



UNIVERSITEIT VAN PRETORIA
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Gordon Institute of Business Science

University of Pretoria

Social factors contributing to tacit coordination

Helen Place

Student Number: 449984

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ABSTRACT

Tacit coordination occurs when parties have to coordinate but communication is not possible. People are able to coordinate remarkably successfully through the use of focal points, choices that possess some characteristic that makes them significant to both parties. While a great deal of research has been undertaken to understand the mechanisms of focal points themselves, little research has directly and empirically investigated the role of the identity of the coordination partner. This study aimed to identify the effects of social distance, age, ethnicity and gender on tacit coordination in order to understand more about the contextual sensitivity of tacit coordination.

An empirical repeated-measures design was used to collect data through the playing of two games. The first experiment was tested on 58 pairings of individuals, 29 pairs of strangers and 29 pairs of colleagues who knew each other relatively well. Subjects attempted to match choices on a table with their partner. The second experiment used a resource-allocation game with (n = 28) subjects each undergoing four treatments, a control treatment, a treatment with a partner of the opposite gender, a treatment with a partner of a different ethnicity and a partner much older than the subject.

Results overall revealed that subjects who knew each other outperformed strangers in a matching scenario. Furthermore, subjects who had to share resources were more tentative about claiming resources from partners older than them or belonging to a different ethnicity. This indicates a low level of certainty of the actions of people with different social histories to the subject, as their focal points, saliences and norms are likely to be different. As tacit coordination underpins a large number of social and economic everyday interactions it is interesting to see the impact of a relatively simple visual or social cue on coordination success and coordinating behaviour.

The research concluded with the practical implications of the research and suggestions for future research to build on the foundation of this research project.

Key Words: Behavioural Economics, Focal Points, Game Theory, Stereotypes, Tacit Coordination

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment for the requirements of the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination at any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

..... Helen Place

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CHAPTER 1: INTRODUCTION

This chapter provides an introduction to this report. It defines the aims and rationale of the study and the subsequent application of the research to current literature and its implications in a business context. This is followed by an outline of the research report with a summary of the intended role of each subsequent chapter.

1.1 Research Title

Social Factors Contributing to Tacit Coordination

1.2 The Research Problem

In many situations, decisions have to be made where parties must cooperate to meet their objectives, but communication is not possible or convenient. Tacit coordination begins as a natural response in the playground in children as young as four years old (e.g. Abbink & Doğan, 2013; Barner-Barry, 1986), and becomes a key part of many social interactions (Abbink & Doğan, 2013), be it meeting with friends (Schelling, 1960), coordinating with colleagues or associate companies (Kaplan & Ruffle, 2012), working with superiors (De Kwaadsteniet & Dijk, 2010), colluding with competitors (Lee, 1999), bidding in an auction (Kaplan & Ruffle, 2012) acting as a team or even managing groups of people who are scattered geographically (Ring & Van de Ven, 1992). Social and economic interactions are based on coordination through the use of ‘virtual bargains’ – sets of unwritten and unspoken rules developed through past experience and social norms (Misyak, Melkonyan, Zeitoun, & Chater, 2014).

When individuals have a common interest in cooperation, they can be remarkably successful in coordinating when compared to purely rational probability-based outcomes (Sugden & Zamarrón, 2006) or a random selection strategy (Coyne, 2003). This ‘human factor’ means that modelling coordination as the result of a rational strategy is also problematic as in a real situation players commonly achieve higher results than can be predicted using modelling tools. The success of tacit coordination relative to probability modelling was identified by Schelling (1960) who attributed this to the use of focal points – hints, clues or landmarks that make one option stand out against others. While this has been discussed in great detail since then, focal points themselves are difficult to identify,

and extremely sensitive to influences such as context, framing, language and culture which makes them incredibly difficult to isolate.

An empirical study that isolates the direct impact of social factors on individual behaviour in a scenario where tacit coordination is required can provide invaluable insight into how decision-makers may adjust their behaviour relative to their external context.

1.3 Research Motivation

While Schelling identified Focal Points and their relative salience as a potential mechanism for tacit cooperation, further research on the topic has focused on identifying and manipulating salient focal points rather than identifying the extent of their use in tacit cooperation in business. In situations where businesses have an interest in tacit cooperation, very little information would be publicly available to decision-makers in other companies, other than the composition of the team (or the person) making the decisions. Understanding the effect of shared social history as well as effects of differing gender, age and ethnicity would allow for regulators to identify (and 'flag') potential cases of tacit cooperation. This has not, as yet, been tested empirically in a game theory scenario to determine the effects of social factors on tacit cooperation. This study aims to assist in identifying tacit collusion through providing information on the role that social factors play in tacit cooperation.

In 1967, following on from Schelling's pioneering work (1960) on focal points, Scherer began to investigate the potential role of focal points to facilitate tacit communication in oligopolies, bearing in mind the role of anti-trust regulation played in curtailing overt communication. It was found that communication was not prevented as pricing could be used as a signal to competitors through the use of focal points, particularly round-numbers or traditional prices such as 19.95, which may be used to signal some form of cooperation between companies (Scherer, 1967). As Schelling (1960) explained, since it is impossible to remove all traces of communication between players, it is important to understand the avenues of communication available to competing firms in order to identify the sources of potential tacit cooperation. While many studies investigate the existence of tacit cooperation (e.g. Lee, 1999; Pinna, 2010), few identify the mechanisms for success in coordination.

One way in which partners are unlikely to be completely isolated in a tacit coordination scenario is that decision-makers are likely to know the identity of the others involved who may influence the outcome. This study aims to test empirically the impact of this knowledge. It has been documented that in successful tacit coordination scenarios, people work on the basis of common ground – information that is available to both parties and known to be available to both. A further indication of success is how well people on either side know each other (Srikanth & Puranam, 2011). Studies show that stereotypes are used as a source of information in decision-making when other information is not available (J. T. Crawford, Jussim, Madon, Cain, & Stevens, 2011). This study aims to quantify the role of participant social distance in the success of tacit coordination, and further to identify whether participants behave differently in a situation where they must cooperate with someone of differing social characteristics to themselves.

1.4 Research Aims and the Objectives of the Study

The purpose of this study is to investigate the role of social factors in tacit cooperation. The use of social cues to inform decision-making is a new direction in tacit cooperation game theory. It requires emphasis on factors external to the situation which may affect the salience of focal points external to those incorporated in the game design. To understand better how social factors affect cooperation strategies, several factors influencing social status are investigated in isolation. This study investigates the role of nonverbal cues that may influence contextual responses in a scenario where tacit coordination is required.

Game theory is used as a tool to provide scenarios where tacit coordination can be tested. The use of pre-existing instruments allows for the standardizing of focal points within each scenario. As each scenario is tested in a repeated-measures situation it highlights the unmodelled effect that social factors measured may have on the behaviour of coordinators.

1.5 Scope of the Research

All subjects were between the ages of 25 and 38, within the upper LSM groups of 7-10 according to the Living Standards Measure developed by the South African Advertising Research Foundation (www.saarf.co.za) and with at least one post-graduate degree completed or in progress. This group of people is relevant to a South African business context as they are likely to become industry leaders in the near future. By understanding

how this elite group of people manage tacit coordination can provide important insight into the future of business in South Africa.

1.6 Key Concepts Defined

Tacit coordination refers to coordination without communication (De Kwaadsteniet, Homan, Van Dijk, & Van Beest, 2012).

Focal point refers to an option in a scenario which is somehow remarkable or different to other options, thereby providing hints or clues to players to facilitate tacit coordination (Schelling, 1960).

Salience refers to the probability that a focal point is recognised among a suite of potential focal points (Bardsley, Mehta, Starmer, & Sugden, 2010).

1.7 Outline of Research Report

1.7.1 Chapter 1: Introduction

This Chapter outlines the overarching purpose and aims of the research project. It provides a brief introduction of the research problem and the business application of the research. It also outlined the scope of the research and identified key concepts relevant to the report.

1.7.2 Chapter 2: Literature Review

In Chapter 2 a relevant literature is reviewed in light of the research question outlined in Chapter 1. A background is provided of the current understanding of the mechanisms used in tacit coordination. This is followed by the presentation of potential extrinsic factors that may affect the salience of focal points and therefore influence the success or failure of tacit coordination.

1.7.3 Chapter 3: Research Hypotheses

In Chapter 3 the research question is subdivided into two categories, each to be investigated separately. The research hypotheses are defined for each subcategory, as they relate to the research question and the aims identified in Chapter 1.

1.7.4 Chapter 4: Research Design

Chapter 4 describes the methodology used in testing the hypotheses defined in Chapter 3. The research design is described, followed by a detailed description of the research

approach, instruments used in the research project and the procedure of their use. This is followed by a description of the nature and analysis of data, and a discussion of the limitations of the research design and procedures.

1.7.5 Chapter 5: Results

In Chapter 5 the results of the two experiments are presented in light of the hypotheses presented in Chapter 3. This includes a three-layered approach of descriptive statistics, where the nature of the data and reliability of statistical testing were investigated, inferential statistics where patterns were identified, and statistical modelling where the hypotheses were tested against the data collected.

1.7.6 Chapter 6: Discussion of Results

In Chapter 6, the results presented in Chapter 5 are discussed in light of the research question identified in chapter 1, and as it related to the literature reviewed in Chapter 2.

1.7.7 Chapter 7: Summary and Recommendations

Chapter 7 provides a summary of the findings presented in Chapter 5 and discussed in Chapter 6, and provides suggestions on future studies to build on the understanding gained from this report.

1.8 Conclusion

This Chapter outlined the overarching purpose and aims of the research project. It provided a brief introduction of the research problem and the business application of the research. It also outlined the scope of the research and identified key concepts relevant to the report. It provided an outline of the structure of the report to follow.

CHAPTER 2: LITERATURE REVIEW

This chapter outlines and reviews relevant literature concerning tacit coordination. A background to tacit coordination is provided. This is followed by a description of basic principles of focal point theory as a mechanism of coordination. Current theories of the mechanisms used in the use of focal points in tacit coordination are described. The potential relationship between contextual social factors and focal point theory is discussed, and a potential model of the role of social factors in coordination is introduced.

2.1 Background of tacit coordination

Firms which cooperate rather than compete may realise opportunities for positive-sum outcomes through effective collaboration (Kanter, 1994). As firms function in dynamic environments, collaboration can result in significant competitive advantage for cooperating partners (Lado, Boyd, & Hanlon, 1997). Lado et al. (1997) propose a syncretic framework for rent-seeking strategic behaviour, but this does not take into account the level of accuracy (higher than possible by pure probability) possible by players in tacit cooperation. While tacit coordination has been shown in children as young as four (Abbink & Doğan, 2013), there is little information available on the accuracy of tacit coordination strategies, given that social factors such as shared background, value systems and perceived differences may be confounding factors even if two firms are compelled to cooperate.

Tacit coordination is important in the case of distributed work – such as outsourcing, where relying on constant communication is cumbersome and can be expensive (Srikanth & Puranam, 2011). This is particularly true in cases where work is redistributed to companies that are geographically separate and therefore not able to hold face-to-face meetings. These companies cope with the challenges through streamlining processes, allowing for ongoing electronic or other forms of communication, and through building and leveraging a stock of common ground to use to enhance tacit coordination (Srikanth & Puranam, 2011). This can be done through the mechanism of using teams made up of staff members who have worked together before and may know each other's idiosyncrasies once they are stationed at different locations (Srikanth & Puranam, 2011).

Game theory supplies a method to understand potential consequences of competition and cooperation (Lado et al., 1997). Classic game theory is used to model situations of conflict,

where participants attempt to secure the highest possible payoff regardless of the nature of their opponent. This can be used to predict behaviour and outcomes through understanding the logic of competitors. There is however a great deal of deviation from rational, probability-based strategy in game theory, particularly when some level of coordination of responses is required between players (Schelling, 1960).

Game theory centres on the Prisoner's Dilemma, which shows that rational individual choices result in mutually undesirable results. This shows the opportunity for tacit cooperation for mutually desirable consequences with repeated play. Macy (1991) suggests that repeated interactions can be seen as a stochastic learning model, where players continuously adapt their play based on past iterations. This shows that resulting cooperation depends on factors such as network size, density, mobility, and anonymity: factors which contribute to reduce the number of decisions required for coordination and assist in developing norms (Macy, 1991). Once norms are established they lose their historic significance and become 'an end in itself' regardless of changes in circumstances (Macy, 1991). Coordination allows players to avoid a Prisoner's Dilemma and therefore receive a significantly better payoff than if they did not cooperate.

Many scenarios exist on a continuum between conflict and cooperation. The purest form of conflict is the Prisoner's Dilemma while the simplest form of cooperation is a simple matched scenario where players' payoffs are determined by their level of coordination with one another (Coyne, 2003). In a coordination game players both receive a reward if they choose the same action, regardless of the content of the action (Bacharach & Bernasconi, 1997). A model matched-set game is shown in the figure below.

Figure 1. A payoff structure where coordination is required to achieve any payoff for either player (Coyne, 2003)

	I	II
I	7,7	0,0
II	0,0	1,1

While mutual defection is the most effective strategy in a once-off game scenario, in repeated game scenarios (which are more likely in firms operating in the same industry) mutual cooperation becomes a likely outcome (Lado et al., 1997; Macy, 1991). While the

possibility of future scenarios encourages competition, the spacing of future interactions seems to be less important than the possibility of their occurrence. For example in a situation of suppliers bidding for contracts, interactions can be far apart, with no guarantee against the introduction of new participants, yet tacit cooperation still occurs (Lee, 1999).

2.1.1 The benefit of tacit coordination

When tacit coordination is successful it is remarkably lucrative. For example a study on the distribution of milk to schools in a district in Texas showed that distributors may have followed a strategy of tacit cooperation. Suppliers gained contracts through the submission of bids for each district. It was found that bids differed significantly between incumbent districts and other districts, despite a lack of overt communication between suppliers. Typically incumbents won bids for school districts over multiple years, with relatively high bids, while competitors provided even higher bids in adjacent districts but the lowest in their own (Lee, 1999). As a result of this tacit collusion, milk prices in this district in Texas were three to four cents per half-gallon higher than in the neighbouring school district (Lee, 1999). It is interesting that in the same year that tacit coordination was identified in the school milk industry in Texas, a famous example of overt collusion in school milk prices was identified in Ohio (Porter & Zona, 2004) which suggests that some form of learned convention may have been evident in the industry at the time.

