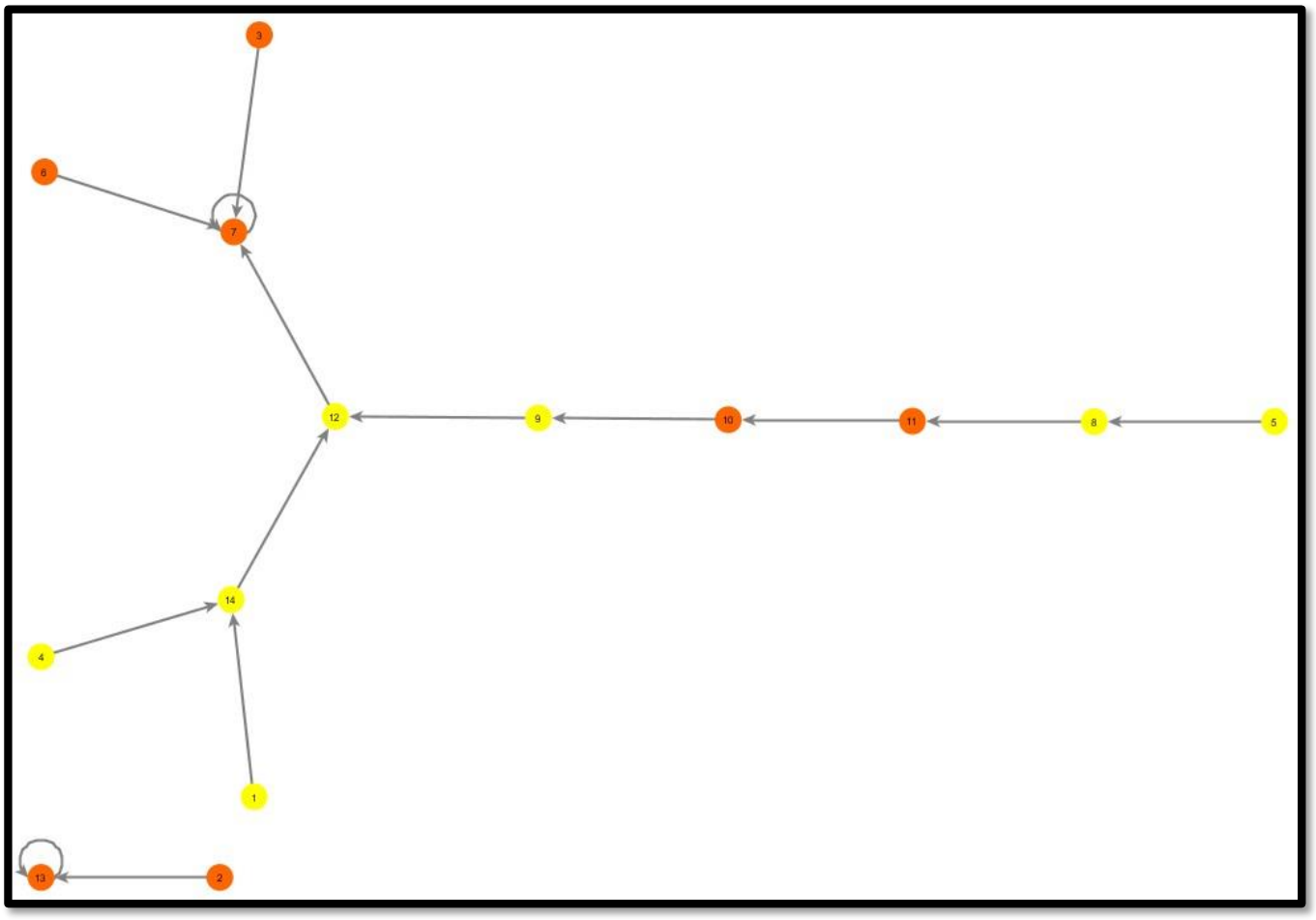
Player 6 continues to allocate their token to an outgroup member since round one. Ties established from token allocations in the previous round are reciprocated in this round, for players 5 and 4 and players 2 and 7. The first instance of self-giving by player 13 occurs.

Figure 18. Trial 1 round 5



Self-giving is taken up by two other players in this round. Reciprocation between members of the same group is evident by the token allocations of players 2 and 11 and players 4, 5 and 8.

Figure 19. Trial 1 round 6



Players 7 and 13 continue to allocate their tokens in a self-giving manner in this round as well. Players 8 and 5 continue their exclusive token exchanges from the previous round into this one.

Trial 2: Individual condition[1]

- As expected, there were more tokens distributed between groups than tokens distributed within groups. There is thus no evidence for ingroup bias operant in this condition. Same group members' spatial locations were more random.

- Token exchanges between particular players continued from previous into

[1] Even though group membership was masked in the individual condition, actors' group assignments were still recorded for a comparison of ingroup bias between the individual and group conditions. Here, group membership is displayed in order to show the extent of ingroup bias and other behaviours operant in the interaction, when group membership is masked.

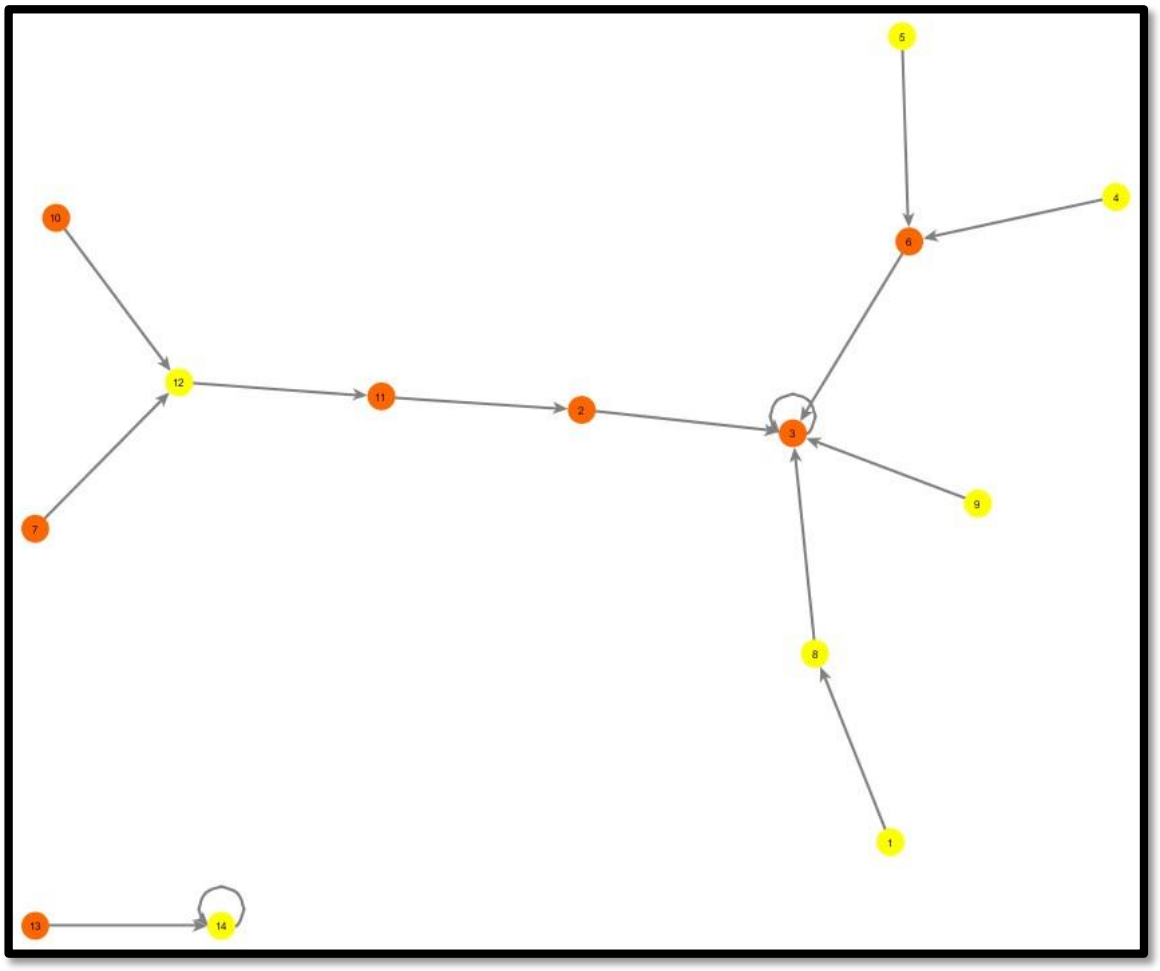
subsequent rounds. This also suggests that reciprocity may be operant in the interaction.

- Those players who received more tokens in previous rounds, compared to the rest of the players, were allocated a lesser amount or zero tokens in subsequent rounds. This suggests that there may be a tendency towards fairness, i.e. allocating tokens to those with a lower balance.

- Self-giving also occurred in this trial, but it served the interest of the individual. When players self-allocated, they were also allocated a lesser amount or zero tokens in the subsequent rounds. This supports the assertion that fairness is operant in the interaction.

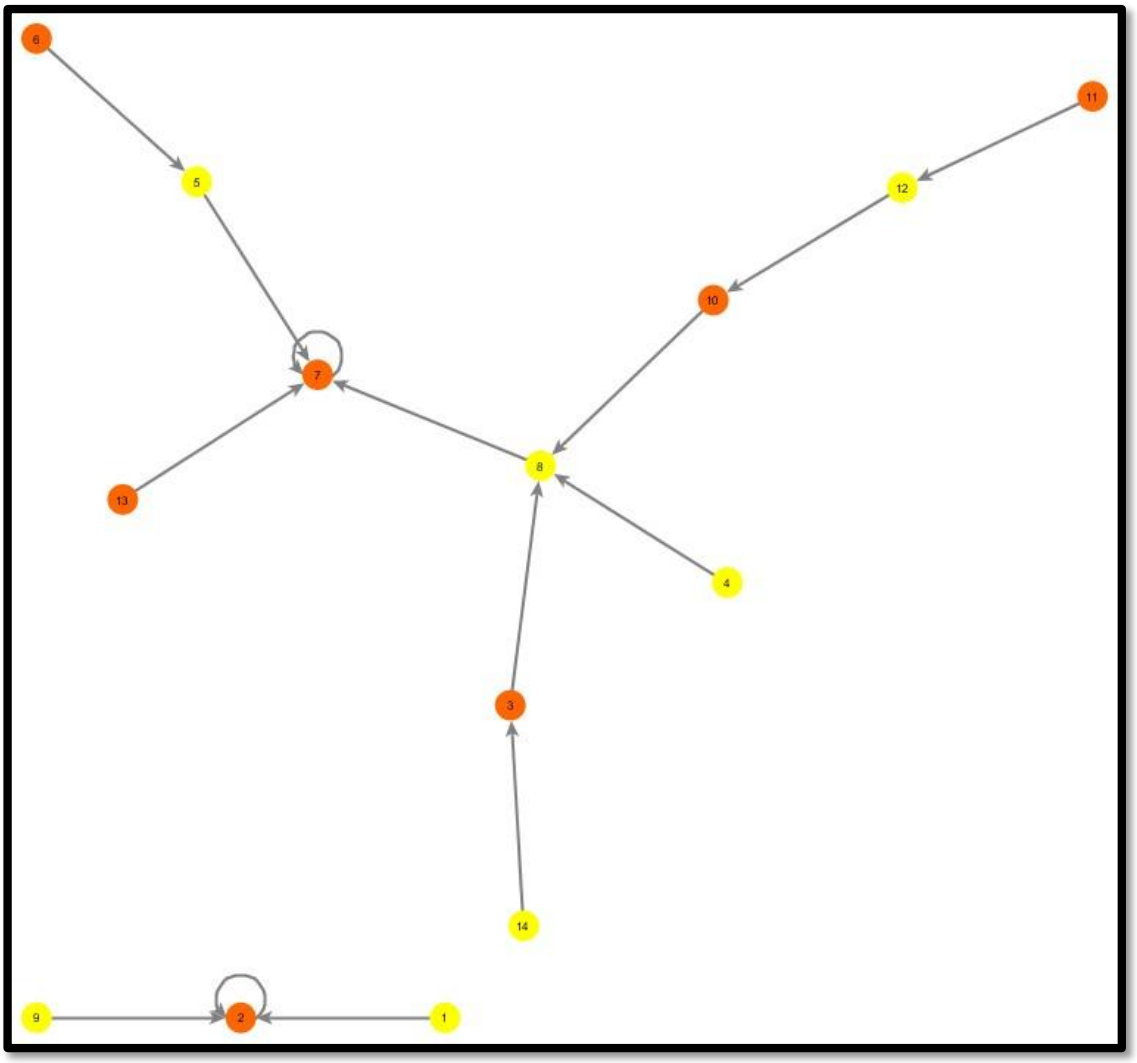
- Figures 20, 21, and 22 provide exemplars of the behaviours manifested in this trial:

Figure 20. Trial 2 round 12



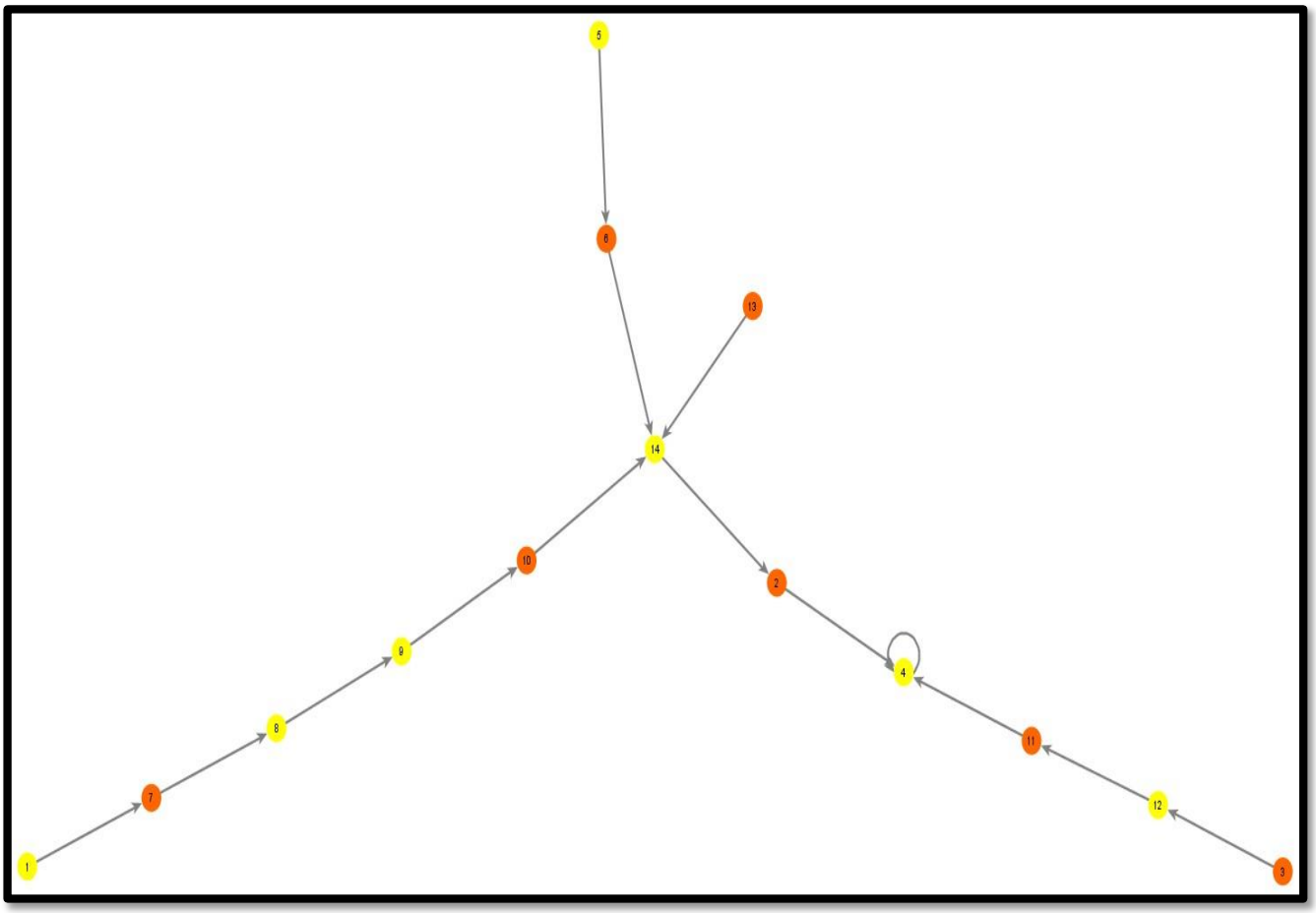
Players 1, 4, 9, 5, 10, 7 and 13 do not receive tokens in this round. Players 1, 4 and 9 were also not allocated a token in the previous round. Two of the five players who received the highest number of tokens in the previous rounds, received zero tokens in this round. Players 12, 3, 6, 14 receive the most tokens in this round, where players 14 and 3 adopt the self- allocation strategy. Only players 11 and 12 extend their exchange from the previous round into this round.

Figure 21. Trial 2 round 13



Players 13 and 14 who were excluded from the network in the previous round are connected to the network, even though they receive zero tokens. Player 14 self-allocated in the previous round but receives no tokens in this round. In this round, players 9, 2, and 1 are excluded from the broader network, all of whom allocate a token to player 2. Players 1, 4, 9, 14, 13, 6 and 11 do not receive tokens in this round. Players 6 and 5; and players 10 and 12 extend their token exchanges from the previous round into the current one. Players 7, 8 and 2 receive the most tokens in this round. Players 7 and 2 also use the self-allocation strategy to accrue more tokens.

Figure 22. Trial 2 round 14



The network is connected in this round. Players 7, 8 and 2, who received the most tokens in the previous round, only receive one token in this round. Players 1, 3 and 5 receive no tokens in this round. Players who did not receive tokens in the previous round, received a token in this round. Only players 14 and 4 receive more than one token in this round, and the second token allocated to player 4 was self-allocated. Players 11 and 12; and players 5 and 6 continue their token exchange from the previous round into this one.

Trial 3: Group condition

- Within group allocations were greater than between group allocations, providing evidence for ingroup bias.

- Same group members, particularly the orange group were exclusively arranged in close proximity to one another as compared to yellow group members. The yellow group engaged in more outgroup giving than the orange group. This explains the yellow group members crossing group boundaries as they were positioned and connected to the outgroup instead of their ingroup. This supports the evidence that the orange group has greater ingroup bias tendencies than the yellow group over many rounds.

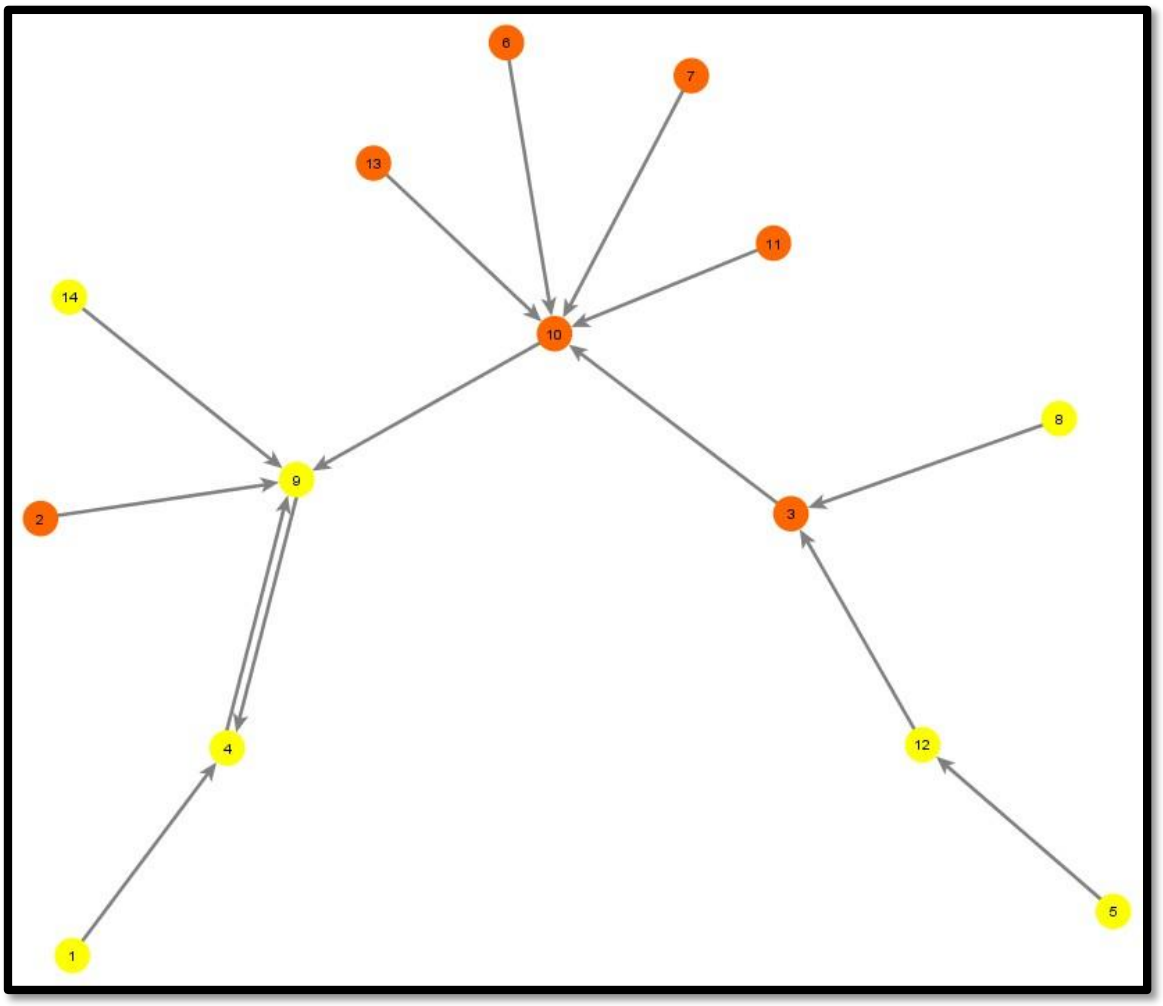
- It appeared that token allocations in subsequent rounds were dependent on whether players received too many, too few or zero tokens in previous rounds. This provides evidence for fairness operating in the interaction.

- Token exchanges between certain players were continued over a minimum of two rounds. This occurred for both within and between group exchanges.

- 10 of the 17 instances of self-giving in this trial was made by one particular player. The marked increase of self-allocation in this trial may be due to the fact that the allocation served the group's interest.

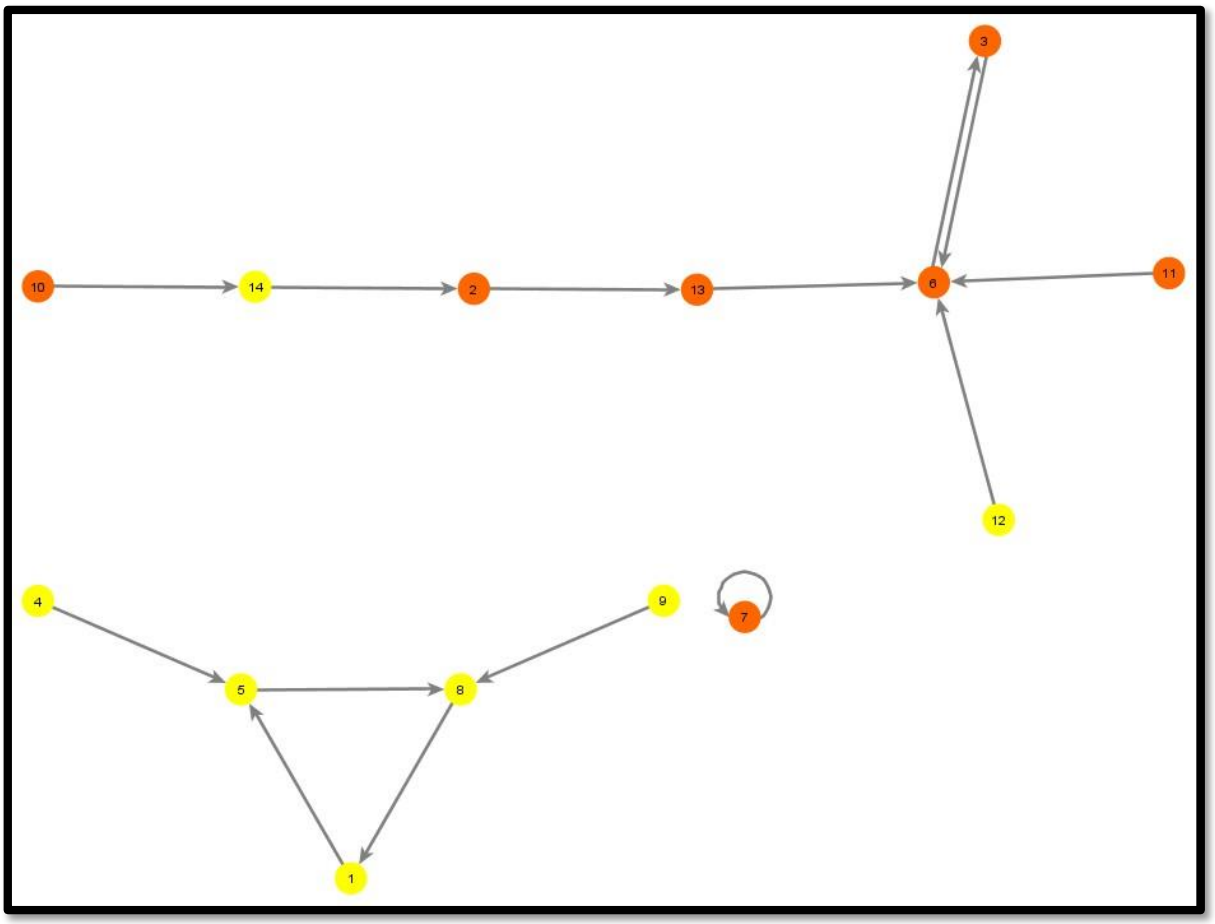
- Figures 23, 24, and 25 provide exemplars of the behaviours manifested in this trial:

Figure 23. Trial 3 round 4



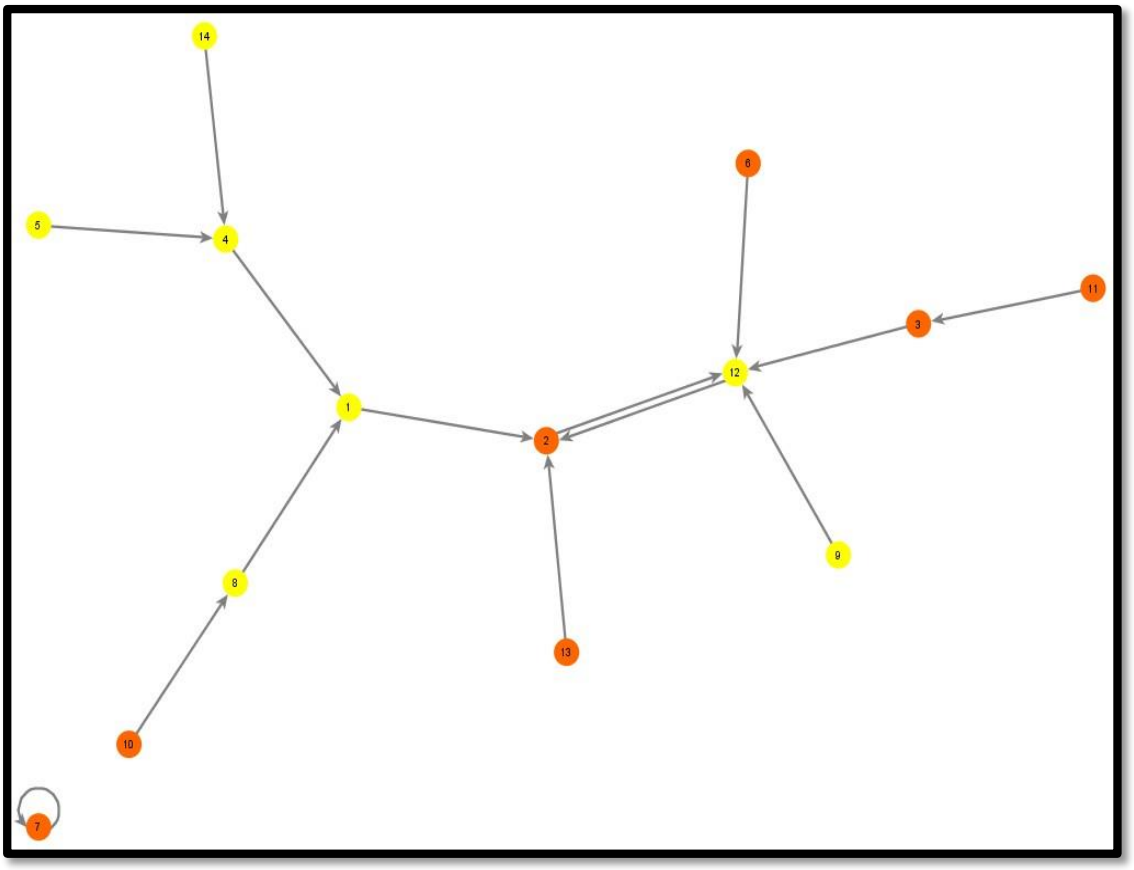
There are ten homogenous and four heterogeneous ties in this connected network. When compared to the previous round, this round shows a decrease of ingroup giving by one token and an increase of across group giving by one token. Only players 2 and 10 of the orange group allocates a token to an outgroup member compared to the rest of the group who allocates their tokens to player 10. In round 2, players 4, 3, 10 and 9 received zero tokens. Players 9 and 10 received a single token each in round 3 and players 3 and 4 were not allocated a token once again. However, in this round, players 3 and 4 each receive two tokens, player 9 receives four tokens and player 10 receives five tokens. Players 10 and 6 extend their token allocation from the previous round into the current round.

Figure 24. Trial 3 round 5



The network is not connected. There is a definite delimitation between the groups, bar players 12 and 14 who are connected to their outgroup. Players 3, 4, 9, and 10 who accrued the highest number of tokens in the previous round, receive no tokens in the current round. When *c*ompared to the previous round, the number of homogenous and heterogeneous ties increase by one token and decrease by one token respectively. Thus there are 11 homogenous ties and three heterogeneous ties. The only player not connected to the network is player 7, who self- allocates for the second time. Players 6, 5 and 8 receive the most tokens in this round.

Figure 25. Trial 3 round 6



In the current round there are only eight homogenous ties and six heterogeneous ties. When compared to the previous round, there is a decrease of three tokens in ingroup giving and an increase of three tokens in across group giving. Two members of each group are located away from where their groups are clustered and player 7 is excluded from the network once more. Even though they are members of the opposite group, players 6 and 12 continue their token allocations from the previous round into this one. Players 5 and 4 and 13 and 2 also continue their token exchanges from the previous round into the current one. Players 6 and 5 who received the highest number of tokens in the previous round receive zero tokens in this round. Players 2, 4, 1 and 12 receive the most tokens in this trial.

Overall summary of the content analysis

The content analysis suggests that 1) in addition to ingroup bias, fairness and reciprocation are also employed by actors in the interaction and, 2) visibility of the interaction appears to be an important factor as players' actions inform how others subsequently act. However, as these tentative conclusions were not statistically analyzed in the content analysis, a SNA model estimation was conducted to assess whether 1) ingroup bias, reciprocity and fairness were operant in the interaction and, 2) whether visibility of the interaction enables subsequent actions of actors to be informed by how others allocated their tokens in previous rounds.

Social network analysis model estimation

In this section, the model best suited to explain the data is described. The model estimation procedure is then described after which the results are presented.

A stochastic actor based model

The 'Give and Get' game data is considered longitudinal network data. This is because the tie exchanges between the players were temporally ordered by each round and repeated measurements were made on the exchanges (Snijders, 2005). As the data reflected the change in interaction over time for a constant set of actors, a stochastic actor based model was employed (Snijders, 2001). As the name implies, stochastic actor based models are actor oriented. They are used to study the relations between actors who maintain and have control over their directed edges with other actors. In the 'Give and Get' game actors control with whom they establish edges. It is assumed that these relations are determined by the actor's attributes (i.e. their specific characteristics), node positions and the actor's perceptions about the network.

In this model, changes to the network can only be made one tie change at a time (Snijders, van de Bunt & Steglich, 2009). Based on a continuous time Markov chain, it is assumed that even though the evolution of the network is evident at specific observation instances, network changes continue to occur at random as time progresses (Snijders, 2001). This means that the network evolves between discrete points in time and that the current state of the network determines how the network will subsequently change. In other words, the network structure is the specific social context which is assumed to influence how the network will subsequently change (Snijders, van de Bunt & Steglich, 2009).

In terms of the 'Give and Get' game, visibility of the interaction enable actors to be aware of the current state of the network. Knowledge of how tokens were allocated influences whether allocations will change or remain the same in subsequent rounds. The model therefore operates via a feedback loop. A feedback loop simply means that at each moment in time, the network influences the possibility of future network changes.

Changes to the structure of the network are assumed to either be endogenously or exogenously determined. In terms of the former, network changes are considered to be a result of the network structure. The network changes because current interactions and changes in the network are influenced by both previous interactions and previous changes that occurred within the network (Snijders, van de Bunt, Steglich, 2009). VIAPPL rendered the interaction visible, thus it is hypothesized that actors changed their allocations to demonstrate ingroup bias and the hypothesized fairness and reciprocity. This is because these behaviours were manifested in previous rounds and actors were aware of the actions of others. The latter change determinant concerns network changes based on the actors' attributes (i.e. the specific characteristics of actors e.g. group membership). These are referred to as actor covariates. It is thus anticipated that the network changes because of 1) tie formations in previous rounds of the game which are influential in subsequent tie formations and 2) the effect of group membership on behaviour.

Model specification

The objective function of stochastic actor based models determines which change to make in the network (i.e. which new tie to establish). It may be simply understood as a measure of how attractive it is to move from one network state to another. In other words, it is the potential to change the interaction so that the network is changed (Snijders, 2005). As previously mentioned, stochastic actor based models assume that changes occur as a result of the theoretically relevant information that actors utilize in deciding with whom to form ties. This information includes the endogenous and exogenous effects and are included in the objective function (Snijders, van de Bunt and Steglich, 2009, p. 9). This thesis posits that ingroup bias, fairness and reciprocity (endogenous effects) as well as group membership (an exogenous effect) are factors that influence changes to the network structure. Thus linear effects representing these factors were included in the model. This decision was dependent on the theoretical underpinnings of the research, principles of SNA as well as driven by the

data itself, as Snijders, van de Bunt and Steglich (2009) recommend. The model is progressively built by a series of ad hoc procedures where effects were added (forward steps) and removed (backward steps) from the model (Snijders, van de Bunt & Steglich, 2009), until the desired model was created.

Estimating a model

Due to computational complexity models cannot be accurately computed. Instead 'the method of moments' is used to estimate the expected results, which approximate the averages over simulated networks from the observed or target values calculated from the actual data. The outcome of this procedure are parameters of the expected results which are estimated from the observed data. Ideally, the expected values (parameters) ought to be equal to their observed values (Snijders, 2009). In other words, the estimation procedure builds a model by fitting the observed results of the data to the expected results. Parameters are estimated by choosing statistics that yielded equal expected and observed values.

Actor based models include a random element to account for why observed data may deviate from what is theoretically hypothesized (Snijders, 2001). Since deviations are likely, the fit of the model is tested. This is done by testing how close the expected and observed values are to one another, via the t-ratio (Ripley, Snijders & Preciado, 2012). The t-ratio assesses the average and standard deviations between the expected and observed values. Ideally, the t-ratio should be 0.0 but the model is considered an excellent fit when the t-ratios are "less than 0.1 in absolute value, reasonable when they are less than 0.2 and moderate when they are less than 0.3" (Ripley, Snijders & Preciado, 2012, pp. 87-88).

A model for the VIAPPL data

The aim of the model estimation procedure was to reveal the "intervening link" of "social mechanisms" discussed by Baker and Faulkner (1993, p. 842). The intervening link refers to reasons that account for certain behaviours in an interaction. It is anticipated that the effects included in the model will clarify 1) whether the network structure and its evolution were based on ingroup bias, reciprocity and fairness operant in the interaction and, 2) whether visibility of the interaction enables subsequent actions of actors to be informed by how others allocated their tokens in previous rounds. The specific effects outlined below were included in the model as they address the above assertions. These effects are explained and the specific hypotheses related to the model estimation are outlined.

Effects included in the Social network analysis model

Outdegree density

Meaning: *Outdegree density* is the ability to have ties in the network and is the number of outgoing ties. Outdegree is influenced by all other effects (Snijders, 2009).

Meaning in relation to the 'Give and Get' game: *Outdegree density* represents the density of the number of outgoing ties. As all actors are limited to allocating a single token per round, their outdegree densities are expected to be similar. This effect seems obvious to include as it indicates that ties were formed. However Snijders, van de Bunt, and Steglich (2009, p. 11) argue that it forms the "basic feature of most social networks" and is conventionally included in all models.

H_0: Outdegree density will not be significant in either condition.
H_1: Outdegree density will be significant in both the individual and group conditions.

Reciprocity

Meaning: *Reciprocity* is the number of reciprocated ties for an actor. It is a direct exchange where an actor *x* makes an allocation to actor *y* and actor *y*, in turn makes an allocation back to actor *x* (Ripley, Snijders & Preciado, 2012).