Collaboration and competition is interlinked, as a firm that collaborates with a strong competitor is more likely to earn economic rents than a firm partnered with a weak competitor (Lado et al., 1997). Further, the use of collaboration allows for the development of competitive advantage through the inter-firm relations (termed 'collaborative advantage') (Lado et al., 1997). Successful collaboration also allows for firms to mutually benefit and avoid a Prisoner's Dilemma. While most focus on inter-firm relationships, which lead to competitive advantage, focus on the collaboration of various parts of the value chain, there is no doubt that collaboration between firms can lead to economic rents in situations such as a Prisoner's Dilemma scenario where both firms benefit from collaboration. The use of game theory as a lens will provide an important insight in the potential success of tacit cooperation between firms to understand aspects of tacit cooperation in a situation where direct communication is prevented and little information is available to players except the identity of decision-makers on both sides.

2.1.2 The cost of tacit cooperation Tacit coordination carries a cost. On a biological level, a substantial amount of energy is required to make inferences about iterated second-order beliefs (what the subject thinks another person thinks that they will do) (Bhatt & Camerer, 2005), which means that people are predisposed to use heuristics where possible. For example people rely on information provided from stereotypes when it is directly relevant to a decision or if other information is absent (J. T. Crawford et al., 2011). On a business level tacit cooperation is risky as it leads to uncertainty in decision-making (Ring & Van de Ven, 1992). This risk can be ameliorated through the use of focal points, developing common ground and established patterns of behaviour and through gathering information on other parties involved in coordination.

Understanding the factors which influence the success of tacit coordination is important in enhancing the success of geographically scattered companies and companies which must make decisions quickly without consultation. It also has implications in anti-competition law where companies in South Africa are prohibited from concerted practices in which cooperation is achieved without a formal agreement in place. This means that in addition to the risk of unsuccessful coordination, companies are exposed to an additional risk of being caught sending concerted signals to the market or to other firms. For a situation to give rise to anticompetitive behaviour in equilibrium under prohibitive competition law, firms must be able to tacitly coordinate their behaviour (Pinna, 2010). While the move towards sustainable competitive advantage through an increase in partnership differentiation and explicit communication makes sense theoretically, little research has been done on the changing degree of communication in a situation where firms are subject to antitrust regulations, where inter-firm competitive advantage violates anti-competition law. With pure tacit collusion being almost impossible to identify or prove, an understanding of relevant social factors can provide additional tools in the identification of such collusion.

2.1.3 Focal points in cooperation

A simulation of repeated Prisoner's Dilemma scenarios demonstrated that human subjects showed different results to computer simulations (Macy, 1991). In a stochastic learning model of the Prisoner's Dilemma, Macy (1991) admits that the required iterations to produce cooperation seem unrealistic in a real-world scenario. Players learn too slowly to produce meaningful cooperation, considering that errors can halt the process prematurely.

If players do not weigh up their decisions according to predicted future interactions, and do not forgive unfortunate outcomes, the process can fail as players consider immediate outcomes in decision-making and therefore defect (Macy, 1991). This is not the case in the real world, as demonstrated by the milk example provided in above. Tacit collusion does occur and can be surprisingly effective. Focal points provide a potential short-cut to effective coordination in a tacit scenario.

In 1960, Schelling identified that it is not possible to completely separate players in a game situation. There is generally some form of communication, albeit rudimentary or tacit. This cannot be modelled, but must be tested through empirical experimentation (Schelling, 1960). In its simplest form, communication occurs through taking hints, through repeated iterations and the forming of norms and conventions (Schelling, 1960). Individuals are able to recognise these hints (termed focal points) in order to vastly increase the probability of successful coordination. Schelling recognised the use of focal points (which he did not define further than 'hints' which "provide some clue, for coordinating behaviour, some focal point for each person's expectation of what the other expects him to be expected to do" (Schelling, 1960 p 57)) where players do not choose the strategy with the highest probability of selection, but rather the strategy that stands out as unique, different or holding some property that makes it the 'obvious' choice despite its holding no material superiority over other options (Schelling, 1960). Focal points can be modelled as asymmetric options within a game holding some 'meta-norm' property that renders one the most reasonable option to select in order to ensure coordination, although this is remarkably difficult and sensitive to the experience of the players involved in the situation (Alós-Ferrer & Kuzmics, 2013). It has been suggested that while norms and conventions may not be defined, they do govern human behaviour, regardless of whether they are formally defined (Sugden, 1989). This means that while people may, by definition, not be rational when following convention, the seemingly irrational response is still surprisingly effective, regardless of the lack of enforcement involved (Sugden, 1989).

The capacity to coordinate through the use of focal points has been referred to by Bacharach and Bernasconi (1997) as 'Schelling Competence.' Focal points create some degree of certainty for decision-makers when information is incomplete (Leeson, Coyne, & Boettke, 2006). For example, when people were asked to choose between 'heads' or 'tails' 36 out of 42 respondents selected 'heads'. In another question, a vast majority of people

who were asked to select a place to meet in New York selected Grand Central Station despite the station being one of many, equally convenient and notable landmarks in the city. This shows that tacit cooperation is possible through coordinating second order iterations (i.e. the expectation of what a participant expects the other player to expect of him/her (Schelling, 1960)). This is through the recognition of incidental properties which convert potential choices to focal points which assist in tacit cooperation. Schelling's Focal Point Theory proposes that people use focal points to enable tacit communication through selection of focal point options – options which have no difference in terms of payoff, yet hold some focal property which both players recognise. Focal points can take many forms, both inside the game (embedded focal points in the game's design), within the game situation (aspects of context, and the nature of opponents) and external to the game (social history and past experience).

2.1.4 Applications of Focal Point theory

Besides the classic examples of 'pick one' style artificial games, there are many examples of companies using focal points to facilitate anti-competitive behaviour. In some cases where perfect information is not available, companies use available information (such as cost accounting) as a focal point to facilitate tacit collusion, particularly in the case of duopolies (Dierynck & Roodhooft, 2011). The use of focal points in pricing between competitors is well-documented, with evidence of cooperation between competitors in the case of books and music companies who sell their products at similar prices, above the lowest possible price which one would expect in a situation of competition between firms. In particular, round numbers and numbers ending in -5 seem to act as focal points and signals in pricing (Beck, 2004). Price-ceilings have been hypothesised to be focal points which facilitate tacit collusion, although some experimental data does not find this to be the case (Engelmann & Müller, 2011; but see Faber & Janssen, 2008; Knittel & Stango, 2003).

The purpose of Focal Point Theory is to understand bargaining situations where communication is incomplete or impossible. The original example of the use of focal points in a tacit cooperation scenario is that of military commanders who use a geographic landmark, such as a river, to divide territory. This landmark may have no significance and the division may not be fair, but the outcome of the bargaining situation is mutually favourable: neither army loses men in a fight for territory 'fairly' divided (Schelling, 1960). This theory also has business significance as it can be applied to firms in a duopoly which

collude to tacitly divide market segments, or to collude in other ways while legally banned from carrying out such practices explicitly (Schelling, 1960).

There is a suggestion that salient focal points could be artificially imposed to facilitate collaboration without requiring communication to enhance the efficiency of agents working independently (Fenster, Kraus, & Rosenschein, 1995; Kraus, Rosenschein, & Fenster, 2000). Focal points can be manipulated by policy-makers to steer committees towards a desired outcome. This is accomplished through the strategic use of focal points within policy proposals in line with the ideology and past experience of decision-makers. This shapes decision-makers' perceptions of the contents as a whole (Ringe, 2005). Understanding the potential factors which influence salience in such a scenario is important in understanding its manipulation for positive or negative outcomes, be it manipulation, collusion or even training practices.

2.1.5 Equal and unequal payoffs

To this point, it has been assumed that the outcomes and payoffs of games requiring coordination are equal, such as a simple matching game (referred to as a 'plain' matching game by Bacharach and Stahl (2000)) where the payoff to each player for cooperating is 1, and the payoff for differing is 0. Since players are not able to use the payoff as a point of strategy they are forced to either randomise their selection or else to attempt to coordinate their responses (Andre Casajus, 1997).

In reality, many scenarios exist where cooperation is required but payoffs are asymmetrical. For example De Kwaadsteniet and Dijk (2010) describe the case of a husband and wife trying to decide what to do on a Saturday night. He wishes to go to a boxing match and she wishes to attend the opera. The worst possible outcome is for them both to stay at home and do nothing, but the alternatives have different payoffs for each player. This was described by Luce and Raffe in 1957 as a 'Battle of the Sexes' game (reviewed in De Kwaadsteniet & Dijk, 2010) and is shown in the figure below.

Figure 2. The game scenario for a situation with unequal payoffs, based on the Battle of the Sexes scenario described in Kwaadsteniet and Dijk (2010)

	Stay at home	Boxing match
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Stay at home	0,0	7,1
Opera	7,1	0,0

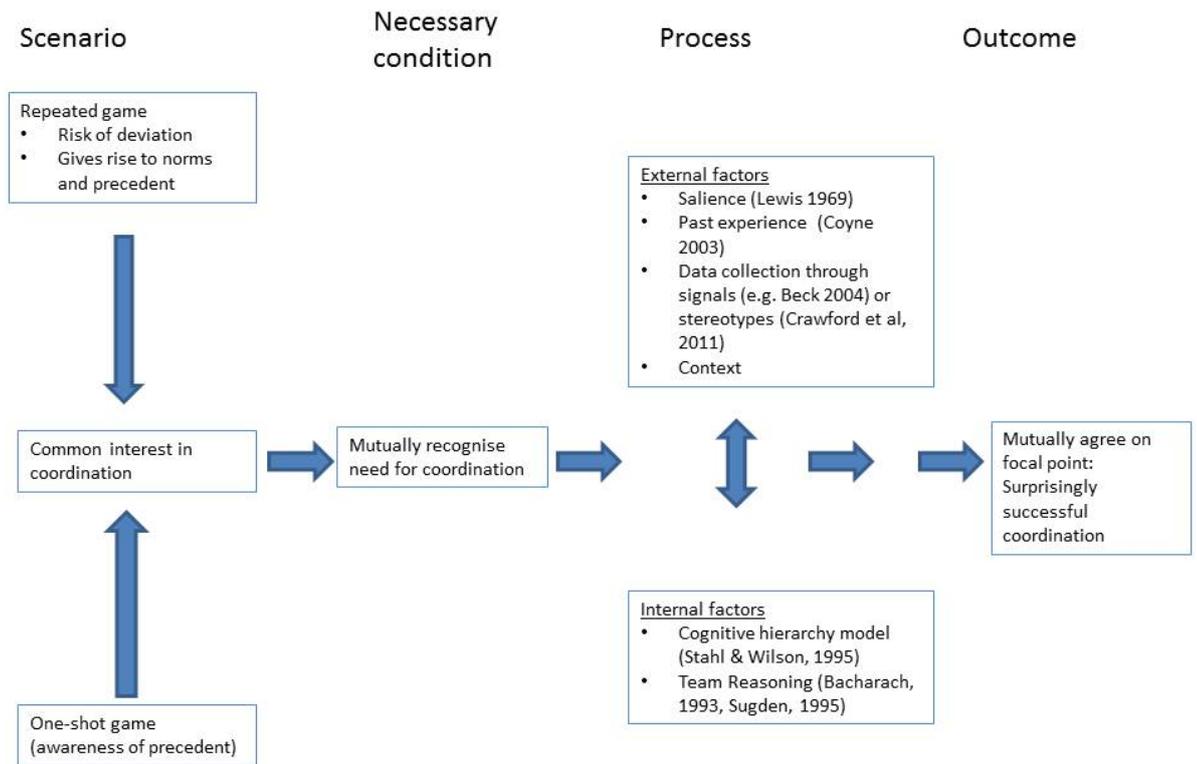
In asymmetric payoff scenarios, even small asymmetries can lead to breakdown in cooperation (V. P. Crawford, Gneezy, & Rottenstreich, 2008), which was originally believed to indicate that focal point strategies apply only to situations with even payoffs. Social status can be used as a coordinating function in tacit cooperation where the individual of lower status defers to the participant of higher status (De Kwaadsteniet & Dijk, 2010), by selecting the option with the highest payoff for the high-ranking person, provided that there is a marked difference in status between them. In symmetric payoff scenarios the team reverts to Schelling salience (De Kwaadsteniet & Dijk, 2010).

In contrast to tacit scenarios, when explicit bargaining is allowed, some argue that players are generally happy to agree on unequal payoffs, although it appears that spatial distribution (or some factor of the payoff attribute) can be used as a focal point for the start of negotiations that may influence outcomes (Isoni, Poulsen, Sugden, & Tsutsui, 2013). While the most efficient scenario usually plays out, the focal cues are used to anchor the distribution of the payoffs between players. For example in the case of a duopoly trying to divide a market, the most salient division is often the final outcome regardless of its economic characteristics (Isoni, Poulsen, Sugden, & Tsutsui, 2011). While the use of focal points can be used to institute a sense of fairness between participants (Janssen, 2006), equality in itself is also often used as a focal point (Poulsen, Poulsen, & Bett, 2013).

2.2 A framework for tacit coordination

It is clear that focal points are a major mechanism used in tacit coordination. This is complex as focal points and their relative salience can be affected by a multitude of factors, which make them notoriously difficult to test. Perhaps due to the complex nature of testing focal points, while Schelling's theory of tacit bargaining has significant implications for economics, there has to date been relatively little empirical testing of focal points (Isoni et al., 2011). Instead, theories have been put forward to understand aspects of the use of focal points in decision-making. The figure below provides a philosophical framework for the use of focal points in tacit cooperation and includes major theories identified.

Figure 3. A philosophical framework for tacit coordination showing the original framework as suggested by Schelling (1960) and including subsequent theories.