Meaning in relation to the 'Give and Get' game: *Reciprocity* models the tendency towards reciprocated token allocations in the interaction. Reciprocity is calculated retrospectively over the 15 rounds of a trial. In other words, it is the reciprocated ties between consecutive rounds. If this effect is significant it will confirm that actors exchange tokens on the basis that their exchange will be reciprocated.

H_0: Reciprocity will not be significant in the individual and group conditions.
H_1: Reciprocity will be significant in the individual and group conditions.

Balance

Meaning: *Balance* accounts for actors establishing ties to those who have similar outgoing ties as themselves. In other words, this effect considers how many same choices and non-same choices were made (Ripley, Snijders & Preciado, 2012). Actors who show this tendency prefer to form ties to other actors who make the same choices as themselves.

Meaning in relation to the 'Give and Get' game: This effect will show whether actors allocate tokens to ingroup or outgroup actors in the same way. If *balance* is significant it will indicate that actors distribute tokens to those who form ties similarly to themselves. This means that actors are distributing their tokens to ingroup, outgroup or individual actors in a similar fashion. This effect therefore provides evidence for observation of the interaction informing how tokens were allocated.

H_0: *Balance* will not be significant in the individual and group condition.
H_1: *Balance* will be significant in both the individual and group conditions.

Number of actors at distance 2

Meaning: *Number of actors at distance 2* reflects the number of actors to whom actor *i* is indirectly tied through one intermediary or more. Negative parameters indicate a preference for more direct ties located in smaller networks whereas positive parameters indicate a larger, indirectly related and open network (Ripley, Snijders & Preciado, 2012).

Meaning in relation to the 'Give and Get' game: The meaning of the significance of *number of actors at distance 2* will depend on whether the parameters are negative or positive. Positive parameters will provide evidence for fairness as ties are not concentrated in smaller cliques of nodes. Instead ties are indirectly established between larger groups of actors. Negative parameters on the hand, will provide evidence for ties being concentrated in smaller networks. If significant in the group condition, it provides evidence for ingroup bias (as ties are clustered between certain ingroup members) or that ties are clustered by neighbours (i.e. tokens are allocated to close neighbours of the sender).

H_0: *Number of actors at distance 2* will not be significant in the individual and group conditions.

H_1: *Number of actors at distance 2* will be significant in the individual and group conditions.

Out-in degree assortivity

Meaning: *Out-in degree assortivity* reflects the tendency for actors with high outdegrees who allocate tokens widely in the network to be preferably tied to actors with high in-degrees (Ripley, Snijders & Preciado, 2012). Here, outdegree refers to the number of targets that are high. In other words, actors allocate their tokens to many actors in the network and do not allocate tokens to the same actors repeatedly.

Meaning in relation to the 'Give and Get' game: The meaning of the significance of *out-in degree assortivity* will depend on whether the parameters were negative or positive. If *out-in degree assortivity* is significant and the parameters are positive it suggests that actors whose allocations are widespread (i.e. they allocate tokens to various other actors in the network), prefer to distribute tokens to those actors who have a high number of incoming ties. This result provides evidence for giving more tokens those who have already accrued tokens, i.e. the opposite of fairness. However, evidence for fairness is demonstrated when the parameters are negative as the same actors whose allocations are widespread prefer to allocate tokens to actors with a low number of incoming tokens.

H_0: *Out-in degree assortivity* will not be significant in both the individual and group conditions.
H_1: *Out-in degree assortivity* will be significant in both the individual and group conditions.

Same group no.

Meaning: *Same group no.* refers to the actor covariate (i.e. group membership in this case). It is the measure of the tendency to have ties between actors with the exact same value of the covariate and represents direct ingroup bias (Snijders, van de Bunt, & Steglich, 2009).

Meaning in relation to the 'Give and Get' game: The homophily hypothesis which states that actors are more likely to form a relationship with similar others as they share the same attributes, formed the basis of this analysis (Yuan & Gay, 2006; Veenstra & Steglich, 2012). This is because the repeated measures ANOVA showed that ingroup bias was greater in trials with visible group membership than masked group membership. Since ties between

ingroups are an indicator of ingroup bias, the aim of this model estimation procedure was to examine whether one's group membership was the key marker or driver of the interaction in the game. If the effect is significant it will provide evidence that actors's ties are influenced by group membership.

H_0: There is no difference in the significance of *same group no.* between the individual and group conditions.

H_1: *Same group no.* will be significant in the group condition but not in the individual condition, as group membership is masked.

Group no. of indirect ties

Meaning: *Group no. of indirect ties* refers to the preference of actors to be indirectly tied to other members of the ingroup rather than members of the outgroup (Ripley, Snijders & Preciado, 2012). In other words, actors prefer to be indirectly tied to other ingroup actors rather than be indirectly tied to outgroup actors. This effect demonstrates an indirect form of ingroup bias where actors prefer being connected to their own group members over outgroup members.

Meaning in relation to the 'Give and Get' game: If *group no. of indirect ties* is significant it provides for an indirect form of ingroup bias as actors prefer to be indirectly tied to other ingroup actors rather than indirectly tied to outgroup actors.

H_0: There is no difference in the significance of *group no. of indirect ties* between the individual and group conditions.

H_1: *Group no. of indirect ties* is significant in the group condition but not in the individual condition, as group membership is masked.

These effects were used to establish the overall hypotheses of the SNA model estimation. The hypotheses are presented in Table 11.

Table 11. SNA Hypotheses

Fairness hypothesis	H_0: Fairness is not significant in both the individual and group interactions. H_1: Fairness is significant in in both the individual and group interactions.
Reciprocity hypothesis	H_0: Reciprocity is not significant in both the individual and group interactions. H_1: Reciprocity is significant in both the individual and group interactions.
Ingroup bias hypothesis	H_0: Ingroup bias is not significantly different between the individual and group interactions. H_1: Ingroup bias is significant in the group condition and not significant in the individual interaction.

Fitting the model to the 'Give and Get' game data

SNA programmes, VISONE and Simulation Investigation for Empirical Network Analysis (SIENA) (http://www.stats.ox.ac.uk/~snijders/siena/) were used for visualising and estimating parameters of the model for the data, respectively. VISONE is a programme enabled to create and use models and algorithms to integrate and advance visualisations and analysis of social networks (http://visone.info/html/about.html). SIENA, a specialised package in R, conducts the statistical estimation of actor based models for repeated measures data (Ripley, Snijders, Preciado, 2012). Visualisations of networks were created prior to the model fitting procedure and there were 45 serparate networks that were visualised for each game. For the model estimation procedure, a network collection was created from the 15 networks (as there were 15 rounds in each trial) of one trial of each experiment. Thereafter the model was fitted to each trial of the experiment.

The results were also subject to Fisher's combined probability test for an overall meta-analysis of the results. This secondary analysis is often used to verify the results of social network model estimations (Mercken, Snijders, Steglich & de Vries, 2009). This method combined the results from the separate independent tests with the same null hypothesis and it assessed whether the multiple tests with the same null hypothesis can reject a shared null

hypothesis (Whitlock, 2005). The test combined the probability values from each test into one test statistic χ^2 where

$$X^2 = -2\sum_{i=1}^{k} \log_e(p_i),$$

The natural logarithms of the p-values were calculated in MSExcel and were then converted to χ^2 by multiplying the sum of the log of the probability values by negative two. The degrees of freedom were then calculated by multiplying the number of probability values by a value of two. Once these values were calculated the final probability statistic was computed using an online statistics calculator found at http://www.stat.tamu.edu/~west/applets/chisqdemo.html. By calculating Fishers combined probability one is able to determine the probability of the hypothesis of many independent tests. If Fishers combined probability is significant then at least one of the separate alternate hypotheses are true (i.e. it provides confirmation that the effect is significant). But, if Fishers combined probability is not significant, then all of the separate null hypotheses are true (i.e. it confirms that the effect is not significant).

Results

The data from Study 1 was excluded from this analysis. This is because ties were masked and participants had no knowledge of the current state of the network. Therefore only the data from Study 2 were suited to this analysis. A total of 48 trials were analyzed where half comprised the individual condition and the other half, the group condition. Wang, Pattison and Robins (2012) regarded t-ratios exceeding an absolute value of 0.2 as a poor fit to their data. Employing their approach, it is argued that this model appropriately fits the data as only 4 of the 336 parameter estimates exceeded this value. Table 12 provides a summary of the results which are thereafter explained.

Table 12: Model estimation results

Effect	**Relation to behaviour manifest in the 'Give and Get'**	**Individual condition: Fishers combined probability values**	**Group condition: Fishers combined probability values**
Outdegree density	Ability to form ties	<0.0001	<0.0001
Reciprocity	Reciprocation	0.9229	0.4723
Balance	Allocating tokens similarly to others' allocations	<0.0001	<0.0001
Number of actors at distance 2	Fairness	<0.0001	<0.0001
Out-in degree assortivity	Fairness	<0.0001	<0.0001
Same group no.	Direct ingroup bias	0.0759	<0.0001
Group no. of indirect ties	Indirect ingroup bias	0.077	0.0045

Fishers combined probability for *outdegree density* is significant for both the individual (combined p= <0.0001, df= 48) and the group (combined p= <0.0001, df= 48) condition. This confirms that ties were formed in each round of the game, in both the individual and group conditions and the null hypothesis (i.e. that outdegree density will not be significant in the individual and group condition) is rejected. As the parameters were negative for both conditions, the networks had a sparse density. This conclusion is based on Snijders, van de Bunt and Steglich (2010) who confirm that in most cases networks are sparse and negative parameters are obtained for this effect. This means that the cost to establish a tie outweighs the benefits of the relation. Thus the network density of the 'Give and Get' game is low because even though actors allocate their tokens they are not guaranteed of receiving tokens.

The results of Fishers combined probability confirms that *reciprocity* was not operant in both the individual (p= 0.9229, df= 48) and group (p= 0.4723, df= 48) conditions. The parameters were also low as they were far from the expected values i.e. between 1 and 2 (Snijders, van den Bunt & Steglich, 2010). Therefore, the null hypothesis that reciprocity is not significant in both the individual and group interactions, is true. This means that even though the interaction was made visible to actors, their exchanges were not based on the expectation that their allocations will be reciprocated.

It appears that Fishers combined probability for *balance* is significant in both in the individual (p= <0.0001, df= 48) and group (p= <0.0001, df= 48) conditions. Thus the null hypothesis (i.e. that balance will not be significant in the individual and group conditions) can be rejected. The results of this effect indicate that actors allocate tokens to other actors who make the same choices with regards to token allocations. But, actors could only make such a choice by knowing with whom other actors' established ties, enabled by the interaction being visible. These results therefore support the notion that observing the interaction informed the way tokens were allocated in subsequent rounds of the game.

Fishers combined probability for *number of actors at distance 2* is significant for both the individual (p= <0.0001, df= 48) and group (p= <0.0001, df= 48) conditions. Thus the null hypothesis (i.e. that *number of actors at distance 2* will not be significant in both the individual and group conditions) is rejected. The parameters are positive for both conditions. This means that in both the individual and group conditions, actors showed a preference for more open networks where they prefer to be indirectly tied through intermediaries. In other words, they prefer sharing resources throughout the network rather than accumulating resources in smaller 'exclusive' networks. This provides evidence for fairness operant in the interaction where actors share their tokens throughout the network as opposed to accumulating ties in cliques.

Fishers combined probability for *out-in degree assortivity* is significant for both the individual (p= <0.0001, df= 48) and group (p= <0.0001, df= 48) conditions. Thus, the null hypothesis (i.e. that *out-in degree assortivity* will not be significant in both the individual

and group conditions) is rejected. Since the parameters are negative, for both individual and group conditions, it suggests that actors with high outdegrees who allocate tokens widely, that is who do not repeatedly allocate tokens to the same actors, prefer to allocate tokens to nodes with a low number of incoming ties. This result provides evidence for actors distributing their tokens fairly, i.e. allocating tokens to those with a low token balance.

As expected, Fishers combined probability for *same group no.* is not significant for the individual condition (p= 0.0759, df= 48), but is significant for the group condtion (p= <0.0001, df=48) conditions. Thus the null hypothesis (i.e. that there is no difference in *same group no.* between the individual and group conditions) is rejected. This means that direct ingroup bias is evident in the group condition but not in individual condition, confirming the findings of the inferential analysis.

Similarly, Fishers combined probability for *group no. of indirect ties* is not significant for the individual condition (p= 0.077, df= 48), but is significant for the group condition (p= 0.0045, df= 48) conditions. The null hypothesis (i.e. that *group no. of indirect ties* will not be significant in the individual and group conditions) is rejected. This finding provides further evidence that individuals prefer to be tied to their ingroups over outgroups, even in an indirect manner in the group interaction.

Conclusion of the results in terms of the overall Social network analysis hypotheses

The results of the model estimation provide evidence that:

- Reciprocity was not operant in the interaction. Actors' token exchanges were not guided by the expectation that their exchange will be reciprocated as *reciprocity* was not significant in either of the conditions. The null hypothesis (i.e. that reciprocity is not significant in both the individual and group interactions) is true.

- Fairness was operant in the interaction in both the individual and group conditions since 1) actors showed a preference for more open networks by distributing tokens throughout the network rather than accumulating tokens in smaller 'exclusive'

networks (significant *number of actors at distance* 2 effect), and 2) actors who allocated tokens widely in the network, preferred to allocate tokens to others with a low token balance, (significant *out-in degree assortivity* effect). Thus the alternate hypothesis, that fairness is significant in in both the individual and group interactions, is true.

- Ingroup bias was operating in the interaction since actors directly (significant *same group no. e*ffect in the group condition) and indirectly (significant *group no. of indirect ties e*ffect in the group condition) favoured their ingroup over the outgroup in the group interaction condition. Thus the alternate hypothesis, that ingroup bias is significant in the group condition and not significant in the individual interaction, is true.

- In addition it was found that observing the interaction informed the way tokens were allocated as actors distributed their tokens to others with similar patterns of outgoing ties (significant *balance* effect in both conditions).

- However, it must be noted that these findings require further investigation as they depend on memory of past events which are not encompassed in Markov chain models.

Chapter six: Discussion and conclusion

This research study was designed to address the aforementioned critiques of the original minimal group study, namely the missing social and temporal features of the interaction as well as the possibility of an experimental artefact producing the results. Therefore, the methodology employed in this research allowed for the study of 1) social interaction between the participants, 2) how the interaction unfolded over time and, 3) behavioural outcomes when no between-group allocations were specified.

The results from the inferential analysis supported the original findings by Tajfel et al. (1971) as participants' demonstrated ingroup bias to a greater extent in the group condition than in the individual condition. This analysis contributed to the original findings in two ways. Firstly, by including a temporal component to this research design, the analysis was able to show evidence that ingroup bias is not static. Despite no support for the temporal hypothesis, the correlation of ingroup bias scores over the rounds of trials with group membership visible, indicated that ingroup bias does not remain at the same. Instead, it changes by increasing and decreasing as the rounds of the game change. Secondly, the analysis revealed that the interaction effects for group visibility and time were stronger when the interaction was made visible to the participants. Thus, visibility of interaction is important as it amplifies the level of ingroup bias that is manifested. Despite the inferential analysis producing these findings, it was limited in its ability to account for the social relations between participants. Consequently, it was unable to reveal the additional behaviours operant in the interaction. Hence SNA was employed.

The SNA model estimation 1) suggested that ingroup bias was manifested in the group interaction as *same group no.* and *group no. of indirect ties* were significant in the group condition but not significant in the individual condition, and suggested that 2) participants distributed their tokens fairly in the individual as well as the group conditions, as *number of actors at distance 2* and *out-in degree assortivity* were significant in both conditions, 3) visibility of the interaction being important as *balance* was significant in both conditions, and 4) *reciprocity* was not operant in the interaction.

The findings of the original study were interpreted in terms of a psychological imperative (Tajfel & Turner, 1979). However others have argued that the results can also be explained

by the experimental artefact of the study's design (Aschenbrenner & Schaefer, 1980). But, the abovementioned critique of the MGP has shown that there is ambiguity in the reasoning behind the once off events where social interaction is missing. This study therefore involved a series of social interactions between participants who observed one anothers' actions as they unfolded over time. This discussion adjudicates between possible explanations of the results. These explanations are 1) the experimental artefact explanation, 2) the psychological explanation, and 3) the interactional explanation of the results.

The experimental artefact explanation

This thesis shows that the results from the original study are manifested even when there is no possibility of an experimental artefact explaining the findings. This is because VIAPPL did not constrain or influence participants' choices, as did the original matrices. Participants were not advised to discriminate between the groups, the conditions of the trials were varied so the purpose of the experiment was not easy to deduce, there were no prescribed allocation strategies from which players had to choose nor were players asked to allocate tokens to ingroups or outgroups. Even though the experiment was not established in a way that ensured participants favour their ingroups over outgroups, ingroup bias was still found to be a significant behaviour in the interaction. In light of this, perhaps the experimental artefact explanation for the results may be ruled out.

The psychological explanation

SIT was used to argue that upon categorization into groups, individuals will inevitably display a preference for and favour their own groups over outgroups (Tajfel & Turner, 1979). This behaviour manifested because of a need to make one's own group more positively distinctive from others in order to establish a positive social identity. Since one's identity is related to their group identity the positive social identity produced from favouring one's group resulted in enhancing their self-esteem (Tajfel & Turner, 1979).

The results indicated that ingroup bias was not constant over time. Instead, ingroup bias changed, depending on the conditions of the interaction. It was expressed to a greater degree when the interaction was visible compared to the interaction being masked and also increased and decreased intermittently when group membership was visible. Furthermore, the SNA model estimation revealed that fairness was also operating in the group interaction. Not only did individuals manifest ingroup bias, they also distributed their

tokens equitably within their groups. This suggests that the inevitable consequence of categorization is not limited to ingroup bias as other behaviours are also manifested in intergroup interaction. It appears that the psychological explanation is therefore insufficient to explain the interaction and another account is warranted.

The interactional explanation

Both the inferential analysis and the SNA suggested that visibility of the interaction may be important as 1) the repeated measures ANOVA showed that the interaction effects for group visibility and time were stronger when the interaction was made visible to the participants, compared to when the interaction was masked, and 2) *balance* was significant in the SNA model estimation, for both individual and group conditions which means that observing the interaction informed the way tokens were allocated. But, these tentative conclusions need to be further explored in order to be confirmed. However, it may be said that as ingroup bias and fairness become established as salient behaviours, they were employed by other actors with similar outgoing ties. This provides evidence for an interactional imperative as actors looked to others to inform their subsequent token allocations.

Furthermore, as ingroup bias changed in different conditions of the experiment, it may be viewed in terms of a dynamic development. Thus the notion of "becoming" provided by Spears, Jetten and Doosje (2001, p. 352) is relevant to how ingroup bias is produced. This is because ingroup bias is 1) constituted in interaction, 2) dependent on group interaction for its expression, 3) is manifest to a greater extent when the interaction is rendered visible to participants, and 4) changes as the rounds of the game advance. The interactional imperative suggests that the change in ingroup bias is most concretely in terms of how the other participants acted. This is because observing the interaction influenced subsequent token allocations and may be understood in terms of Blumer's concept of symbolic interactionism.

According to this theory, individuals' actions are oriented towards the meaning they attribute to them. This meaning is derived from individuals' interactions with others and when interpreted, influences their subsequent behaviour (Blumer, 1969). This notion is useful to understand how the temporal and visibility features of the VIAPPL enabled one to examine how participants rendered the interaction meaningful. By witnessing the majority of players allocate tokens in way that displayed 1) ingroup favouritism and

fairness over the rounds of the group condition, and 2) fairness over the rounds of the individual condition; these behaviours were taken up by more players as the interaction proceeded. Thus it seems that observing the actions of others were employed to render the allocation task meaningful and therefore framed participants' responses. This in turn impacted back upon participants' subsequent actions.

These findings support the notion that "…social context is not static. It is made up of other individuals' practices. These practices … are themselves informed in part by the audience's interpretation of group members' behaviors" (Klein, Spears & Reicher, 2007, p.15). In other words, ingroup bias and fairness manifest in the 'Give and Get' game are based on an interpretation of the meaning of the allocating tokens in a way that 1) favours the ingroup over the outgroup, as well as 2) maintaining fairness in how tokens are distributed. This meaning is developed by observing how other participants behave and from knowing who those others are (i.e. the groups to which they belong). Given the evidence that observing the interaction informed the way tokens were allocated it is likely that

> To behave appropriately is a powerful social motive. It is in large part responsible both for the attempts to preserve or to modify one's conduct to fit a situation, and to change, reform or revolutionize a situation or systems of situations which interfere with the possibility (or the freedom) to act appropriately. (Tajfel, 1972, pp. 100-101).

This is because individuals allocated their tokens in a similar manner to others in the interaction. Reicher (1994; 1996, as cited in Postmes, Spears & Lea, 2000) and Postmes, Spears and Lea (2000) explain this in terms of group norms which are deduced from the interaction. Reicher (1994; 1996, as cited in Postmes, Spears & Lea, 2000) found that norms of a group emerge as group members induce them from the behaviours they observe when they actively participate in the interaction. Similarly, when studying how group norms are found in computer-mediated communication contexts, Postmes, Spears and Lea (2000) concluded that normative influences can be inferred as the conventional group behaviour develops over time. Since the interaction in the 'Give and Get' game was visible and unfolded over time, it is possible that the allocation norms of ingroup bias and

fairness were deduced by participants observing the interaction and were inferred as they developed over time.

It appears that once ingroup giving and fairness were established as salient behaviours they were enacted upon as the interaction unfolded over time. This is because visibility of the interaction enabled individuals to inductively work out the patterns or regularities of behaviour of the context as they occurred in each round of the trial. This assertion is based on the idea that a norm “originates in out-of-the-ordinary "extramundane" social situations in which people may come to feel their emergent collective behavior is feasible, timely, permissible, necessary, or duty-bound behavior. Their collective action is seen as appropriate” (Aguirre, Wenger & Vigo, 1998, p. 302). Therefore it is in this treatment, of being accepted within the context and taken up by the players, that the ingroup bias and fairness norms were produced. It was not outside of the situation or an already established framework that guided the way participants acted. Rather it was in the situation where these behaviours were accomplished that they became established as normative.

Contribution of this thesis

This thesis critiqued the original MGP as a method to study ingroup bias. It was argued that methodological shortcomings resulted in an individualized explanation of this social phenomenon and succumbed to the general problematic of social science research. Drawing on the work of Billig (2002), the critique was not aimed to reject the seminal work but rather to develop a social understanding of the behaviours operant in this minimal group interaction. The contribution of this thesis methodologically based as the investigation, analysis and explanation of the ‘Give and Get’ game interaction, aimed to provide a social understanding of ingroup bias.

Firstly, VIAPPL accounted for social interaction between the participants whereas other laboratory experiments of intergroup behaviour do not attend to social interaction because

> an awareness of the power of interaction may have led researchers to control for its effects by designing it out of their research. Somewhat paradoxically, then, this final argument suggests that it is the very knowledge that interaction is important

> that has led to research outcomes which obstruct its investigation.
> (Haslam & McGarty, 2001, p. 14)

Therefore, the merit of VIAPPL is that it models real life social interaction where group differences emerge over time as they are produced in different contexts of social interactions. VIAPPL allowed participants to interact with one another over a period of time, in a virtual environment. Furthermore the temporal and visibility enabled features of VIAPPL allowed for the detection of 1) ingroup bias, 2) fairness, 3) observation of the interaction informing the interaction, and 4) reciprocation as it developed out of the interaction. Thus this novel methodology attended to the missing social interaction in laboratory experiments and thereby moved beyond an individual level investigation. It was able to provide a socially based method of investigation by enabling social interaction between groups, revealing how interaction creates connections between individuals and how the interaction develops and is produced over time.

Secondly, SNA was introduced as an alternate method to study intergroup behaviour in social psychology. This method allowed for the study of the relations that formed when participants exchanged tokens and it also accounted for the conditions of the 'Give and Get' game. In order to achieve this, the unit of analysis was not the individual but rather the relations that formed between individuals as a result of their interaction. The analysis method was therefore able to extend beyond the individual level as it accounted for the situation and individuals' participation in social interaction.

Thirdly, the explanation of the interaction focussed on an interactional and relational understanding in lieu of the traditional psychological explanation. The interactional explanation argued that visibility of the interaction facilitated how actors acted in the 'Give and Get' game. This is because participants were responsive to the normative behaviours salient in the interaction as they took up these similar ways of allocating tokens. It thus appears that the behaviours manifest in the 'Give and Get' game are based on the meaning attributed to the behaviour gained from watching how others behave and who the others are. Observing how others behaved in accordance with the norm resulted in players enacting the same 'appropriate' behaviours as their group members and other players. Thus individuals' behaviour was shaped by what people around them considered appropriate, correct or desirable. Accordingly, it may be said that the behaviours manifest

in this context were "identity performances" (Klein, Spears & Reicher, 2007) where individuals established themselves as 1) group members by allocating more tokens to ingroup members than outgroup members, as well as 2) actors who try to maintain fairness in terms of to whom they allocate tokens. These behaviours therefore produced a dynamic social context where there were norms about how to behave and emergent identities of the actors involved. Consequently, this explanation has shown that it is in the interactive context where individuals make meaning of the nature of the situation and the actions of others which shape how they behave. Hence, this explanation suggests a social and relational understanding of the interactions in this minimal group context.