2.2.1 Saliency of focal points

The concept of saliency was first established by David Lewis in 1969 who remarked that convention arises from repeated interactions between people to provide an option with a property of uniqueness – referred to as saliency (as reviewed in Cubitt & Sugden, 2003) which has become the backbone of understanding convention as a mechanism for deviation from rational reasoning (Cubitt & Sugden, 2003). These repeated interactions give rise to the evolution of shared conventions, rules, norms and perceptions which act as focal points within interactions that require tacit coordination (Coyne, 2003). It is simplistic to assume that every situation contains a single focal point. It appears that focal points within a suite of options increase and decrease in saliency depending on the context of the situation. Schelling Saliency refers to the probability of a focal point being recognised among a suite of potential focal points (Bardsley et al., 2010).

As uniqueness, limited potential labels and increased exposure to particular sets of labels have proved difficult to use to predict the relative use and success of focal points in tacit

bargaining, it has been suggested that salience is an emergent property based on shared experience and past successes of participants in similar recurring situations (Alberti, Sugden, & Tsutsui, 2012). This is problematic in pure game theory as experimental design requires incorporating labels into the scenario with little understanding of what creates salience and what results in some focal points holding more salience than others (Alberti et al., 2012).

Relative salience of focal points is critical as in situations with multiple saliences of uncertain rank, coordination falls through (Shahriar & Dugar, 2009). Conflict between salient labels in decision titles and risky payoffs generally leads to a degradation of cooperation efficiency (Shahriar & Dugar, 2009). At present, although using focal points seem to be an effective strategy in enabling cooperation, there is no clear understanding on what gives rise to salience when multiple focal points are in place (Bardsley et al., 2010). Despite the risk of multiple focal points, single focal points within a situation with multiple Nash Equilibria can be an effective strategy for cooperation (Bosch-Domènech & Vriend, 2013), provided that the parties involved recognise the same focal point.

It has been suggested that players use distinctions provided by labelling to create distinctions that lead to the evolution of focal point salience (Alberti et al., 2012). Salience therefore appears to be linked to language where players describe each of the options internally and must understand how other players may describe the scenario in order to understand which properties hold salience (Andre Casajus, 1997). With this understanding, Focal Point reasoning in a tacit coordination system involves the systematic use of players' strategy labels (Andre Casajus, 1997; André Casajus, 2000). While this may be simple in a laboratory setting where choices can be described as 'up' or 'down' or 'near' and 'far' this also extends into real-world competitive scenarios where participants use their own labelling conventions to assign salience to certain options in the situation (Alberti et al., 2012). In a South African context, where there are 11 official languages, and multiple cultural and contextual backgrounds involved in any kind of coordination scenario, understanding factors that may adjust relative salience could be vital in ensuring effective coordination.

2.2.2 Variable Frame Theory

Some argue that salience of focal points is irrelevant, and that tacit cooperation occurs as a

model of stochastic learning, shaped by cues which are developed through repeated game play (Macy, 1991). Learning experiences give rise to frames which change perceptions of a scenario and possible options provided.

Variable Frame Theory suggests that players use frames – sets of variables used to describe and understand the game. The Focal Point is therefore given salience as it fits in the frame which has been selected by the player (Bacharach & Bernasconi, 1997). This means that players must conceptualise the strategic option as belonging to a frame, determine the most relevant frame for the situation, given that the opposing player may select a different frame set (Bacharach & Bernasconi, 1997). For example in a situation where a player must select one of four blocks, three of which are red and one of which is yellow, there is a high likelihood that the player will use ‘colour’ as a frame, selecting the yellow block as the focal point selection within the frame of colour. As with salience, framing is affected by background, language and context – for example a language with more words for colour may focus on a colour frame more readily than one in which colour is not emphasised (and therefore lacks the words required to label it sufficiently (André Casajus, 2000)).

Each focal point possesses two attributes, one which makes it unique or different, and another which denotes its belonging to the frame in use (Bacharach & Bernasconi, 1997). This means that the ‘pattern’ is selected as a frame, and the ‘odd-one-out’ is selected within the frame. There are often multiple frames at play and the player must guess which frame is being used in order to select the matching focal point to their partner which requires a level of bounded-rationality (Bacharach & Stahl, 2000). It appears that focal points (and their frames) are selected according to the context of the situation.

It has been suggested that framing methods have developed through an Evolutionary Stable Strategy in order to minimise energy expended by monitoring novel differences (Binmore & Samuelson, 2006) which could allow for significant overlap in framing methodology and therefore coincidence of focal points. It is notable how sensitive frame selection can be to extrinsic factors, merely calling a game by a name that implies cooperation can alter the player’s frame and encourage cooperation (Ellingsen, Johannesson, Mollerstrom, & Munkhammar, 2012). The delivery of a game to players can also be affected by minor changes to wording used to explain the context or by changes in

facial expression from the person delivering the experiment (McAdams & Nadler, 2008).

As a mechanism for focal point selection, variable frame theory suggests that context and personal history can have a dramatic impact on the results of a scenario where tacit coordination is required. Players selecting to use a certain frame must also consider the frames available to their partner, which can be affected by a multitude of extrinsic factors.

2.2.3 Cognitive hierarchy Theory and Team Reasoning

Cognitive hierarchy theory states that each player will consider their strategy to be superior to their opponent (Camerer, Ho, & Chong, 2004). Cognitive hierarchy theory shows that neither player should defer because they should both believe that they have the superior strategy, but this is mediated through their analysis of the competence (and therefore the strategic reasoning level) of their opponent. The model defines the player as a level-k strategizer, with opposing players ranging from k-1 to level 0 where selection is entirely random (Camerer et al., 2004). This could potentially be affected by the relationship between the players, be it status, or merely personal familiarity. Analysis of competence of an opponent is likely to change dramatically if the opponents have a shared social history and are aware of one another's abilities.

Team reasoning requires decision-making that is affected by the composition of the team, regardless of the independent nature of individual team actions (Bacharach, 1999) Team reasoning has gained status among students of Focal Point Theory, although Schelling rejected the idea (Sugden & Zamarrón, 2006). Players' decision-making is dependent on context (Bardsley et al., 2010) and may be motivated by the potential for mutual advantage (Sugden, 2011). The coordination of team reasoning to reach coordination can be explained either by Cognitive Reasoning Theory or by salience, both of which are supported and appear to be context-dependent (Bardsley et al., 2010). In fact, empirical testing of both Team Reasoning and Cognitive Hierarchy Theory finds that both theories explain some degree of cooperative reasoning, but neither is exhaustive in its explanatory power. Team reasoning is used in a situation where equality is a factor, whereas level-k reasoning is used to identify focal points where 'fairness' is not required (Faillo, Smerilli, & Sugden, 2013). The elements of bounded rationality and unpredictability of human decisions is not addressed by either framework. This is counterintuitive considering that the evolution of game theory has been driven, at least in part, by the fact that in the real world a situation may have several equilibrium solutions, and by assuming perfect rationality and common

knowledge it is not possible to model which solution a player would select, unless the concept of salience is used (Sugden, 2001).

2.3 Applications of understanding social factors as they impact on focal point theory

As Schelling (1960) explained that it is impossible to remove all traces of communication between players, it is important to understand the sources of communication available to competing firms in order to identify the sources of potential tacit cooperation. In situations where businesses have an interest in tacit cooperation, very little information would be available to decision-makers in either company, other than the composition of the team (or the person) making the decisions. Understanding the effect of shared social history as well as effects of differing gender, age and ethnicity would allow for regulators to identify (and 'flag') potential cases of tacit cooperation. Bearing in mind that recent amendments to the Competition Act (Act 89 of 1998) call for prohibition of companies behaving in a manner that includes concerted practices in which cooperation is achieved without a formal agreement in place, understanding social effects that affect the efficiency of tacit cooperation would be vital to identifying and regulating its occurrence. It may also assist in considering changing legislation, as often legal requirements in themselves create focal points which facilitate cooperation (McAdams & Nadler, 2008). While it is already difficult to legally monitor collusion, particularly the tacit kind, it also appears that legislation and rules which may be in place to prevent compliance are actually creating the focal points required for successful tacit cooperation.

Focal points are also used strategically between suppliers and consumers. For example the difference in price between 0.99 carat diamonds and 1 carat diamonds is significant, which indicates that merchants are capitalising on existing focal points of consumers to increase profits (Scott & Yelowitz, 2010). There is further evidence of price focal-points being manipulated as suppliers consistently use prices ending with a -9 to signal low prices – often strategically using prices ending with -9 following a price increase (Snir, Levy, Gotler, & Chen, 2012). Understanding the role of social cues used in tacit bargaining would allow further studies to be developed to explore the relationship between social cues such as age and gender in consumer-producer rivalry situations.

Understanding factors which influence the success of tacit coordination is important in

enhancing the success of geographically scattered companies and companies which must make decisions quickly without consultation. It also has implications in anti-competition law where companies in South Africa are prohibited from tacit collusion. For a situation to give rise to anticompetitive behaviour in equilibrium under prohibitive competition law, firms must be able to tacitly coordinate their behaviour (Pinna, 2010). With tacit collusion being almost impossible to identify or prove, an understanding of relevant social factors can provide additional tools in the identification of such collusion.

2.4 Social factors potentially affecting tacit cooperation

The use of cues to determine social status is a new direction in tacit cooperation game theory. It requires emphasis on focal points in the situation external to those incorporated in the game design. To understand better how social factors affect coordination strategies, several factors influencing social status should be investigated in isolation. This study investigates the role of nonverbal cues that may indicate status or indicate shared experience in order to determine the effect that these cues may have on tacit cooperation.

2.4.1 Social Distance

Coordination can be achieved tacitly through reliance on common ground – i.e. understanding that some knowledge is shared, and known to be shared, and using this understanding as a foundation of tacit coordination (Srikanth & Puranam, 2011).

If players do not know one another, it is likely that they will use a focal point strategy in tacit cooperation games to reduce uncertainty in a situation with little information. If social distance is shorter, it is likely that players may be able to predict one another's preferences which may have an impact on successful cooperation. At the same time salience can be a function of common understanding, often brought about through shared experiences (Hédoin, 2011), or rather the relative prominence of a focal point is governed by common experience (Sugden, 1989) which indicates that the incidence of choosing the same focal point may be a function of social distance. For example, if a person were asked to select a location to meet someone in Sandton City it is likely that they would choose the statue at Nelson Mandela Square. If friends, who became acquainted through a shared interest in video games were asked the same question, it is more likely that they would choose to meet each other at a computer store. While studies have been conducted using social distance, they focus more on the role of anonymity than on the effect of existing familiar relationships between participants (e.g., Charness & Gneezy, 2008).

In understanding the evolution of cooperation, it has been suggested that social networks provide opportunities for repeated game iterations and therefore encourage the development of social norms which facilitate tacit cooperation (Macy, 1991). Cooperation and the likelihood of future scenarios can also be linked to guilt-aversion and the promise of reciprocity in a situation where future games are likely (Dufwenberg, Gächter, & Hennig-Schmidt, 2011).

It appears that many aspects of tacit cooperation could be affected by shared social history and the shared social experiences brought about by low social distance. This could have a vast impact on the success of tacit cooperation.

Established patterns of behaviour often occur as a result of shared experience, and these patterns can evolve spontaneously with little communication required (Sugden, 1989). While cooperation can be difficult, successful coordination can be increased through repeated iterations of coordination attempts (developing norms) and through the development of organisational culture which establishes focal points and norms (Camerer & Malmendier, 2007). A scenario that includes elements of tacit bargaining, rather than mere fortuitous coordination also increases the level of utility through successful coordination in an unequal payoff scenario (Isoni et al., 2011).

While shared experience and the use of focal points and cues create a mechanism for tacit coordination, the scenarios are not free of context. Social factors such as social history, language, framing of the situation and perceived social status affect the relative salience of focal points and may influence the decisions made. Understanding the role of extrinsic factors involved in tacit coordination will provide further insight into the functioning of mechanisms for coordination.

2.4.2 Ethnic background

In a country such as South Africa where historic political systems have given rise to vast inequality between ethnic groups, it is possible that ethnicity could be used as a focal cue for cooperation. It is important to understand how people from diverse cultures coordinate considering that the need for coordination is ubiquitous in social and business interactions (Bernard, Reuben, & Riedl, 2011) and doing business in South Africa requires interacting

with a diverse group of people on a daily basis. It has been seen in studies that previously existing property rights and entitlements become an important focal point in bargaining situations regardless of the legal rights in place in a new negotiation (Gächter & Riedl, 2005). In addition, there is evidence that people from different cultural backgrounds possess different decision-making strategies based on historic exposure to diverse cultural backgrounds (Henrich, Heine, & Norenzayan, 2010).

In America, race has decreased in salience in America due to a rise in class-related subordination (Wilson, 2012). While this is unlikely in a South African context due to the relatively recent end to apartheid, the rise of class over race could be an end goal as the country moves away from segregation. Understanding the role that ethnicity plays in coordination behaviour among South Africans could show whether or not ethnicity is a salient focal point and, if so, would provide information on the resulting behaviour of subjects.

Differing ethnicity may also signal different past experiences and social history between participants. A study comparing coordination within and between students from India and America showed that subjects were more effective in coordinating with partners of their own culture than partners of the other country (Jackson & Xing, 2014). Cultural difference can lead to the adoption of specific norms and decision-making practices (Henrich et al., 2010) which is an argument for the creation of diverse teams in order to ensure that a team on the whole has sufficient diverse past experience to facilitate tacit coordination (Bucci & Tenorio, 2010). Inaccurate stereotypes can also negatively influence successful coordination which can hamper people of different ethnicities from coordinating (Laban & Kelsey, 2014).

Ethnicity is a visible cue that could influence bargaining behaviour in participants. Additional factors such as differing languages or a lack of shared experiences could preclude the use of focal points between subjects of differing ethnic backgrounds.

2.4.3 Gender

Gender can influence economic outcomes (Boschini, Dreber, von Essen, Muren, & Ranehill, 2014) and is a strong factor in bargaining situations such as influencing the price of taxi fares (Castillo, Petrie, Torero, & Vesterlund, 2013). In a scenario where players could choose between receiving a payoff or playing a 'battle of the sexes' game where players

had to cooperate to achieve any payoff, but the payoffs were distributed unequally (600,200 or 200,600) it was found that the player who selected to play the game was generally (but not always) deferred to in the game process (R. Cooper, DeJong, Forsythe, & Ross, 1993). There may be some un-tested measure of gender significance in this scenario. In another test, participants were shown pictures of their game partner. In many cases a photograph of a smiling partner led to cooperation, but this was secondary to male-female pairings (where men with female partners cooperated overwhelmingly) or female-female pairings (where women did not cooperate with other women) (Scharlemann, Eckel, Kacelnik, & Wilson, 2001). In another study comparing children in Sweden and Colombia found significant differences between cooperation behaviour towards girls and cooperation towards boys (Cárdenas, Dreber, Von Essen, & Ranehill, 2014).

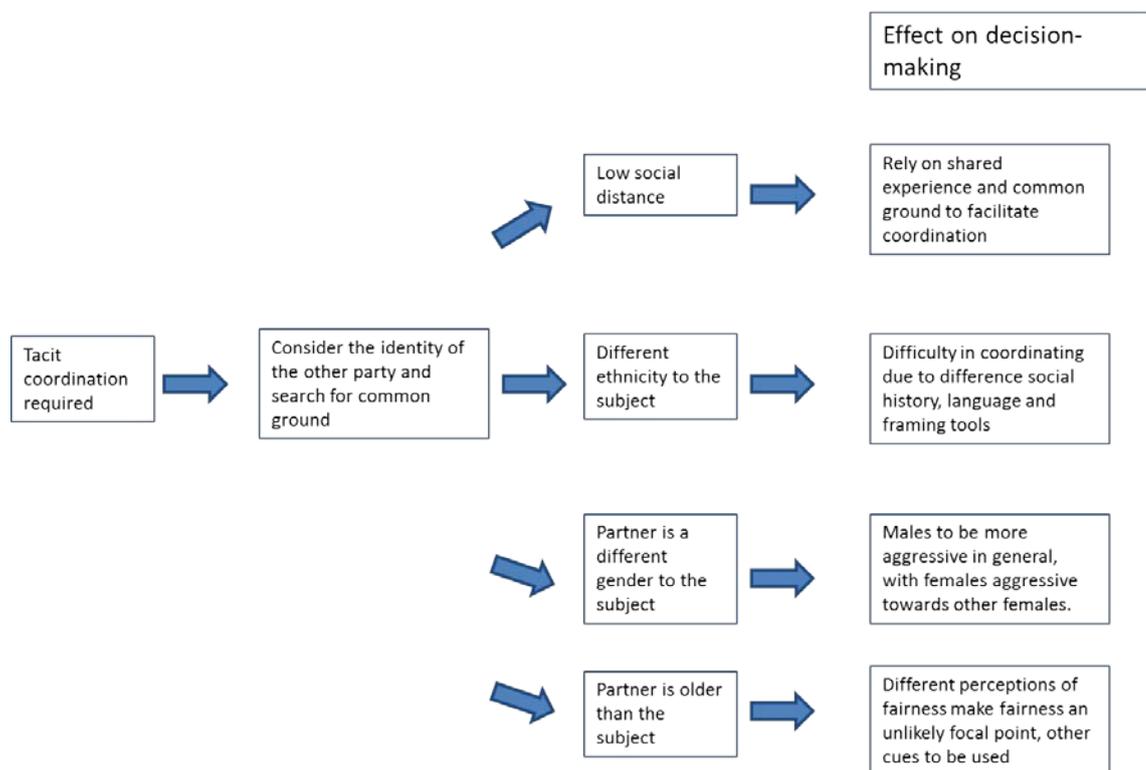
It has been found that gender stereotypes influence behaviour due to the expected behaviour from each gender (Bett, 2013). In general females select recreational games with less violent competition than those selected by males (Hartmann & Klimmt, 2006), which means that subjects could potentially control their external context to an extent according to their attitude towards conflict. In the Netherlands a study found that subjects used gender as a frame of reference in order to match or mismatch an opponent. Females matched with subjects with a feminine name invariably selected a gender-typical option when matching and increased their success at tacit coordination. In contrast, in the same study where subjects were asked to select an option that they thought their partner had not chosen, they focused on their differences rather than their similarities in order to successfully mismatch their partner (De Kwaadsteniet et al., 2012). While this shows that the gender of an opponent can be used as a tool in tacit coordination, the effect of gender has not been empirically tested in a more complex situation or in a society with the diversity available in South Africa where gender may be merely one aspect of similarity or difference between coordination partners. Interactions between focal points or framing structures and gender may influence cooperation tactics and strategies of participants.

2.4.4 Age

Age has an impact on bargaining and cooperative behaviour, with changes in perceptions of fairness as well as differing responses to seemingly unfair situations in different age groups (Murnighan & Saxon, 1998). While bargaining and cooperating may change, trustworthiness does not differ across age groups (Sutter & Kocher, 2007) which indicates that players of all ages should be inclined to cooperate similarly.

influencing individual decision-making. This research aims to understand the relationship between social factors and tacit coordination, and the impact and direction of this interaction on individual behaviour. Below is a proposed model of the impact of social distance, ethnicity, gender and age, according to the information available in current literature. Note that while there is little information available to make an inference on the likely effect on the outcome, differences between the subject and his or her respective partner are likely to result in difficulties in coordinating. As tacit coordination is a ubiquitous scenario in social and economic life, understanding the effects of these social factors may be used by antitrust regulators in flagging potential sources of tacit collusion, companies in formulating their team dynamics to ensure smooth functioning within and between departments, and by large companies with geographically scattered offices to enhance coordination between branches or units.

Figure 5. A proposed model showing the likely effects of social factors on tacit coordination decision-making



2.6 Summary

Tacit coordination is used by individuals in a variety of situations, from social interactions, to working together within a firm to managing decision-making between firms. As tacit coordination is often more successful than can be explained by pure probability or by a

stochastic learning model, game theory has been used to try and model decision-making in tacit scenarios. A key concept used to explain the mechanism used in tacit coordination is focal point theory which states that certain options hold some significance to decision-makers. These focal points vary in salience depending on context, personal background and framing. Focal point theory has been extended with the use of the team reasoning and cognitive hierarchy model which considers how tacit coordination partners understand the actions and competence of each other. While much work has been done on the intrinsic factors affecting tacit coordination decision-making, very little has been done to understand the implication of extrinsic factors such as context, specifically the social cues provided by the identity of the other player. Understanding the role of social factors related to the identity of the coordination partner will allow antitrust regulators to flag potential sources of tacit collusion, inform multinational companies about methods to enhance coordination and inform smaller firms about ways to structure their teams to maximise coordination.

CHAPTER 3: RESEARCH HYPOTHESES

The theory presented in Chapter 2 highlights the fact that focal points are used to increase the success of tacit coordination. These focal points are in themselves highly sensitive to contextual factors such as framing, language and context. Game situations have to be tested empirically with human subjects as rational thought and pure game theory are unable to replicate these effects (Schelling, 1960). The combination of the 'human factor' as identified by Schelling (1960) and the inherent difficulty in pinpointing the incidence of tacit cooperation makes it a tricky subject to navigate.

3.1 Research question

The main research question posed is: do age, gender, ethnicity and/or social distance affect the use of tacit coordination in individuals through focal points in tacit coordination games? This was tested in two separate studies.

In the first study players were presented with closed sets for picking and guessing. The hypotheses tested are as follows:

Prediction: Coordination success will increase with decreased social distance between players;

- a. H_0 : cooperation score of a pair of strangers = cooperation score of a pair of colleagues
- b. H_1 : cooperation score of strangers < cooperation score of colleagues

In the second experiment players were presented with scenarios where they had to share resources with a partner. Hypotheses tested are as follows:

Prediction 1: Players will defer to partners of an ethnic group different from their own during unequal pay-off scenarios;

- a. H_0 : Amount claimed from control partner = amount claimed from a partner of a different ethnic group
- b. H_1 : Amount claimed from control partner < amount claimed from a partner of a different ethnic group

Prediction 2: Women will defer to men in unequal pay-off scenarios;

- a. H_0 : Amount claimed from control partner = amount claimed from a partner of a different gender
- b. H_1 : Amount claimed from control partner \neq amount claimed from a partner of a different gender

Prediction 3: Younger players will defer to older players in unequal pay-off situations

- c. H_0 : Amount claimed from control partner = amount claimed from an older partner
- d. H_1 : Amount claimed from control partner $>$ amount claimed from an older partner

3.2 Summary

This chapter has outlined the main research questions and associated predictions and hypotheses. These hypotheses centre on the contextual cues provided by the identity of the other player in determining the behaviour of the subject. The following chapter describes the research methodology used to test the above hypotheses.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 The Nature of the Study

As rational thought and pure game theory are unable to replicate the results provided by human subjects (Schelling, 1960), an empirical experimental approach was used. In an experimental study variables are manipulated in a controlled setting which allows for systematic examination of the effect of variables under investigation (D. R. Cooper & Schindler, 2013). An experimental approach also allowed for a high degree of control of the context of the scenarios as focal points are extremely sensitive to situational factors (e.g. Alós-Ferrer & Kuzmics, 2013).

The research consisted of one main research question: do age, gender, ethnicity and/or social distance affect the use of tacit coordination in individuals through focal points in tacit coordination games? This was divided into two separate research questions which were tested separately. First, the effect of social distance was tested by measuring the rate of coordination in pairs of people who knew each other quite well, and pairs of strangers. Second, the effect of visible demographic cues was tested through a game where players had to share resources with a partner. The partner belonged to different demographic treatments as outlined in section 4.5.2 below. The number of resources (points in this case) players allocated to themselves or to their partners indicates their coordination behaviour when everything except the demographic variable in question is held constant. The experiments are described in more detail below.

4.2 Population of Relevance

In the evolution of focal points, people tend to diverge from existing salient social points in a similar manner to those of similar social standing and education (Heath, Ho, & Berger, 2006). The use of sample groups where this is relatively standard within the group should render this effect to be negligible. For this reason subjects were kept as similar as possible with all subjects being knowledge workers between the ages of 25 and 35 and each with at least one postgraduate degree obtained or in progress. To reduce variance in results and to control for differing social history or factors of context, a repeated measures design was used to test the effect of demographic factors (research question 2) to ensure meaningful results that can be generalised to a larger population.

4.3 Sampling Method and Size

Due to the fact that the nature of focal point theory requires subjects to be relatively similar in terms of social status and education, probability sampling was not possible for this study. Any research question requires an approach that considers the most efficient sampling protocol and experimental design to efficiently test the relevant hypotheses (Hulley, Cummings, Browner, Grady, & Newman, 2013). In this case a repeated measures design was deemed the most appropriate method to reduce the impact of non-probability sampling on the outcome of manipulations. As a researcher must ensure that extraneous variables do not influence the outcome of an experimental process (D. R. Cooper & Schindler, 2013), two classes of MBA students at the Gordon Institute of Business Science provided a convenient and controlled sampling environment.

The first study involved the comparison of effectiveness of coordination between that achieved by pairs who were well acquainted (low social distance) and strangers (high social distance). This was achieved by measuring coordination with self-selected pairings within two classes of MBA students and then by creating high distance partnerships by providing each person with the name of their partner in the other class. Classes were of consecutive cohorts and therefore the risk of acquaintance was low. Fifty-six pairings were measured, 28 low social distance pairings and 28 high distance pairings.

The second study investigated the role of visible cues (age, gender and ethnicity) in influencing cooperative behaviour in a situation where participants were required to tacitly coordinate with an opponent in order to share resources. In this case subjects in one class were paired with stock photographs representing their partners in each of four scenarios. A class-list was made available to the researcher and so for two days prior to the testing session each potential participant was matched with fictional partners based on their own demographic characteristics, which were confirmed against the demographic details each participant provided. Data were discarded where the assumed demographic details did not match the actual demographic details of a participant. A sample size of 38 subjects was used in analysis, with eight of the samples of people with similar social history characteristics collected subsequently to supplement the original dataset.

A repeated measures design was used. Repeated measures reduces overall variability by using the same subjects for all treatments, while allowing for the removal of differences between subjects (Howell, 2012). This leads to a reduction in required sample size when compared to experiments using stratified groups (Lawal, 2014) and also reduces the potential confounding effects of individual experience and social history which have been found to have a significant effect on the use of focal points (Alós-Ferrer & Kuzmics, 2013). The experiment on social distance was constructed for repeated-measures analysis, however to group scores by participant resulted in duplicate scores for each partnership. As a result the data were analysed per partnership as each partnership was only measured once and can therefore be considered an independent sample.

4.4 Data Quality

Data quality is influenced by the type of data, the source of the data, methods of data collection and methods of data preparation (Wegner, 2010). Each of these sources of data quality is discussed below as relevant to the research project.

4.4.1 Data type

The data collected in this study are quantitative and numeric in nature as all data consists of scores of subjects in the two research question experiments. As scores consist of whole numbers or integers it can be further categorised as ratio-scaled discrete data (Wegner, 2010). Numeric data allows for extensive statistical analysis as most statistical tests are designed to interrogate ratio data (Wegner, 2010).

4.4.2 Source of data

The nature of experimental research necessitates the collection of primary data. Primary data is data that is collected for a specific purpose at the time of the study as compared to secondary data which is data that already exists in some format (Wegner, 2010). The benefit of primary data is that it is typically high quality in terms of relevancy and accuracy, and the control of the researcher over the data collection process ensures that the data is relevant to the research question (Wegner, 2010).

4.4.3 Method of data collection

The method of data collection employed for the research was experimental. Experimental data collection allows for the manipulation of variables under investigation in controlled conditions (D. R. Cooper & Schindler, 2013). The advantage of experimental data collection

is that the data is of high quality, with lower levels of noise than data collected in other methods such as observations or surveys. This means that statistical testing of experimental data is typically more reliable than data collected in other ways. A disadvantage of experimental data collection is that certain factors can be difficult to control, which may lead to erroneous conclusions (Wegner, 2010).

4.4.4 Data preparation

Data preparation took place in three stages. In the first stage, data relevancy was ascertained to determine if the correct variables had been selected for analysis (Wegner, 2010). As the nature of this research was experimental, the variables in question were determined during the formulation of the research question and associated hypotheses. The second stage of data preparation was data cleaning, where data was checked for outliers, typographic errors and extreme values (Wegner, 2010). Data cleaning took place in the first stage of analysis as data capture was checked by a third party to ensure accuracy, and data were inspected visually for extreme values and outliers through the use of graphs and stem-and-leaf plots.