Furthermore, this thesis has shown that ingroup bias was not the only salient behaviour in this minimal group interaction. Even though fairness was highlighted as an allocation strategy in the original MGP, there was only one way in which it could be enacted, i.e. by allocating the same amount of points to the ingroup and the outgroup. But, VIAPPL on the other hand, placed no constraints on how individuals allocated their tokens. This methodological feature coupled with the SNA revealed different forms of fairness operating in the interaction, namely 1) fairness as trying to act equitably, 2) democratic fairness, and 3) fairness operating alongside ingroup bias.

The first form of fairness was evident where actors tried to maintain a balance between those individuals receiving more tokens than those receiving a lesser amount, i.e. to counteract inequity between individuals. The second form of fairness was manifest where individuals allocated tokens widely in the network. These individuals did not allocate tokens to the same actors consistently but rather shared their tokens between many individuals. Finally, the third form of fairness was apparent in the group condition, where individuals shared their tokens between their own group members. These forms of fairness were not evident in the original MGP because fairness was abstracted to one possible outcome whereas VIAPPL allowed for multiple ways in which fairness could be produced. Thus, VIAPPL revealed features of interaction that are indicative of how social interaction actually unfolds in the real world.

Concluding remarks

From the above argument, it appears that the main aim of this research was achieved. Tajfel's original minimal group study was replicated using a new technology which overcame the problems of neglecting social interaction and the temporal features of interaction, as well as requiring a between group allocation. To answer the overall research question (i.e. "Under what conditions of interaction is ingroup bias most likely to be manifest?") this investigation has shown that 1) ingroup bias is most likely to be manifest in social interaction characterised by group categorization, 2) ingroup bias is expressed to a greater extent when the group interaction is visible to those within the interaction, and 3) ingroup bias is amplified as the group interaction unfolds over time. Furthermore, the investigation revealed that 1) participants distributed their tokens fairly when they acted with and without a group membership, 2) observing the interaction informed the way tokens were allocated in both conditions as participants distributed their tokens in a similar manner, and 3) reciprocity was not operant in the interaction. When explaining these findings, the experimental artefact explanation was ruled out and the interactional explanation was proposed in lieu of the psychological explanation. Therefore, this investigation moved beyond the individual level as this new framework for studies in the MGP suggests a social explanation of ingroup bias and the other behaviours operant in the interaction, which was not possible with traditional paper and pencil methods.

Limitations

Firstly, the small sample size in the first study reduced the power of the research design leading to an increased the risk of Type II error. This could be a possible reason for the small effect size and the non-significant probability of ingroup bias increasing over time. However this problem was resolved by conducting a second research study.

Secondly, participants participated in more than one experiment, most likely for the monetary profit they received. As repeated measures designs are subject to carry-over and learning effects that impact performance in one or more of the measurements (Howell, 2010) it is uncertain whether participants engaged fully in the experiment or they became "test-savvy", resulting in the validity of the data being compromised.

The third problem regarding the design was that it is uncertain whether the data is

compatible for the stochastic actor based model used in the SNA. This is because the data and the research design violates of three assumptions of this model. Firstly, the data indicates how each tie changed per round of the game and tie changes are therefore considered brief events. The ties do not endure but are momentary for that particular round in which it is established. As a result the assumption that ties between actors are states that endure over time and that change is gradual (Snijders, van de Bunt, Steglich, 2010) is violated. The data are therefore more representative of event data where ties change more rapidly. However it is unknown whether it is consistent for this method of analysis as event data can also be treated as enduring in some cases (Snijders, van de Bunt, Steglich, 2009). Secondly, the research design violated the assumption that the current state of the network determines probabilistically how the network will change as "the total network structure is the social context that influences probabilities of its own change" (Snijders, van de Bunt, Steglich, 2009, p. 6). This is because even though the interaction was visible to participants, the tie exchanges were presented to players after the round was completed. Players were unable to observe how the structure of the network changed in real time. Thus the context of the social network did not influence the likelihood of its own change. Thirdly, claims about fairness and reciprocity operating in the interaction require further investigation suign a more suitable model. This is because time continuous Markov chains exclude any forces other than those operating at the immediate moment however fairness and reciprocity both depend on some memory of past events.

Other problems relating to the analysis were that the first round of each experiment was as an exemplar of how the game works and this data was not excluded from the analysis. In terms of the SNA, as the software did not account for the spatial distance between actors the *number of actors at distance 2* effect included in the SNA model estimation could not be explained in terms of ties being clustered by neighbours (i.e. tokens are allocated to close neighbours of the sender). The missing spatial variable thus limited the interpretation. In addition, the content analysis ought to have included more formal criteria instead of merely counting the number of times ingroup bias, fairness and reciprocity was identified. Also, the content analysis should have also been conducted by independent raters.

Multivariate methods should have been employed for the inferential analysis in order to better deal with the dependencies between multiple measurements on the same

participants. Furthermore, family-wise error should have been controlled for as there were many significance tests conducted on the correlations between the 15 rounds of a trial where group membership was visible and the number of tokens only allocated to the ingroup. It is also acknowledged that visibility of the ties should have been experimentally controlled for in the repeated measures ANOVA analysis. This would have provided evidence for the tentative conclusions about the importance of the visibility of the interaction. In addition, demographic information like age and gender distribution for the samples were not collected. This should have been done as it is common practice to report at least the averages of the distributions in experimental research.

Fourthly, the reliability and validity of the VIAPPL were established during the testing phase of the software development. Numerous pilot tests were conducted to ensure that the software was free from any bugs. Each condition was tested to ensure the software performed as intended. The output was also inspected to ensure accurate data. But, even though the design was counterbalanced to control for extraneous factors affecting the results and the results were not intended to be generalizable, it was subject to certain internal and external validity threats.

Internal validity threats

Once started, the research study became popular on campus leading to repeated participation by particular participants. The impact of the threat of co-varying events (Tredoux & Smith, 2006) is likely as it cannot be ruled out that participants did not discuss their token allocation strategies with one another, outside of the research context. Consequently, it could have impacted upon their actions in subsequent experiments and not be an accurate reflection of their behaviour if the research presented a novel situation. The reactive effects to participation (Tredoux & Smith, 2006) also posed a threat to the validity of the research. Participants were not primed before the start of the game and they were provided with minimal instructions on how to behave. However, it is possible that participants acted in ways that they thought the researcher desired due to repeated participation by some participants.

External validity threats

The results were not intended to be generalizable. However it is recognised that the threat of subject selection (Tredoux & Smith, 2006) is problematic since the sample consisted

only of university students who volunteered to participate (Greenberg, 1975). He does however also highlight the value in using homogenous groups for research is linked to theory development, as is the case in this research study. Threats of the generalizability to how the effect of group membership (IV) and ingroup bias (DV) were sampled are unlikely. This is because the VIAPPL enables a novel context for a history of social interaction to develop between participants over time. This method is indicative of how groups interact in real world settings and has not been used in other research instances.

A further limitation deals with the explanation of the findings. The experimental context was designed so as to create the simplest situation for meaningful interaction. However the simplified and abstracted context meant that the tokens contained no real value to participants. It is acknowledged that the norm based explanations of the interaction do upon hindsight seem grandiose given that they are based on two experimental studies. Thus Perhaps then another more simple explanation of the findings could be that the game is viewed as a task that has to be performed by the participant. They are required to do something with a token and in the absence of any deep thought or decision process, they draw upon what others are doing with their tokens as they search for a basis on which to allocate or retain a token.

Recommendations

In hindsight, there are a number of ways that future studies of this kind can be improved. In terms of data collection, it is suggested that the VIAPPL software be upgraded to prevent participants participating in more than one of the same experiment. Data collection should be conducted over a longer time period with experiments scheduled randomly to allow for a less systematic sample of participants and to negate the problems associated with participants becoming test-savvy. Using this study as a baseline measure, further research studies are encouraged, in efforts to establish the reliability and validity of the VIAPPL as a credible (software) instrument to study social interaction. In addition to this, an adequate level of statistical power can be estimated to improve the research design such that it has low risks for Type I and Type II error. It is suggested that future research improve these results by improving SNA capability to obtain a more suitable model to explain the data. In addition, effects that assess indirect reciprocity ought to be included in future SNA model estimation procedures.

References

Adorno, T. W., Frenkel-Brunswik, E., Levinson, D. J., & Sanford, R. N. (1950). *The authoritarian personality*. New York: Harper & Brothers.

Aguirre, B. E., Wenger, D., & Vigo, G. (1998). A test of the emergent norm theory of collective behavior. *Sociological Forum, 13*(2), 301-320.

Allport, G. W. (1954). *The nature of prejudice*. New York: Addison-Wesley.

Asch, S. E. (1952). *Social psychology* . Englewood Cliffs, N. J. : Prentice Hall.

Asch, S. E. (1956). Studies of independence and conformity. *Psychological Monographs, 70*(9), 1-70.

Aschenbrenner, K. M., & Schaefer, R. E. (1980). Short research notes minimal group situations: Comments on a mathematical model and on the research paradigm. *European Journal of Social Psychology*, *10*, 389-398.

Baker, W. E., & Faulkner, R. R. (1993). The social organization of conspiracy: Illegal networks in the heavy electrical equipment industry. *American Sociological Review, 58*(6), 837-860.

Berkowitz, L. (1989). Frustration-aggression hypothesis: examination and reformulation. *Psychological Bulletin*, *106*(1), 59-73.

Billig, M. (2002). Henri Tajfel's 'cognitive aspects of prejudice' and the psychology of bigotry. *British Journal of Social Psychology, 41*, 171-188.

Billig, M., & Tajfel, H. (1973). Social categorization and similarity in intergroup behaviour. *European Journal of Social Psychology*, *3*(1), 27-52.

Bizumic, B., & Duckitt, J. (2012). What is and is not ethnocentrism? A conceptual analysis and political implications. *Political Psychology*, *33*(6), 887-909.

Bizumic, B., Duckitt, J., Popadic, D., Dru, V., & Krauss, S. (2009). A cross-cultural investigation into a reconceptualization of ethnocentrism. *European Journal of Social Psychology*, *39*, 871–899. DOI: 10.1002/ejsp.589

Block, J. & Block, J. (1951). An investigation of the relationship between intolerance of ambiguity and ethnocentrism. *Journal of Personality*, *19*(3), 303- 311.

Blumer, H. (1969). *Symbolic Interactionism; Perspective and Method*. Englewood Cliffs, NJ: Prentice-Hall

Borgatti, S. P., Mehra, A., Brass, D. J., & Labianca, G. (2009). Network analysis in the social sciences. *Science*, *323*, 892-895.

Bornewasser, M., & Bober, J. (1987). Individual, social group and intergroup behaviour. Some conceptual remarks on the social identity theory. *European Journal of Social Psychology*, *17*, 267-276.

Brewer, M. B. (1979). In-group bias in the minimal intergroup situation: A cognitive- motivational analysis. *Psychological Bulletin, 86*(2), 307-324.

Brewer, M. B. (1999). The psychology of prejudice: Ingroup love or outgroup hate? *Journal of Social Issues, 55*(3), 429-444.

Brewer, M. B., & Silver, M. (1978). Ingroup bias as a function of task characteristics. *European Journal of Social Psychology, 8*, 393-400.

Brewer, M. N. (2007). The importance of being we: Human nature and intergroup relations. *American Psychologist, 62*(8), 728-738.

Brown, R. (1965). *Social psychology*. New York: The Free Press

Brown, R. (1988). *Group processes dynamics within and between groups*. Oxford: Basil Blackwell.

Brown, R., Tajfel, H., & Turner, J. (1980). Minimal group situations and intergroup discrimination: Comments on the paper by Aschenbrenner and Schaefer. *European Journal of Social Psychology, 10*, 399-414.

Condor, S. (1996). Social identity and time. In W. P. Robinson (Ed.)., *Developing the legacy of Henri Tajfel* (pp. 285-314). England: Butterworth Heinemann.

Condor, S. (2003). "The least doubtful promise for the future"? The short history of Tajfel's "sociopsychological" approach to laboratory experimentation. In J. Laszlo, & W. Wagner (Eds.), *Theories and controversies in societal psychology* (pp. 153-179). Hungary: New Mandate.

Cowen, E. L., Landes, J., & Schaet, D. E. (1959). The effects of mild frustration on the expression of prejudiced attitudes. *The Journal of Abnormal and Social Psychology*, *58*(1), 33-38.

Deutsch, M. & Gerard, H. B. (1995). A study of normative and informational social influences upon individual judgment. *Journal of Abnormal and Social Psychology*, *51*(3), 629-636.