4.5 Data Collection Process

The data collected was facilitated through the use of two instruments: a table of closed sets for picking and guessing, adapted from Rojo Arjona (2010) in order to fit a South African context. The second research question was approached using a subset of grids selected from the collection published by Isoni et al. (2011).

Demographic information (age, ethnicity and gender) was collected prior to starting the experiments. The form for collecting demographic information was developed by the researcher and can be seen in Appendix 3. Collecting demographic information was used to confirm that the prepared test pack was accurate (in the cases where subjects were not paired with appropriate subjects their results were discarded). Collecting such data long before it was used was also done intentionally to try to reduce framing effects in the second experiment.

The data collection process allowed for a standardised approach with large groups of subjects tested simultaneously in order to reduce the impacts of extraneous factors which could influence the validity of the research. Unfortunately it was not possible to gather

data on reactions or comments of subjects as the groups were simply too large to monitor each subject. The researcher did note down a number of remarks from subjects during the process. While these comments are not treated as analysable data, and not weighted as such, they provided valuable insight into possible motivations for subject behaviour and are included in the discussion in Chapter 6 to assist in contextualising the results.

4.5.1 Closed sets for picking and guessing

The object of this test was to answer Research Question 1. The prediction for the outcome was as follows: Coordination success will increase with decreased social distance between players.

Participants were provided with two copies of the table of closed sets for picking and guessing (Appendix 1). The table was adapted from Rojo Arjona (2010) to fit a South African context (i.e. removing and replacing brands or items not found in South Africa) and a Likert scale of social distance was added by the researcher. For the low social distance trial subjects were requested to try to match the choices of the person sitting nearest to them, as this was likely to be the person in the group with whom they were most familiar. In the high social distance treatment subjects were provided with the name of a person in the other group. In both cases subjects were asked to identify how well they knew their partner on a five-point scale ranging from 1: Very Well to 5: Not at all/ know by sight or name only. In the case where the partner was familiar with the person from the other group (high social distance) their tests were discarded. The order of treatments was randomised for the first potential subject and alternated thereafter in the pre-prepared experiment packs.

The table consisted of fourteen categories with five options available per category. Participants were asked to mark one item in each category with an aim of matching the choices made by their partner. The order in which treatments were presented to subjects was alternated to reduce the impact of possible order effects confounding the results.

Subjects were told “The purpose of the game is to determine how well you can match another person’s selections without talking to them. In each line select one option which you think that the other person would have selected. You will score one point for each item that matches and no points for items that do not match. If you select more than one

option the question will not be counted.”

4.5.2 Grids

To test for the effects of social composition on unequal payoff games, the experimental protocol described in Isoni et al. (2011) was adapted. The purpose of this experiment was to answer Research Question 2. The predicted outcome is as follows: Subjects will defer to people of a social group different from their own when dividing resources.

In each iteration participants were presented with a 9x9 grid with one square demarcated as theirs (coloured blue) and another demarcated as belonging to their partner (coloured red). Scattered around the board were circles each containing a number which represented the payoff. Participants were asked to circle the numbers which they claimed as theirs, and to cross out numbers which they believed belonged to their partner. The objective, as far as the participant was told, was to maximise their revenue from the grid scenarios by matching their partner’s choices as closely as possible. Participants were told: “For each of the following questions you will be provided with a grid containing two squares and a number of circles. The blue square represents you and the red square represents the position of your partner. Each of the circles contains a number which indicates the points assigned to it. In each case you must assign which of the circles you believe belongs to your square by circling them. Circles that you believe belong to your partner must be indicated by crossing them out. All circles must be assigned. Points will be assigned by adding the numbers in the circles selected by you. If you and your partner do not match (i.e. you have both assigned the same circle to yourselves) the points will be subtracted from your scores. A photograph of your partner has been attached to each page. They have already made their selection.”

Subjects completed four sets of six grids (Appendix 2), one set as a control treatment and three experimental treatment sets. In each case six grids were provided on a single sheet of paper, with a photograph of their partner stapled to the top right hand corner of the page. Each participant went through the following four treatments:

1. Control treatment, with a partner of similar age and the same gender and ethnicity as the subject.
2. Gender treatment, where the partner was of a similar age and ethnicity but a differing gender to the subject.

3. Age treatment, where the partner was of the same gender and ethnicity but much older than the subject.
4. Ethnicity treatment, where the partner was a similar age and the same gender as the subject, but a different ethnicity.

The order in which subjects underwent treatments was randomised for the first subject and cyclically alternated thereafter to remove potential treatment order-effects. As pairing participants was not possible because participation was voluntary and several potential subjects elected not to participate in the study, partners did not exist, and the photographs of partners were sourced from Shutterstock.com, a database of stock photographs. Using pictures as a substitute for physical opponents has worked successfully in previous studies (e.g., Scharlemann et al., 2001) and allows for standardising of opponents to remove the effects of attractiveness, facial expression and other cues which may affect the outcome of the game. All 'partner' photographs were of people smiling, dressed in business attire to standardise for effects of social status beyond that inherent in the stereotype of the treatment.

4.6 Pilot testing

Prior to the collection of data from the two experimental groups, the experiment packs were tested in a pilot study on four individuals. Pilot testing is used to detect weaknesses in research design and to refine processes used in research without compromising data collection (D. R. Cooper & Schindler, 2013). Issues were addressed such as explaining the games; problems with understanding the games; and the effect of order of treatments particularly in the closed sets for picking and guessing were identified. The selection of grids was finalised in this stage as it was found that grids that were relatively simple to divide fairly were not considered in terms of the partner but rather through the focal point of fairness. The final grid selection used grids that were deemed the 'most unfair' by pilot participants as this was more likely to provide relevant results to answer the research question. The photographs of opponents were also analysed for believability and the most effective brand of photo-paper was chosen by pilot subjects. Following the pilot study the experimental protocol was adapted accordingly before data was collected. Pilot data was not included in analysis as it was collected with a slightly different use of wording and framing to data collected in experimental sessions.

4.7 Preparation and Distribution

The test instruments were physically administered. Each subject was given an experiment pack. The first group was given a pack that consisted of a consent form, a demographic information table and two sets of the closed sets for picking and guessing. The second group were given a pack consisting of a consent form, demographic information table, two tables of closed sets for picking and guessing and four sets of grids with photographs of opponents pre-matched to their demographic profile. Testing took approximately fifteen minutes.

4.8 Data Analysis Approach

Data analysis consisted of capturing data, testing the assumptions of normal distribution, descriptive statistics and the selection of appropriate statistical tests and then statistical testing.

4.8.1 Capturing the Data

All data was captured in Microsoft Excel before transfer to SPSS.

4.8.1.1 Research Question 1

Closed sets for picking and guessing were scored for coordination success per partnership with each successful coordination selection being scored as one point (to a maximum of 14 for the pairing). Each partnership was coded by social distance as either 'high distance' or 'low distance' based on the scale of how well the partners knew each other. In all cases high distance pairings were partnerships where both respondents indicated that they did not know each other, while low distance partnerships were pairings where partners indicated that they knew each other either extremely well (close friend or family) or relatively well (friend or colleague).

4.8.1.2 Research Question 2

The total number of points claimed by each subject was totalled per treatment. A total of 64 points were available across all six grids, and no participant selected all available points. These were grouped by the ID code given to each subject to allow for repeated-measures analysis and four scores were allocated to each subject, coded per treatment. Treatments were coded as control, gender, age and ethnicity as according to the partner photograph provided.

4.8.2 Descriptive Statistics

Descriptive statistics were used to provide a general overview of the data. These descriptive statistics include the mean median and mode for each experiment as well as the standard deviations of the data. Data were also represented graphically. Due to the repeated-measures analysis used in analysing the grid data not much emphasis was placed on descriptive statistics as within subject variation tends to be much finer than between-subject variation.

4.8.3 Statistical Analysis

All statistical testing was done in SPSS version 22. In all cases α was set to 5%.

4.8.3.1 Research Question 1

Although the data were gathered with a view to a repeated-measures analysis, analysing coordination success by person rather than by partnership led to duplication of results and therefore an artificially large sample size. Instead, each partnership was considered separately, and a Mann-Whitney U test was performed to analyse the difference between scores obtained by partnerships with high and low social distances. Assumptions of normality for parametric testing were tested with a Shapiro-Wilk test for normality as well as measures of skewness. The results of the test for normality showed that non-parametric testing was appropriate, hence the use of a Mann-Whitney U test.

The findings of the Mann-Whitney U test, as shown in Chapter 5, contained enough information to draw conclusions on the research and so the analysis did not progress to statistical modelling.

4.8.3.2 Research Question 2

Differences were calculated by comparing the payoff outcome (the total number of points claimed by the participant) for each player in each treatment to the payoff score calculated in the control treatment. The scores across treatments were compared using a repeated-measures mixed model with the treatment as a fixed effect.

A mixed model was appropriate in this case as it allowed for the inclusion of the gender and ethnicity of subjects as random effect covariates to determine whether or not the demographics of the subject had a significant effect on the outcome of the experiment. Mixed models are also flexible to the correlations implicit in repeated-measures data which can violate the assumptions of classic ANOVA and regression models (Seltman, 2012). A mixed model gives parameter estimates of the effects of treatment in the presence of internal correlation of a data hierarchy (in this case repeated measures of individuals), without reducing the power of the test through testing for differences between individuals and therefore losing degrees of freedom (Seltman, 2012).

4.9 Validity and Reliability

Validity of research concerns how true the results are. There are two types of validity, internal validity which asks whether the conclusions drawn about a relationship between a variable and the outcome truly implies cause, and external validity which asks whether or not the observed relationship can be generalised to other people, settings and situations (D. R. Cooper & Schindler, 2013).

Internal validity questions whether or not confounding factors influence the outcome of the experiment, rather than the variable in question. The experiments conducted to answer the research questions show relatively high internal validity for a number of reasons.

First, there is no chance of a history effect taking place. A history effect, a common problem in repeated-measures designs, occurs when subjects are tested at different intervals, and so extrinsic events could alter the results of later measures (D. R. Cooper & Schindler, 2013). The fact that all data were collected in a single sitting minimises the risk of a history effect taking place. The fact that demographic information was collected before the first experiment when it was only relevant to the second is an example of the history effect being used to reduce the chance of subjects realising the purpose of the second experiment, and therefore reduced the risk of it confounding the outcome.

Maturation is an effect that occurs when the subject changes during the testing process (D. R. Cooper & Schindler, 2013). An example of maturation is the effect of a subject becoming tired after prolonged testing possibly responding differently to the outset of

testing. This was minimised in this research by the use of subsets of grids to reduce testing time, as well as the alternation of treatments between subjects to ensure that maturation would be constant across subjects and therefore unlikely to affect the results.

The process of testing can alter the responses of individuals, as can changes in instrumentation, unequal groups in different treatments or changes in the test group (D. R. Cooper & Schindler, 2013). These factors were all reduced by virtue of the fact that the experiment was conducted in a single sitting, by the use of pilot testing to finalise the testing instruments and through the use of a repeated measures design where all subjects were exposed to all treatments. The first group only participated in the first experiment as many of the group were familiar with the design of the second and therefore could have threatened the internal validity of the study.

External validity questions whether the testing process itself influences the outcome of the results which may affect the ability to meaningfully generalise the results to other contexts. This can be a result of the way the experiment is introduced, the selection of subjects and the setting of the experiment (D. R. Cooper & Schindler, 2013). While the research design minimised the risk of internal validity, and careful use of wording and framing reduced the risk of interfering with external validity, care must be taken in generalising the results to other populations. In this case the use of a standard test group with high levels of education may have affected the ability of the results to be generalised across other groups, but this allows for an advantage over results gained the same way using probability sampling. By sampling a subset of individuals likely to become leaders, it is possible to investigate the social factors influencing tacit coordination in people required to make high-level decisions. Considering the social history of South Africa it is also an advantage to test people of a similar age and class as it is unlikely to result in the confounding effects of personal history between subjects born before and after the end of apartheid in 1994. Testing this subset also raises an opportunity to study the impact of education and social welfare on tacit coordination in future studies.

4.10 Research Limitations

The research conducted in this research project had the following limitations:

- The grids used in the second stage of testing are a subsample of the original instrument. Due to concerns over participant fatigue and the inherent risk of

compromising internal validity, each participant was required to complete four sets of six grids, rather than complete sets of 24 per treatment.

- The nature of assigning subjects to demographic groups prior to testing was, given the diversity evident in South Africa, simplistic. It would be advisable to consider a finer scale of demographic groupings to provide subjects with partners of their own cultural heritage, but the time constraints of the project did not allow for this.
- The sample size was relatively low for this type of research, and from a very diverse population. While the sample was adequate for statistical analysis, the results must be interpreted with the characteristics of the sample in mind.
- Convenience sampling may result in data that is not suitable to make inferences to the broader population. While a repeated measures design reduces the impact of this by focusing on an individual level, future testing of groups with more diverse backgrounds and social histories may assist in calibrating these data.

4.11 Ethical Note

The research contained in this report was approved by the Research Ethics Committee of GIBS prior to any collection of data. The protocol carried out in the research process adhered to ethical standards as set out in student guidelines as approved by the committee. This included the full anonymity and confidentiality of subjects who participated voluntarily in the research and they were able to withdraw at any time in the process.

4.12 Summary

This chapter outlined the design of the research and the methodology employed by the researcher. The validity of the research was examined and the logic for selecting analytic tools was shown. The chapter concluded with limitations inherent to the research design. The results of the research are reported in Chapter 5.

Appendix 1 – closed sets for picking and guessing, to test the effect of social distance on coordination

Name of participant _____

Name of partner _____

How well do you know your partner (please select from the choices below)

Very well (close friend/family)

Relatively well (friend or colleague)

Acquaintance

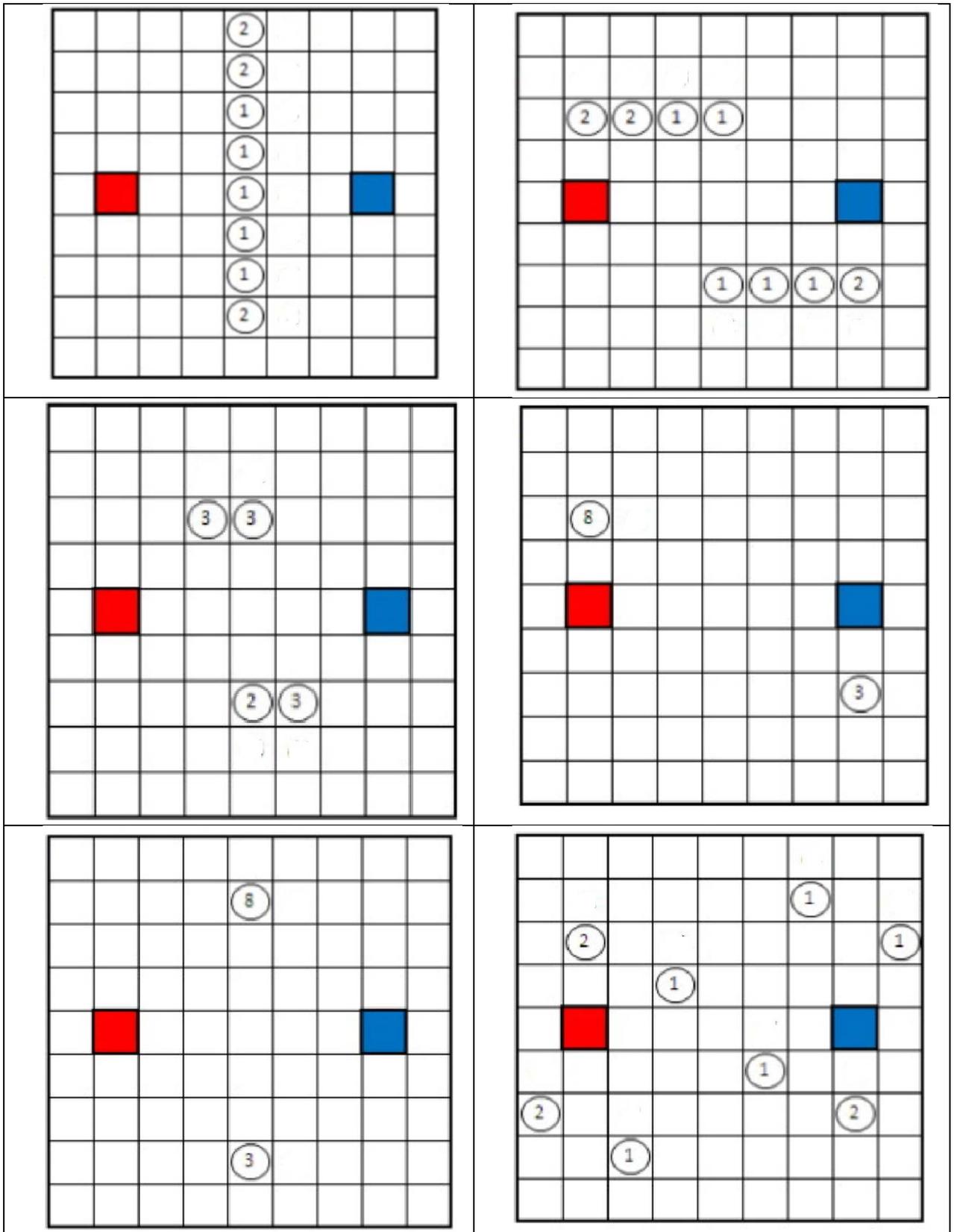
I know them by sight but we are not well acquainted

I don't know this person

Closed sets for picking and guessing

Category	Option 1	Option 2	Option 3	Option 4	Option 5
City	JOHANNESBURG	NELSPRUIT	MAFIKENG	CAPE TOWN	BLOEMFONTEIN
Fruit	ORANGE	MANGO	APPLE	PEAR	BANANA
Sport	TENNIS	CRICKET	SOCCER	SWIMMING	RUGBY
Number	1	2	5	7	10
Supermarket	PICK N PAY	SPAR	CHECKERS	WOOLWORTHS	SHOPRITE
Flower	SUNFLOWER	ROSE	PROTEA	DAISY	SWEETPEA
Furniture	DESK	COUCH	TABLE	BED	CHAIR
Car	HONDA	MERCEDES	FORD	FERRARI	BMW
Fast food	KFC	MCDONALDS	BURGER KING	NANDOS	STEERS
Animal	LION	MONKEY	DOG	TIGER	CAT
Colour	GREEN	BLACK	RED	YELLOW	BLUE
Metal	ALUMINIUM	GOLD	IRON	SILVER	STEEL
Drink	WATER	JUICE	BEER	TEA	COKE
Superhero	SUPERMAN	BATMAN	SPIDERMAN	IRONMAN	THE HULK

Appendix 2 – grids for point allocation paired with different demographic treatments



Appendix 3 – demographic information sheet filled out by subjects prior to the start of experiments

Please complete the following:

Name _____

Age _____

Gender _____

Ethnic group with which you identify _____

CHAPTER 5: RESULTS

The previous chapter outlined the methodology employed by the researcher in order to answer the main research question: do age, gender, ethnicity and/or social distance affect the use of tacit coordination in individuals through focal points in tacit coordination games? This question was investigated by way of two subsequent questions. As the instruments used to answer each question were different, the results obtained are presented in two separate sections below. In both cases the results are presented first by way of descriptive statistics, then as the results of statistical testing.

5.1 Research Question 1

The first study centred on the role of social distance in facilitating successful coordination. The predicted outcome was that coordination success would increase with decreased social distance between players.

5.1.1 Descriptive statistics

Fifty-six pairings were measured in this part of the study. Each pair attempted to match answers on a table of closed sets for picking and guessing. Twenty-eight pairs consisted of subjects who were well acquainted and 28 pairs consisted of strangers. The descriptive statistics of each group are shown in the table below. The statistics are grouped into the three traditional areas of describing data profiles: central location which describes the representative value of data concentration, dispersion which shows the spread of the data around the central location, and shape which describes the level at which the sample distribution was skewed (Wegner, 2010).

Table 1. Descriptive statistics of coordination success of groups with a high and a low social distance.

	statistic	Low social distance (n=28)	high social distance (n=28)
central location	mean	4,75	3,18
	median	5	3
	mode	6	3
	standard deviation	1,77	1,36
dispersion	range	7	4
	variance	3,16	1,86

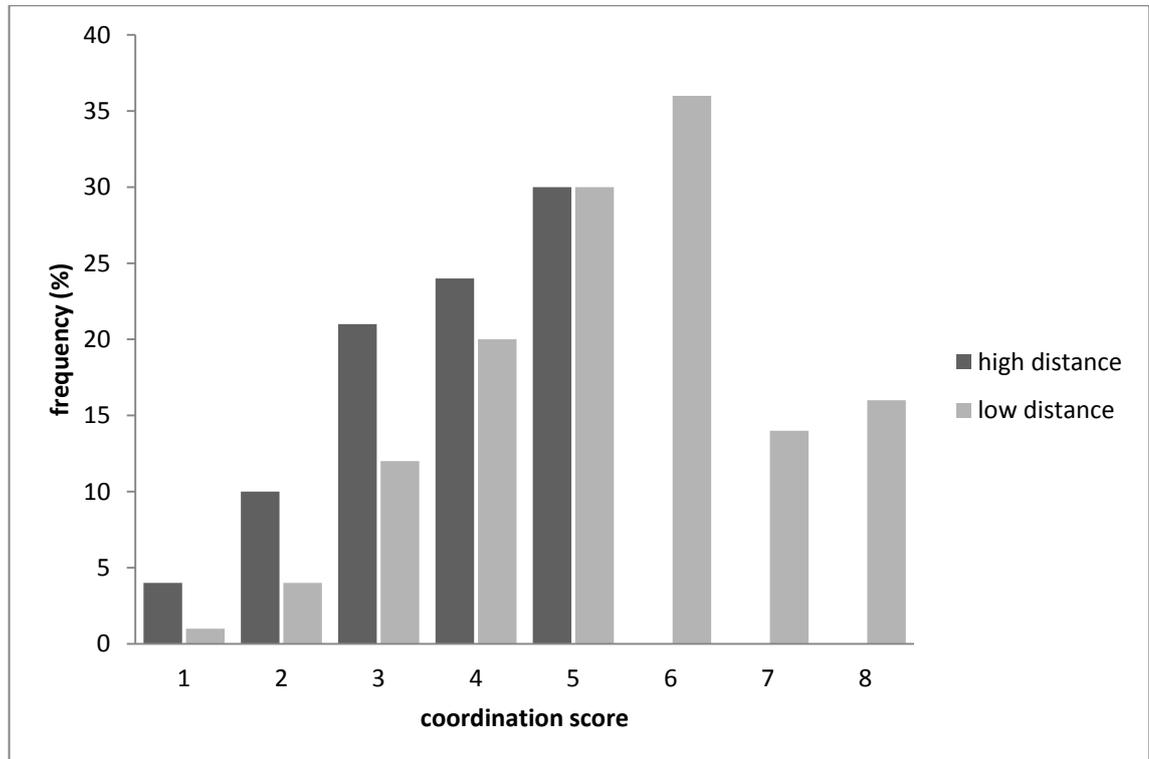
	statistic	Low social distance (n=28)	high social distance (n=28)
	coefficient of variation	37.3%	42.8%
shape	skewness	-0,101	-0,158

The descriptive statistics show that the group with pairings of a low social distance had an average success of 4.75 (out of a possible 14). The median and mode are slightly higher than the mean which suggests that the sample may be negatively skewed (Wegner, 2010). The pairings with a high social distance had an average coordination success of 3, with an equivalent median and mode which suggests a symmetrical distribution. The dispersion, or spread, of the data indicates that the results were clustered around the mean in the pairs with a high social distance (standard deviation of 1.36, variance of 1.86 and range of 4). This indicates that the central location values have a high likelihood of representing the sample. The pairings with a low social distance show more of a spread than those with high social distance. The variance of the low social distance group is 3.16, almost double that of the group with a high social distance (1.86) and the range is much larger, at 7, as compared to the range of 4 for the high social distance group. The coefficient of variation shows that the relative variability of both groups is quite high, and slightly higher in the high social distance group than the low social distance group. This means that the data for the low social distance pairings is more spread around the central location than that of the other treatment.

Skewness indicates the shape of the data around the central location. In both cases the skewness is between zero and minus one which indicates that, while the histograms for both treatments are negatively skewed, the skewness is not excessive or caused by extreme outliers (Wegner, 2010).

A visual representation of the results is shown in the histogram below. The histogram shows that the group with a low social distance had a wider spread of scores than that with a high social distance, but these scores are typically higher than the high social distance pairings.

Figure 6. A histogram showing coordination scores in closed sets for picking and guessing of pairs with a high social distance between partners and pairs with a low social distance between partners.



5.1.2 Inferential statistics and hypothesis testing

Inferential statistics allows for the testing of the hypotheses outlined in Chapter 3. The first research question focused on the effect of social distance on coordination success. Therefore the hypotheses were as follows:

H_0 : cooperation score of a pair of strangers = cooperation score of a pair of colleagues

H_1 : cooperation score of strangers < cooperation score of colleagues

Before determining the appropriate statistical testing, it must be determined whether or not the data fit the assumptions of a normal distribution with homoscedasticity of variance. As the sample size is less than 50, a Shapiro-Wilk test for normality is the most appropriate test to use to test the assumptions of a normal distribution (Pallant, 2010). The coordination scores for the pairs with a low social distance did not differ significantly from a normal distribution ($W_{28} = 0.967$, $p = 0.514$), however the pairs with a high social distance did differ from a normal distribution ($W_{28} = 0.903$, $p = 0.013$) and therefore parametric tests are not appropriate to test the hypotheses of the research question (Pallant, 2010). A Mann-Whitney U test was used to compare the groups, as no pair was

measured more than once which fitted the assumptions required to conduct the test. The test showed that in general the pairs with low social distance had a higher coordination score (mean rank = 35.57, sum of ranks = 996) than pairs with a high social distance (mean rank = 21.43, sum of ranks = 600). The test shows that there is a significant difference between the two groups ($U = 194$, $p = 0.001$).

From the results of statistical testing the null hypothesis is rejected in favour of the alternate hypothesis: this means that the coordination score of colleagues is higher than the coordination score of strangers, and that social distance is a predictor of coordination success.

5.2 Research Question 2

The second study centred on how the coordination behaviour of games would be affected by the demographic characteristics of the coordination partner. The prediction was that players would defer to partners with differing characteristics to themselves, by claiming fewer of the resources that they have to share with a partner.