Diehl, M. (1990). The minimal group paradigm: Theoretical explanations and empirical findings. *European Review of Social Psychology*, *1*(1), 263-292.

Doise, W. & Sinclair, A. (1972). The categorization process in intergroup relations. *European Journal of Social Psychology*, *3*(2), 145-157.

Downing, L. L., & Monaco, N. R. (1986). In-group/out-group bias as a function of differential contact and authoritarian personality. *The Journal of Social Psychology*, *126*(4), 445-452.

Duckitt, J. (1989). Authoritarianism and group identification: A new view of an old construct. *Political Psychology*, *10*(1), 63-84.

Durrheim, K. & Quayle, M. (2012). *NRF 'Blue Skies' grant application: Developing a virtual interaction network application and research paradigm*. (Unpublished manuscript). University of KwaZulu-Natal, KwaZulu-Natal.

Drury, J., & Reicher, S. (2009). Collective psychological empowerment as a model of social change: Researching crowds and power. *Journal of Social Issues, 65(4), pp. 707—725.*

Ferguson, C. K. & Kelley, H.H. (1964). Significant factors in overevaluation of own group's product. *Journal of Abnormal and Social Psychology*, *69*(2), 223-228.

Grant, P. R., Brown, R. (1995). From ethnocentrism to collective protest: Responses to relative deprivation and threats to social identity. *Social Psychology Quarterly*, *58*(3), 195-211.

Greenberg, J. (1975). The college sophomore as guinea pig: Setting the record straight. *The Academy of Management Review*, *12*(1), 157-159.

Hanneman, R. A., & Riddle, M. (2005). *Introduction to social network methods.* Riverside, CA: University of California (published in digital form at http://faculty.ucr.edu/~hanneman/).

Hamilton, D. L., & Trolier, T. K. (1986). Stereotypes and stereotyping: An overview of the cognitive approach. In J. F. Dovidio, & S. L. Gaertner (Eds.). *Prejudice, discrimination and racism*. (pp. 127-159). Orlando, FL: Academic Press.

Hammond, R. A., & Axelrod, R. (2006). The evolution of ethnocentrism. *The Journal of Conflict Resolution, 50*(6), 926-936. Doi: 10.1177/0022002706293470

Haslam, S. A., & McGarty, C. (2001). A 100 years of certitude? Social psychology, the experimental method and the management of scientific uncertainty, *British Journal of Social Psychology, 40*(1), pp. 1-21.

Hertel, G. & Kerr, N. L. (2001). Priming in-group favoritism: The impact of normative scripts in the minimal group paradigm. *Journal of Experimental Social Psychology, 37*, 316-324. doi:10.1006/jesp.2000.1447

Howell, D. C. (2010). *Statistical methods for psychology*. (7th ed.). USA: Cengage Wadsworth

http://www.stats.ox.ac.uk/~snijders/siena/

http://www.visone.info/

http://www.stat.tamu.edu/~west/applets/chisqdemo.html

Klein, O., Spears, R., & Reicher, S. (2007) Social identity performance: Extending the strategic side of SIDE, *Personality and Social Psychology Review, 11*(1), 28-45.

Knoke, D., & Yang, S. (2008). *Social network analysis*. (2nd ed.). Series: Quantitative applications in the social sciences. Thousand Oaks: Sage.

Milner, D. (1981). Racial prejudice. In J. C. Turner, & H. Giles (Eds.), *Intergroup behaviour* (pp. 102-143).Oxford: Basil Blackwell.

Mercken, L., Snijders, T. A. B., Steglich, C., & de Vries, H. (2009). Dynamics of adolescent friendship networks and smoking behavior: Social network analyses in six European countries, *Social Science & Medicine*, doi:10.1016/j.socscimed.2009.08.003

Noel, J. G., Wann, D. L. & Branscombe, N. R. (1995). Peripheral ingroup membership status and public negativity toward outgroups. *Journal of Personality and Social Psychology*, *68*(1), 127-137.

Paladino, M. & Castelli, L. (2008). On the immediate consequences of intergroup categorization: Activation of approach and avoidance motor behaviour toward ingroup and outgroup members. *Personality and Social Psychology Bulletin, 34*(6), 755-768.

Perreault, S., & Bourhis, R. Y. (1999). Ethnocentrism, social identification, and discrimination. *Personality and Social Psychology Bulletin, 25*(1), 92-103.

Postmes, T., Spears, R., & Lea, M. (2000). The formation of group norms in computer- mediated communication. *Human Communication Research, 26*(3), 341-371.

Purdue, C. W., Dovidio, J. F., Gurtman, M. B., & Tyler, R. B. (1990). Us and them: Social categorization and the process of intergroup bias. *Journal of Personality and Social Psychology*, *59*(3), 475-486.

Pratto, F., Sidanius, J., Stallworth, L.M., & Malle, B.F. (1994). Social dominance orientation: A personality variable relevant to social roles and intergroup relations. *Journal of Personality and Social Psychology*, *67*, 741–763.

Rabbie, J. M., & Wilkens, G. Intergroup competition and its effect on intragroup and intergroup relations. *European Journal of Social Psychology*, *1*(2), 215-234.

Reicher, S. D., Spears, R., & Postmes, T. (1995). A social identity model of deindividuation phenomena. *European Review of Social Psychology*, *6*(1), 161-198.

Ripley, R. M., Snijders, T. A. B., Preciado, P. (2012). *Manual for RSiena*. Retrieved from http://www.stats.ox.ac.uk/~snijders/siena/RSiena_Manual.pdf

Rokeach, M. (1948). Generalized mental rigidity as a factor in ethnocentrism. *Journal of Abnormal and Social Psychology*, *43*(3), 259-278.

Sherif, M. & Sherif, C. W. (1953). *Groups in harmony and tension: an integration of studies on intergroup behaviour*. England: Harper.

Sherif, M. (1937). An experimental approach to the study of attitudes. *Sociometry, 1*(1/2), 90-98.

Sherif, M., Harvey, O. J., White, B. J., Hood, W. R., & Sherif, C. W. (1961). *Intergroup cooperation and competition: The robbers cave experiment*. Norman, OK: University Books.

Snijders, T. A. B. (2001). *The statistical evolution of social network dynamics*. (Unpublished manuscript). University of Groningen, Netherlands.

Snijders, T. A. B. (2005). Models for longitudinal network data. In P. J. Carrington, J. Scott, & Wasserman, S (Eds.). *Models and methods in social network analysis* (pp. 215-247). Cambridge: Cambridge University Press.

Snijders, T. A. B. (2009). Longitudinal methods of network analysis. In B. Meyers (Ed.). *The encyclopedia of complexity and system science* (pp. 5998-6013). Springer Verlag. Retrieved from: http://www.stats.ox.ac.uk/~snijders/siena/Longi_Net.pdf

Snijders, T. A., van de Bunt, G.G., & Steglich, C. E. (2010). Introduction to stochastic actor-based models for network dynamics. *Social Networks, 32*, 44-60. http://dx.doi.org/10.1016/j.socnet.2009.02.004.

Snijders, T. A., van de Bunt, G.G., & Steglich, C. E. (2009). *Introduction to stochastic actor-based models for network dynamics*. (Unpublished manuscript). University of Oxford, Oxford.

Spears, R. Jetten, J., & Doosje, B. (2001). The (il)legitimacy of ingroup bias from social reality to social resistance. In J. T. Jost & B. Major, (Eds.), *The psychology of legitimacy emerging perspectives on ideology, justice and intergroup relations*, (pp. 332-362). Cambridge: Cambridge University Press.

Stagner, R., & Congdon, C. S. (1955). Another failure to demonstrate displacement of aggression. *The Journal of Abnormal and Social Psychology*, *51*(3), 695-696.

Sumner, W. G. (1906). *Folkways. A study of the sociological importance of usage, manners, customs mores and morals*. New York: Ginn and Company.

Tajfel, H. (1970). Experiments in intergroup discrimination. *Scientific American*, *223*, pp. 96-102.

Tajfel, H. (1972). Experiments in a vacuum. In J. Israel, & H. Tajfel (Eds.), *The context of social psychology: A critical assessment.* (pp. 69-121). London: Academic Press.

Tajfel, H. (1978a). Intergroup behaviour individualistic perspectives. In H. Tajfel, & C. Fraser (Eds.), *Introducing social psychology*, (pp. 401-422). Middlesex: Penguin Books.

Tajfel, H. (1978b). Intergroup behaviour group perspectives. In H. Tajfel, & C. Fraser (Eds.), *Introducing social psychology*, (pp. 423-444). Middlesex: Penguin Books.

Tajfel, H., & Turner, J. (1979). An intergrative theory of intergroup conflict. In W. G. Austin., & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33-47). Monterey, CA: Brooks-Cole.

Tajfel, H., Billig, M. G., Bundy, R. P., & Flament, C. (1971). Social categorization and intergroup behaviour. *European Journal of Social Psychology, 1* (2), 149-178.

Tajfel, H., & Wilkes, A. L. (1963). Classification and quantitative judgment. *British Journal of Psychology, 54*(2), 101-114.

Tredoux, C., & Smith, M. (2006). Evaluating research design. In M. Terre Blanche, K. Durrheim, & D. Painter (Eds.), *Research in practice* (pp. 160-187). Cape Town: University of Cape Town Press.

Turner, J. C., & Giles, H. (Eds). (1981). *Intergroup behaviour*. Oxford: Basil Blackwell.

Veenstra, R., & Steglich, C. (2012). Actor-based model for network and behavior dynamics: 56 A tool to examine selection and influence processes. In B. Laursen, T. D. Little, and N. A. Card (Eds.), *Handbook of developmental research methods* (pp. 598-618). New York: Guilford Press.

Wang, P., Pattison, P., & Robins, G. (2012). Exponential random graph model specifications for bipartite networks- A dependence hierarchy. *Social Networks*, pp. 1-12. doi:10.1016/j.socnet.2011.12.004

Wellman, B. (1983). Network analysis: Some basic principles. *Sociological Theory*, *1*, 155-200.

Whitlock, M. C. (2005). Combining probability from independent tests: The weighted Z-method is superior to Fisher's approach. *Journal of Evolutionary Biology, 18*, 1368-1371. Doi: 10.1111/j.1420-9101.2005.00917.x

Yamagishi, T., & Kiyonari, T. (2000). The Group as the Container of Generalized Reciprocity, *Social Psychology Quarterly*, *63*(2), pp. 116-132..

Yuan, Y. C., & Gay, G. (2006). Homophily of network ties and bonding and bridging social capital in computer-mediated distributed teams. *Journal of Computer-Mediated Communication*, *11*(4). Retrieved from: http://jcmc.indiana.edu/vol11/issue4/yuan.html

Appendices

Appendix A: Invitation to participate

Social Psychology Experiment on Intergroup Behaviour

You will be required to participate in a computer game with others.

Come to the: **PsycLab** (behind the Psychology building on Golf Road)

Between: **7-18 April 2012**
During: **10am/ 11:30am/ 13:00pm/ 14:30pm**
Look out for adverts for more details

You will receive R20 cash for participating!

Appendix B: Information sheet and informed consent form

INFORMATION SHEET

Hello, I am Lavanya Pillay. I am a Psychology Research Masters student at the University of

KwaZulu-Natal. I am conducting a research project on intergroup behaviour.

Brief outline of the study

This research study aims to explore behaviour in a social setting. The study is an electronically based game, played by up to 14 players who give and receive tokens.

What you will be required to do

The study will take place in the Psych Lab. You will be required to play a game and participate in a short group interview afterwards. This will take about 20 minutes.

Voluntary participation

Your participation is voluntary and you are not being forced to take part in this study. The choice of whether or not to participate is yours alone, and there will be no consequences of choosing not to take part. You may withdraw from the research at any time by telling me that you do not want to continue. There will be no penalties for doing so.

Anonymity

Although we will ask you to register as a research participant, your responses will not be linked with your name or any other information by which you can be identified. In other words you will remain entirely anonymous and your participation will remain confidential. There are no limits to confidentiality.

Research incentive

You will be given R20 cash after you complete the study.

Who to contact if you have been harmed or have any concerns

If you have any questions or complaints about aspects of the research or feel that you have been harmed in any way by participating in this study, please contact:

Human Social Science Research Ethics Committee:

Ms. Phume Ximba (ximbap@ukzn.ac.za/ 031 260 3587)

Research Supervisors: School of Applied Human Sciences, University of KwaZulu-Natal.

Professor Kevin Durrheim

(Durrheim@ukzn.ac.za) Dr. Mike Quayle

(QuayleM@ukzn.ac.za)

Researcher: School of Applied Human Sciences, University of KwaZulu-Natal.

Lavanya Pillay (211558985@stu.ukzn.ac.za)

CONSENT FORM

I hereby agree to participate in research on social interaction. I am aware of what is required of me, and I understand that:

- I am participating freely and without coercion.
- This is a research project whose purpose is not necessarily to benefit me personally.
- I will remain anonymous and my participation in the study will remain confidential.
- I have a right to withdraw from the study at any time, without penalty.
- I agree to the results of my participation being used for research and teaching purposes and for presentation in reports and at conferences. My name will not appear in any of these documents.
- I also agree to the discussion at the end of the game being recorded for research purposes.

Signature of participant Date

Appendix C: Confirmation of receipt of incentive

Confirmation of Receipt of Incentive

Experiment Name:

……

Researcher:

……

Date:

……

I hereby confirm that I have received a R20 incentive for my participation in the

VIAPPL
research study

Full Name	Student Number	Signature

Appendix D: Ethical Approval

13 August 2012
Ms Lavanya Pillay 211558985
School of Applied Human Sciences- Psychology
Dear Ms Pillay
Protocol reference number: HSS/0337/012M
Project title: An emergent and holistic theory of ethnocentrism
EXPEDITED APPROVAL
I wish to inform you that your application has been granted Full Approval through an expedited review process. Any alteration/s to the approved research protocol I.e. Questionnaire/Interview Schedule, Informed Consent
Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the **amendment/modification prior to its implementation. In case you have further**
queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 **years.**
I take this opportunity of wishing you everything of the best with your
study. Yours faithfully
Professor Steven Collings (Chair)
/px
cc Supervisor Professor K
Durrheim cc co supervisor Dr
Mike Quayle
cc Academic leader Professor JH
Buitendach cc School Admin. Ms
Nondumiso Khanyile Professor S Collings
(Chair)
Humanities & Social Sc Research Ethics Committee
Westville Campus, Govan Mbheki Building
Postal Address: Private Bag X54001. Durban, 4000, South Africa
Telephone: +27 [0)31 260 3587/8350 Facsimile: +27 [0)31 260 4609 Email: ximbap@ukzn.ac.za / snymanm@ukzn.ac.za
Founding Campuses: • Edgewood • Howard College Medical School • Pletermarltzburg • Westville

17 July 2013
Ms Lavanya Pillay 211558985
School of Applied Human Sciences- Psychology
Pietermarltzburg Campus
Protocol reference number: HSS/0337/012M
Project title: "lnvestigatlnglngroup bias in an interactive minimal group environment".
Dear Ms Pillay
Approval of a change of project title
I wish to confirm that your application in connection with the above mentioned project has been approved.
Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title
of the Project, Location of the Study, Research Approach/Methods must be reviewed and approved through an amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number. Please note: Research data should be securely stored in the school/department for a period of 5 years.Best wishes for the successful completion of your research protocol.
Yours faithfully
/px
cc Supervisor: Professor K Durrheim
cc Co-supervisor: Dr Mike Quayle
cc Academic Leader Research: Professor D McCracken
cc School Administrator: Mr Sbonelo Duma
Humanities & Social Sciences Research Ethics Committee
Professor Urmilla Bob (Chair) and Dr Shenuka Singh (Deputy Chair)
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X5400 1, Durban. 4000. South Africa
Telephone: +27 (0)31 260 35871835014557 Facsimile: +27 [0)31 260 4609 Email: ximbap@ukzn.ac.za /
snymanm@ukzn.ac.za *1* mohunp@ukn.ac.za
Website: www.ukzn.ac.za
Founding Campuses: • Edgewood • Howard College Medical School • Pietermaritzburg • Westville

Appendix E: Model Specification results

Study 2: IGI condition			
Experiment I n= 10			
	Trial 1 (masked group)	**Trial 2 (visible group)**	**Trial 3 (masked group)**
Outdegree (density)	< 0.001 (t= 0.072)	< 0.001 (t= 0.131)	< 0.001 (t= 0.012)
Reciprocity	0.663 (t= 0.106)	0.111 (t= 0.08)	0.553 (t= 0.037)
Same groupno	0.094 (t= 0.082)	< 0.001 (t=0.084)	0.317 (t= -0.043)
Experiment II n= 14			
	Trial 1 (masked group)	**Trial 2 (visible group)**	**Trial 3 (masked group)**
Outdegree (density)	< 0.001 (t= -0.126)	< 0.001 (t= 0.069)	< 0.001 (t= 0.038)
Reciprocity	0.490 (t= -0.017)	0.732 (t= -0.07)	0.357 (t= -0.011)
Same groupno	0.262 (t=-0.144)	< 0.001 (t=-0.093)	0.848 (t= 0.003)
Experiment III n= 14			
	Trial 1 (masked group)	**Trial 2 (visible group)**	**Trial 3 (masked group)**
Outdegree (density)	< 0.001 (t= -0.027)	< 0.001 (t= 0.035)	< 0.001 (t= 0.054)
Reciprocity	0.815 (t= -0.049)	0.847 (t= -0.062)	0.537 (-0.024)
Same groupno	0.730 (t= 0.004)	< 0.001 (t= -0.03)	0.007 (t= 0.113)
Experiment IV n= 14			
	Trial 1 (masked group)	**Trial 2 (visible group)**	**Trial 3 (masked group)**
Outdegree (density)	< 0.001 (t= 0.033)	< 0.001 (t= 0.127)	< 0.001 (t=0.057)
Reciprocity	0.616 (t= -0.113)	0.584 (t= -0.055)	0.744 (t= -0.028)
Same groupno	0.878 (t= -0.044)	0.018 (t= 0.093)	0.422 (t= 0.097)
Experiment V n= 14			
	Trial 1 (masked group)	**Trial 2 (visible group)**	**Trial 3 (masked group)**

Outdegree (density)	< 0.001 (t= 0.106)	< 0.001 (t= 0.09)	< 0.001 (t= 0.142)
Reciprocity	0.794 (t= 0.135)	0.673 (t= 0.045)	0.186 (t= 0.002)
Same groupno	0.895 (t= -0.016)	< 0.001 (t= 0.036)	0.413 (t= 0.059)
Experiment VI n= 14			
	Trial 1 (masked group)	**Trial 2 (visible group)**	**Trial 3 (masked group)**
Outdegree (density)	< 0.001 (t= 0.019)	< 0.001 (t= 0.036)	< 0.001(t= 0.125)
Reciprocity	0.690 (t= 0.004)	0.318 (t= 0.047)	0.675 (t= -0.018)
Same groupno	0.522 (t= -0.054)	< 0.001 (t= 0.002)	0.013 (t= -0.067)
Experiment VII n= 14			
	Trial 1 (masked group)	**Trial 2 (visible group)**	**Trial 3 (masked group)**
Outdegree (density)	< 0.001 (t= 0.011)	< 0.001 (t= 0.029)	< 0.001 (t= 0.012)
Reciprocity	0.064 (t= -0.066)	0.566 (t= 0.02)	0.992 (t= 0.042)
Same groupno	0.829 (t= 0.08)	0.001 (t= -0.059)	0.894 (t= 0.022)

Study 2: GIG condition			
Experiment I n=14			
	Trial 1 (visible group)	**Trial 2** (masked group)	**Trial 3** (visible group)
outdegree (density)	< 0.001 (t= -0.125)	< 0.001 (t= -0.012)	< 0.001 (t= 0.076)
reciprocity	0.331 (t= -0.023)	0.466 (t= 0.013)	0.528 (t= 0.057)
same groupno.	< 0.001 (t= -0.079)	0.634 (t= 0.049)	< 0.001 (t= -0.077)
Experiment II n= 14			
	Trial 1 (visible group)	**Trial 2** (masked group)	**Trial 3** (visible group)
outdegree (density)	< 0.001 (t= 0.051)	< 0.001 (t= 0.016)	< 0.001 (t= 0.023)
reciprocity	0.858 (t= 0.008)	0.033 (t= 0.059)	0.023 (t= -0.039)
same groupno.	0.001 (t= 0.06)	0.718 (t= -0.057)	< 0.001 (t= 0.023)
Experiment III n= 14			

	Trial 1 (visible group)	**Trial 2** (masked group)	**Trial 3** (visible group)
outdegree (density)	< 0.001 (t= -0.102)	< 0.001 (t= 0.123)	< 0.001 (t= =0.147)
reciprocity	0.474 (t= 0.037)	0.951 (t= 0.27)	0.683 (t= 0.071)
same groupno.	< 0.001 (t= -0.027)	0.928 (t= 0.095)	< 0.001 (t= -0.077)
Experiment IV n= 14			
	Trial 1 (visible group)	**Trial 2** (masked group)	**Trial 3** (visible group)
outdegree (density)	< 0.001 (t= -0.013)	< 0.001 (t= 0.012)	< 0.001 (t=0.016)
reciprocity	0.297 (-0.108)	0.226 (t= -0.07)	0.163 (t= 0.04)
same groupno.	< 0.001 (t= -0.054)	0.009 (t= -0.006)	< 0.001 (t= 0.033)
Experiment V n= 14			
	Trial 1 (visible group)	**Trial 2** (masked group)	**Trial 3** (visible group)
outdegree (density)	< 0.001 (t= -0.11)	< 0.001 (t= 0.058)	< 0.001 (t= 0.091)
reciprocity	0.330 (t= 0.012)	0.427 (t= -0.018)	0.644 (t= 0.032)
same groupno.	< 0.001 (t= -0.106)	0.463 (t= 0.093)	0.359 (t= 0.053)
Experiment VI n= 14			
	Trial 1 (visible group)	**Trial 2** (masked group)	**Trial 3** (visible group)
outdegree (density)	< 0.001 (t= 0.136)	< 0.001 (t= -0.037)	< 0.001 (t= -0.09)
reciprocity	0.737 (t= -0.057)	0.871 (t= 0.013)	< 0.001 (t= -0.094)
same groupno.	0.048 (t= 0.01)	0.971 (t= 0.051)	0.012 (t= -0.024)
Experiment VII n= 13			
	Trial 1 (visible group)	**Trial 2** (masked group)	**Trial 3** (visible group)
outdegree (density)	< 0.001 (t= 0.015)	< 0.001 (t= 0.063)	< 0.001(t= -0.049)
reciprocity	0.248 (t= 0.04)	0.958 (t= -0.02)	0.750 (t= -0.15)
same groupno.	0.991 (t= 0.036)	< 0.001 (t= -0.046)	< 0.001 (t= -0.104)

Study 1: IGI condition			
Experiment I n= 12			
	Trial 1 **(masked group)**	**Trial 2** **(visible group)**	**Trial 3** **(masked group)**
outdegree (density)	< 0.001 (t= -0.023)	< 0.001 (t= 0.014)	< 0.001(t= -0.074)
reciprocity	0.326 (t= -0.066)	0.754 (t= 0.016)	0.192 (t= 0.042)
same groupno.	0.142 (t= 0.034)	0.935 (t= -0.048)	0.604 (t= 0.122)
Experiment II n= 12			
	Trial 1 **(masked group)**	**Trial 2** **(visible group)**	**Trial 3** **(masked group)**
outdegree (density)	< 0.001(t= -0.004)	< 0.001(t= 0.001)	< 0.001(t= 0.035)
reciprocity	0.008 (t= -0.09)	0.040 (t= 0.032)	0.813 (t= -0.025)
same groupno.	0.717 (t= -0.093)	0.735 (t= 0)	0.365 (t= -0.023)

Study 1: GIG condition			
Experiment I n= 12			
	Trial 1 **(visible group)**	**Trial 2** **(masked group)**	**Trial 3** **(visible group)**
outdegree (density)	< 0.001 (t= -0.053)	< 0.001(t= 0.059)	< 0.001(t= 0.12)
reciprocity	0.009 (t= 0.058)	0.707 (t=0.044)	0.002 (t= -0.064)
same groupno.	0.538 (t= -0.02)	0.264 (t= -0.084)	0.535 (t= -0.085)
Experiment II n= 9			
	Trial 1 **(visible group)**	**Trial 2** **(masked group)**	**Trial 3** **(visible group)**
outdegree (density)	< 0.001(t= 0.042)	< 0.001(t= -0.012)	< 0.001 (t= -0.036)
reciprocity	0.436 (t= -0.006)	0.860 (t= -0.001)	0.618 (t= 0.071)
same groupno.	0.790 (t= 0.085)	0.649 (t= -0.055)	0.717 (t= -0.02)
Experiment III n= 12			
	Trial 1 **(visible group)**	**Trial 2** **(masked group)**	**Trial 3** **(visible group)**
outdegree (density)	< 0.001 (t= 0.046)	< 0.001 (t= -0.035)	< 0.001 (t= -0.01)
reciprocity	0.267 (t= 0.024)	0.177 (t= 0.023)	< 0.001 (t= 0.07)
same groupno.	0.794 (t=0.117)	0.035 (t= -0.066)	0.031 (t= 0.049)