5.2.1 Descriptive statistics

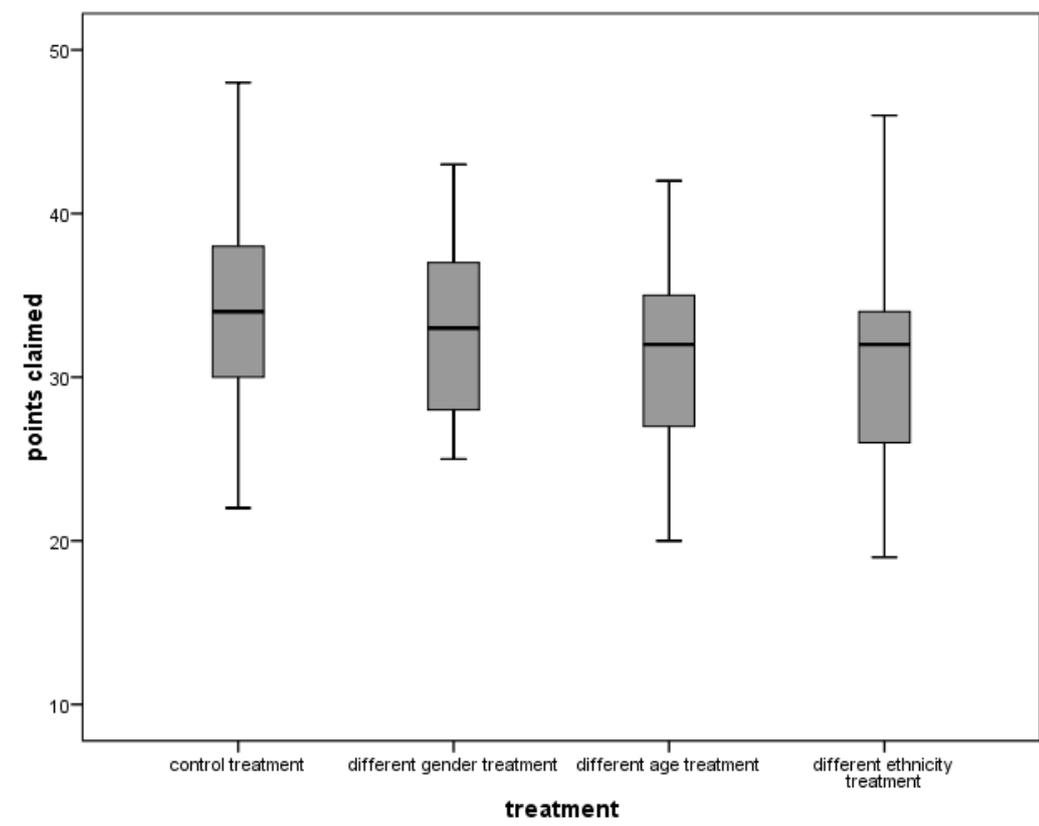
Thirty-eight subjects were tested in all four treatments. Each subject was given four identical sets of grids, containing a total of 64 points which could be allocated either to themselves or to their partner. The treatment was the demographic identity of the partner, provided by way of a photograph stapled to each sheet. Descriptive statistics are shown in the table below for each treatment. It must be noted that as the design of the experiment was repeated-measures, the overall descriptive statistics provide an overall picture of the results, but do not account for within-subject effects and therefore are not likely to show the precise patterns found in statistical modelling. Rather, descriptive statistics show a general overview of the nature of the data. As in the results for the previous research question, descriptive statistics are grouped into central location, dispersion and shape.

Table 2. Descriptive statistics of coordination success of groups with a high and a low social distance.

	statistic	control treatment	different gender treatment	different age treatment	different ethnicity treatment
central location	mean	34,16	32,92	31,26	30,89
	median	34	33	32	32
	mode	32	31	33	26
Dispersion	standard deviation	5,93	5,11	5,13	5,59
	range	26	18	22	27
	variance	35,11	26,13	26,36	31,29
	coefficient of variation	17.4%	15.5%	16.4%	18.1%
Shape	skewness	0,15	0,26	-0,02	0,211

The descriptive statistics show that the control treatment had the highest score, which means that participants allocated the most points to themselves in this treatment (medians shown in Figure 7 below). The lowest mean occurred in the treatment where the partner was of a different ethnicity to the subject. In all treatments except the age treatment, the mean is higher than the mode which indicates a positively skewed histogram (Wegner, 2010). In the age treatment the mean is lower than the mode which indicates negative skewness. The standard deviations of all treatments are similar, between five and six, although the ranges differ, with age and gender showing much narrower ranges than the control treatment and the ethnicity treatment. The coefficient of variation ranges between 15 and 18 percent, which indicates low relative variability across all treatments. In all cases skewness falls between zero and one or negative one which suggests that the skewness is not excessive.

Figure 7. Points claimed by individuals in each treatment. Boxes indicate interquartile range with the median indicated within each box. Bars indicate range.



5.2.2 Statistical model building and hypothesis testing

As the nature of the data does not lend itself to inferential testing, in order to test the hypotheses outlined in Chapter 3, the researcher proceeded to statistical modelling.

The research question asked whether age, gender or ethnicity would have an impact on the coordination behaviour of a subject, when paired with a partner of differing demographic status to themselves. The sub-predictions and associated hypotheses follow the model.

A linear mixed effects model allowed for the concurrent testing of all hypotheses which reduces the probability of additive errors from pairwise analysis (e.g. Shi, Pavey, & Carter, 2012). This means that inferential statistics were not used in this case as they would not add any useful information that could be gained through statistical modelling. In addition, normality does not affect the parameter estimates of a mixed model and therefore does not require the testing of parametric assumptions prior to model building (Gelman & Hill, 2012).

The model showed a significant main effect of treatment $F_{3,37} = 3.70$, $p = 0.02$. This shows that the treatment has significant predictive value for the number of points claimed by participants. The ethnicity of the subject was not a significant predictor of the outcome ($F_{1,35} = 1.28$, $p = 0.26$) and nor was the gender of the subject ($F_{1,35} = 0.14$, $p = 0.71$).

A Least Significant Difference pairwise comparison identified the source of the differences between treatments. This can be used to accept or reject the hypothesis around which the study was built. The results from the pairwise comparisons are shown in the table below. While there were differences between treatments other than the control, these differences are not directly relevant to the research question and therefore identify avenues for further research. These will be discussed further in Chapter 7.

Table 3. Pairwise comparisons for treatment effects. Significant differences are highlighted in bold type.

(I) treatment	(J) treatment	Mean Difference (I-J)	Std. Error	df	p	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
Control	Gender	1.237	.951	37	0.202	-0.691	3.165
	Age	2.895	.955	37	0.004	0.959	4.831
	Ethnicity	3.263	1.175	37	0.009	0.882	5.644
Ethnicity	Control	-3.263	1.175	37	0.009	-5.644	-.882
	Gender	-2.026	1.161	37	0.089	-4.379	.326
	Age	-.368	1.012	37	0.718	-2.418	1.681
Gender	Control	-1.237	0.951	37	0.202	-3.165	.691
	Age	1.658	.951	37	0.090	-0.270	3.586
	Ethnicity	2.026	1.161	37	0.089	-0.326	4.379
Age	Control	-2.895	0.955	37	0.004	-4.831	-.959
	Gender	-1.658	0.951	37	0.090	-3.586	.270
	Ethnicity	0.368	1.012	37	0.718	-1.681	2.418

Sub-prediction 1: Players will defer to partners of a differing ethnic group than their own during unequal pay-off scenarios;

H_0 : Amount claimed from control partner = amount claimed from a partner of a different ethnic group

H₁: Amount claimed from control partner < amount claimed from a partner of a different ethnic group

There was a significant difference between the control treatment and the treatment with a partner of a different ethnicity ($p = 0.009$), therefore the null hypothesis is rejected in favour of the alternate hypothesis. This means that subjects allocated more points to a partner of a different ethnicity to themselves than allocated to a control partner.

Sub-prediction 2: Women will defer to men in unequal pay-off scenarios;

H₀: Amount claimed from control partner = amount claimed from a partner of a different gender

H₁: Amount claimed from control partner \neq amount claimed from a partner of a different gender

There was no significant difference between the control treatment and the gender treatment ($p=0.202$), therefore the null hypothesis cannot be rejected. As noted above, there was no significant influence of the participants' gender on the outcome of the scenario. This means that subjects did not alter their behaviour if the coordination partner was of a different gender to themselves.

Sub-prediction 3: Younger players will defer to older players in unequal pay-off situations

e. H₀: Amount claimed from control partner = amount claimed from an older partner

f. H₁: Amount claimed from control partner > amount claimed from an older partner

There was a significant difference between the number of points claimed in the control treatment and those claimed in the treatment where subjects were paired ($p = 0.004$). The descriptive statistics confirmed that the mean amount claimed from an older partner was less than that claimed against a control partner. Thus, the null hypothesis is rejected in favour of the alternative hypothesis. Subjects claimed significantly fewer points from an older partner than from the control partner who was approximately the same age as the subject.

5.3 Summary

This chapter served to present the results of the study. This was done through

descriptive statistics and graphical representations, inferential statistics and the use of statistical modelling. Following the presentation of the results, hypotheses were selected based on the data presented. The results show that low social distance enhances tacit coordination. The second experiment showed that subjects deferred to partners of a differing ethnicity or age to them, but there was no effect of the gender of the coordination partner. The results will be discussed with regard to current literature and the implications of the findings in the following chapter.

CHAPTER 6: DISCUSSION OF RESULTS

This chapter discusses and analyses the results presented in Chapter 5, in light of relevant literature, as presented in Chapter 2 and in terms of the aims and objectives of the study as outlined in chapters 1 and 3. Implications of the findings are discussed in light of tacit coordination in individual interactions. As the study looked at two different aspects of social factors affecting tacit coordination, by way of two experiments, these findings are discussed separately.

6.1 Findings – Social Distance in Tacit Coordination

H₀: cooperation score of a pair of strangers = cooperation score of a pair of colleagues

H₁: cooperation score of strangers < cooperation score of colleagues

According to the statistical evidence presented in Chapter 5, using a Mann-Whitney U test to compare pairs, the p-value < 0.05 and therefore the null hypothesis was rejected. This means that pairings with a low social distance significantly outperformed pairings of a high social distance.

Of particular interest to the findings are *ad hoc* observations of subjects taken during the testing. While the format of testing large groups simultaneously served as a disadvantage in observing all subjects closely and as such observations were not statistically tested, comments overheard during the testing process provided important insight into how people manage situations where they must coordinate with strangers.

People tend to use stereotypes where other information is not available and the stereotype itself is relevant to the decision at hand (J. T. Crawford et al., 2011). This was shown by participants making remarks such as “Well his name is Venda, and in Venda they eat lots of mangoes, so I’m going to choose mangoes.” – Upon inspection following the trials, the subject’s partner had indeed selected ‘mango’ in the fruit category. Another subject said “I can’t figure out anything about this person from their name, but I know my name is obviously female so I’m going to act like a typical woman to help them to match me.” The pairing did not perform any better than average, but the clear intent to act out a stereotype is a fascinating example of the use of stereotypes to transmit information where communication is not possible. The fact that on occasion it did assist in coordination is contrary to the literature where providing information on a partner significantly increases

the risk of mis-coordination (Stoddard & Leibbrandt, 2014)

In a study in the Netherlands performed by De Kwaadsteniet et al. (2012), subjects were requested to coordinate with unknown partners to select colours, given only the name of their partner. Names of partners were typically male or female and colour choices consisted of pink, blue or yellow. In this study coordination was remarkably successful with subjects choosing the pink colour for a female partner and blue for a male partner (De Kwaadsteniet et al., 2012). This illustrates just how successful a relevant stereotype can be in assisting coordination, but in a situation where several selections must be made, in many cases where choices are not relevant to information that can be obtained from a name, it seems that social distance trumps stereotypes.

It is considered best practice in multinational corporations to establish areas of common ground to facilitate situations where communication is not possible and decisions must be made (Srikanth & Puranam, 2011). This common ground can be created through communication of what knowledge is known (and understood to be known by both parties) (Srikanth & Puranam, 2011) as well as by establishing norms through shared past experience (Hédoin, 2011) and organisational culture (Camerer & Malmendier, 2007). It is clear from the results of this research that shared experiences, manifested as low social distance, leads to an increase in tacit coordination effectiveness. This is despite the lack of future implications or requirements for reciprocity from the other player (as per Dufwenberg et al., 2011). In fact the only interest subjects had in their scores was to find out how well they scored in the low social distance pairing, which seemed to hold some kind of status in itself relevant to the strength of their relationship.

6.1.1 Research Question 1 Summary

The null hypothesis was rejected as pairs with a low social difference outperformed pairs with a high social distance. This was despite the use of stereotypes gleaned from the name of partner of high social distance. This indicates that while stereotypes can be used to facilitate tacit coordination, these are highly context-specific and not nearly as effective as shared past experiences.

6.2 Findings – demographic factors influencing cooperation

In most cases, subjects behaved differently when they had to coordinate with a partner that looked like them than when the partner was different in some way. This shows that when all that is available to a decision-maker is the demographic makeup of their tacit coordination partner, they are using information from their partner's demographics relative to their own to facilitate coordination. The fact that the mixed model did not find an effect of the demographics of the subject shows that this occurs relative to the identity of the subject and does not differ across gender or ethnic lines. A previous study found that men deferred to female partners, and women did not cooperate with other women (Scharlemann et al., 2001) and so it was expected that different genders at least would behave differently, but this was not the case in this study.

6.2.1 The effect of ethnicity on tacit coordination

H_0 : Amount claimed from control partner = amount claimed from a partner of a different ethnic group

H_1 : Amount claimed from control partner < amount claimed from a partner of a different ethnic group

The null hypothesis was rejected in favour of the alternate hypothesis. Subjects claimed more points in the control treatment than in the treatment where the partner was of a different ethnic group to themselves.

It is important to understand how people from diverse cultures coordinate, considering that the need for coordination is ubiquitous in social and business interactions (Bernard et al., 2011). This is particularly true in a South African context where the diversity of interactions is considerable. Previous studies have found that different groups find different coordination solutions, but tend to coordinate as long as single normative rules are followed in each case. In heterogeneous groups there can be disagreement of the relative salience of normative principles that can lead to mis-coordination (Bernard et al., 2011). Certain overriding principles such as equity and fairness are usually agreed upon (Bernard et al., 2011). This was seen in observations of subjects during the trials. Several subjects counted out the points available to see if they could be divided equally. As consecutive grids offered choices between either an eight or a three (appendix 2, grids four

and five), many subjects remarked “I gave them the last eight, so this next one is mine,” which indicated a sense of fairness as a normative principle at play.

It has been argued that, while previously extremely salient, the significance of race has decreased in recent years as subordination is more class-related than race-related (Wilson, 2012). While this was found to be the case in America, where South Africa has a much more recent history of democracy it can be argued that the high status of all subjects could have overcome the salience of race as a focal point in the subjects tested, in that the ethnicity of the participant did not significantly affect the outcome. It is reassuring to see that perhaps class can overcome race and therefore future business leaders of South Africa may begin with a clean slate as economic growth fosters the formation of a larger middle class. It would be useful to test this further on groups with a lower education and income level to see whether the effect stays the same.

As the race of the partner was the only factor that changed between treatments, it seemed that subjects were tentative in coordinating with people of a different ethnicity to themselves. This could be due to the design of the experiment, where subjects were told that if both parties claimed a circle containing points, the points would be subtracted from both scores. This could show that while people are confident in predicting the actions and second-order iterations of people who looked like them, they are slightly uncertain of interactions with people belonging to different ethnic groups and therefore different social histories to themselves.

The tentative strategy of claiming fewer points from a partner of differing ethnicity to the subject has a basis in previous literature. In a study using subjects from India and the United States, participants were more accurate in guessing the actions of a partner from their own population which led to higher frequency of coordination and therefore significantly higher payoffs (Jackson & Xing, 2014). People of different cultures are likely to use different decision-making practices (Henrich et al., 2010) which, together with differences in language that could influence framing, may result in very different actions from partners of differing ethnic backgrounds. While this suggests that homogeneity of coordination partners should be an indicator of success in tacit coordination, there are considerable benefits to diversity in decision-making and coordinating teams.

Diverse groups are more successful at matching survey responses than homogenous groups

(Bucci & Tenorio, 2010). This has an implication in tacit coordination where a diverse team, while limited on a one-to-one basis, may cooperate more successfully with other teams than a homogenous team in a situation where resources need to be shared. This was seen in a study where diverse families were more successful at matching survey responses than more typical, homogenous families (Bucci & Tenorio, 2010). This diversity carries a handicap in that coordination is likely to be more accurate with homogenous participants, but having a diverse team leads to a wealth of different past experience which can be leveraged to use to coordinate with a more diverse group of people or teams.

An example of the potential benefit of diversity was illustrated in a study where British and Asian students had to coordinate. It seemed that British students used the stereotype of Asians being cautious to inform their decision-making, while Asian students did not alter their behaviour according to the ethnicity of their coordination partner (Laban & Kelsey, 2014). Perhaps a more diverse team would have been able to debunk unrealistic stereotypes and assist in coordination if Asian and British students were put into coordinating teams. As shown in the results of research question 1, low social distance improves coordination, and in this research question differing ethnicity leads to tentative coordination. As a result, the benefit of communication between diverse groups in order to lower social distance may counteract the difficulty of coordinating with someone of a different social background.

6.2.2 The effect of gender on tacit coordination

H₀: Amount claimed from control partner = amount claimed from a partner of a different gender

H₁: Amount claimed from control partner \neq amount claimed from a partner of a different gender

The null hypothesis was not rejected, which means that subjects claimed as much from a partner of their own gender as one of the opposite gender. This is surprising because past research has found gender to be a strong influence in economic outcomes (Boschini et al., 2014) and as an important factor in bargaining situations, whether tacit or otherwise. For example in a study in Peru, it was found that women were consistently offered lower fares by taxi drivers than men, as women were perceived as lower valuation customers than men (Castillo et al., 2013).

Gender provides a visible cue which can be attached to stereotypes that can inform tacit coordination decision-making, provided that there are expectations of behaviour based on these stereotypes or cultural rules of behaviour that can create focal points based on gender (Bett, 2013). Gender plays a significant role in strategy formation in a game scenario, with participants expecting higher payoffs from a partner or opponent of the opposite gender, based on internalised expectations of gender-related behaviour and cultural stereotypes (Bett, 2013). Differences in gender-specific behaviour can be cultural. For example, an experiment comparing cooperative behaviour in Sweden and Colombia found no difference between the countries, but found significant gender differences in cooperation behaviour between genders and between girls and boys of each country (Cárdenas et al., 2014). Perhaps the relationship between gender and coordination has been similarly differentiated in South Africa, due to social history and cultural differences between South Africa and the rest of the world.

In a battle of the sexes experiment it was found that gender was a focal point, second only to fairness, and that players of both sexes were more aggressive when their partner was female (Holm, 2000). In a meta-analysis of over a hundred ultimatum and dictator games it was found that women consistently give away more of the payoff than men, and consistently receive more than men (Engel, 2011). Female politicians value female colleagues less highly than men, but are more threatened by female than by male challengers (Kanthak & Krause, 2011). Typically men are more competitive than women, and far less generous when it comes to sharing payoffs (Boschini et al., 2014).

The fact that there was no difference between the behaviour of men or women in the gender treatment as well as no difference between the control and the gender treatment is therefore quite unusual. Previous studies have shown men to behave differently to women in their behaviour towards opponents or partners of different genders (e.g. Scharlemann et al., 2001) While this could be an artefact of a relatively small sample size, the relatively large p-value indicates that there is not even a trend towards changes in behaviour with a partner of a different gender. Perhaps there is a hierarchical effect on salience where the other treatments of age and ethnicity were isolated appeared comparatively more different to the subject than gender and therefore behaviour was affected on a relative scale.

As an additional possible factor, a review of gender behaviour in dictator games showed mixed results, which were largely affected by the level of priming involved in the experimental protocol (Boschini, Muren, & Persson, 2012). As the deception required in the experimental design for this study required that demographic information be collected long before the experiment, it is possible that gender was not particularly salient due to a lack of priming. It would be interesting to repeat the study in an isolated fashion, with gender priming used prior to the start of the experiment.

6.2.3 The effect of age on tacit coordination

H_0 : Amount claimed from control partner = amount claimed from an older partner

H_1 : Amount claimed from control partner > amount claimed from an older partner

The null hypothesis was rejected in favour of the alternative hypotheses, as subjects claimed significantly more points from partners in the control treatment than they claimed against a partner who was much older than them.

This agrees with current literature. For example, in a gesture-based game, pairings of older people with young partners generated more cooperative behaviour than pairings of people of the same age (Rice et al., 2013). While trustworthiness does not change across different age groups (Sutter & Kocher, 2007), which indicates that cooperative behaviour should be similar, bargaining and cooperating strategies tend to change with age (Sutter & Kocher, 2007). In some cases where players have a choice of who to cooperate with, older players are discriminated against (Levitt, 2003), but there is little evidence of this discrimination effect in single pairings. In this study the tentative nature of subjects' behaviour in claiming fewer points, bearing in mind the expected penalties of mis-coordination, could be due to uncertainty of the partner's behaviour, similar to that seen in the ethnicity treatment. Considering that diversity allows for the understanding of more norms and rules than homogeneity, but also gives rise to mis-coordination (Bucci & Tenorio, 2010), perhaps subjects viewed older partners as likely to have more unknown rules of coordination from extended life experience.

6.3 Research Question 2 summary

The results for the second research question revealed that people change their coordination behaviour according to visible cues in their partners. This was the case in the

age and the ethnicity treatment, where subjects claimed fewer points when paired with someone who looked different to them. There was no effect of a partner of a different gender to the subject, which may be a result of a lack of priming in a situation where a great deal of diversity was presented to each subject and gender may have lost salience.

6.4 Chapter Summary

In this chapter the results presented in the previous chapter were discussed in light of relevant literature and predictions made prior to the start of the research. The findings were then applied to developing the model proposed in Chapter 2, based on the findings presented in Chapter 5. The following chapter presents a summary of findings, implications of the results for businesses and individuals, and suggestions for future research.

CHAPTER 7: CONCLUSION

Chapter 7 provides the conclusion to this research report. It highlights the major findings of the research presented in Chapter 5 and key points from the discussion in Chapter 6. The implications of these findings are discussed and suggestions are offered for future work to build on this research.

7.1 Summary of Research Objectives

The purpose of this research was to examine the effects of characteristics of a coordination partner have on tacit coordination behaviour in individuals. This research tested this by way of two sub-questions: does social distance affect the success of tacit coordination matching; and do demographic differences between individuals affect coordination behaviour? These social factors could alter the current understanding of focal point based coordination as the characteristics of a partner, while extrinsic to the scenario itself, are not extrinsic to the situation and therefore fall between internal factors such as game or scenario design and external factors such as priming, framing or individual history. The characteristics of the partner are therefore potential factors operating on the interface between extrinsic and intrinsic influences that may significantly affect the outcome of a situation where tacit coordination is required. Considering the wealth of social and economic situations where coordination is necessarily tacit (as discussed in Chapters 1 and 2), understanding the impact of social factors on tacit coordination is critical in mediating successful tacit interactions.

7.2 Summary of findings

7.2.1 Social Distance and tacit coordination

To test the effect of social distance on tacit coordination, subjects were given tables of closed sets for picking and guessing and asked to try to match two partners: one a close friend or colleague and the other a stranger. The number of matches for each treatment was compared with a Mann-Whitney U test which showed a statistical difference between the treatments. The success of tacit coordination was significantly higher where subjects knew each other relatively well than when strangers tried to coordinate. This is as described by Srikanth and Puranam (2011) where best practice for coordination in geographically separate entities that need to coordinate is to ensure that decision-makers in each location know each other well. Low social distance is a clear component of the success of tacit coordination, presumably due to shared past experiences (as seen in

Hédoin, 2011).

The results are also contrary to some literature, for example Stoddard and Leibbrandt (2014) found that providing information about partners increased the probability of mis-coordination. Strangers did not coordinate as well as friends or colleagues, but observations indicated that subjects sought to infer information about strangers by looking at their names. Where this was not possible, subjects acted in a manner stereotypic to any information evident within their own name in an attempt to ease coordination for the other player. This is in line with previous research put forward by J. T. Crawford et al. (2011), where subjects use stereotypes when no further information is available, although not as successful as other studies where the stereotype used was directly related to the options given to subjects (e.g. De Kwaadsteniet et al., 2012).

7.2.2 Summary of Findings – visible demographic factors

To test the effect of visible demographic factors on coordination behaviour, subjects were given sets of grids containing ‘points’ – resources to be divided between themselves and a partner, a picture of whom was attached to the page. Each subject was required to divide resources, under the impression that the partner had already made their assignment of points, in four treatments. These treatments consisted of a control treatment where the partner was of the same gender, ethnicity and approximate age as the subject; an ethnicity treatment where only the ethnicity of the partner differed from the subject; a gender treatment where the partner was of the opposite gender to the subject and an age treatment where the partner was much older than the subject. Subjects were told that mis-coordination would result in the contested points being subtracted from their score, which rendered mis-allocation quite costly. The total number of points each subject assigned to themselves in each treatment was run in a linear mixed model for repeated measures.

The results showed that subjects showed no difference in behaviour in the gender treatment, but assigned significantly fewer points to themselves in the ethnicity and age treatments than in the control treatment. There was no effect of the gender or ethnicity of the subject, in all cases changes in behaviours referred to differences between the subject and the partner, irrespective of their demographic grouping.

Considering the social history of South Africa, it is likely that subjects of the same ethnicity and age are likely to have similar social histories and therefore are likely to have some form

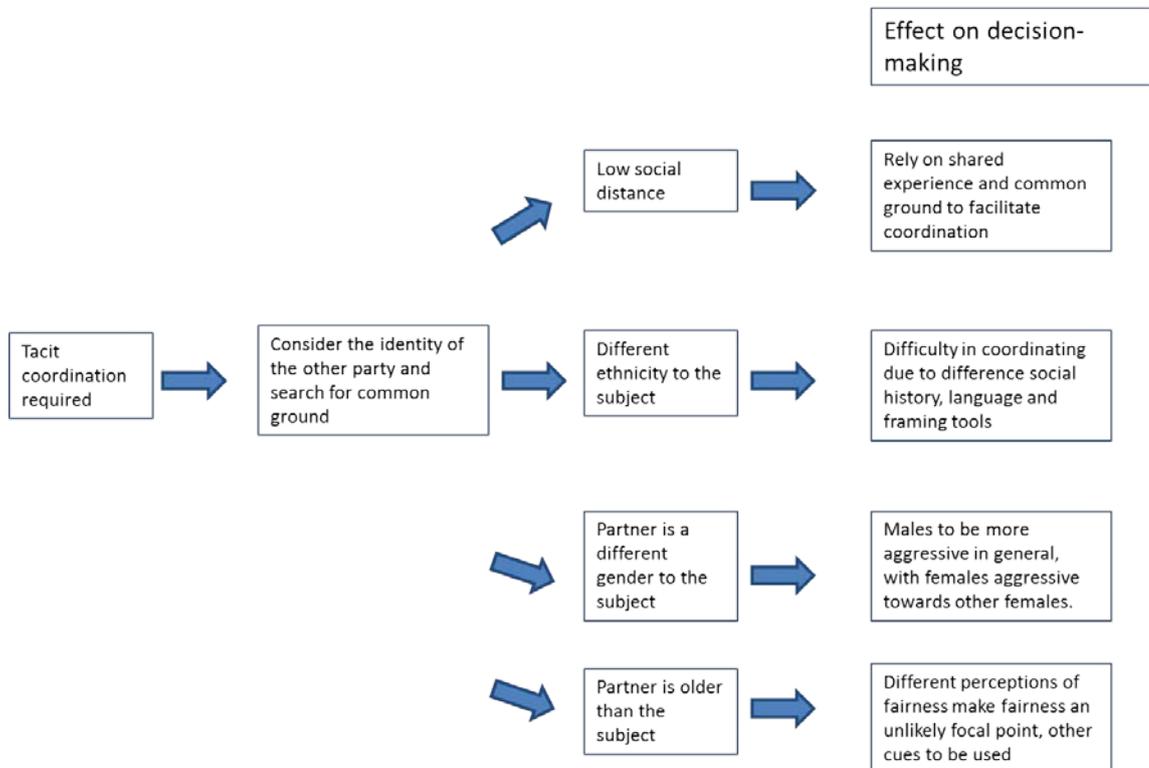
of shared past experiences. Shared past experiences are known to increase coordination success (e.g. Hédoïn, 2011; Srikanth & Puranam, 2011). This means that subjects were likely to feel able to coordinate effectively with partners similar to them, and gender in this case is likely not particularly salient as apartheid involved segregation on a racial basis rather than gender. For the same reason, a partner much older than the subjects was likely to have had very different past experiences and therefore access different collections of norms and rules to the subjects, particularly considering that the subjects in the project were all of an age range that would have involved them living a significant portion of their lives post-apartheid, contrary to much older partners.

7.3 Implications of this research

Social and economic interactions are based on coordination through the use of ‘virtual bargains’ – sets of unwritten and unspoken rules developed through past experience and social norms (Misyak et al., 2014). As the identity of a coordination partner is often the only source of information available, it is important to understand the implications of the effect of social factors on tacit coordination.

Chapter 2 presented an overview of current theory of the mechanisms behind the use of focal points in tacit cooperation, as well as a proposed model for the impact of social factors as tested here. As the results largely followed the predictions made based on the literature review, the model itself remains relatively unchanged. The results as well as comments overheard during testing have allowed for some refining of the model in an attempt to understand the process of how an individual makes decisions in tacit coordination based on the characteristics of the partner in coordination. The originally proposed model is shown below followed by the refined model.

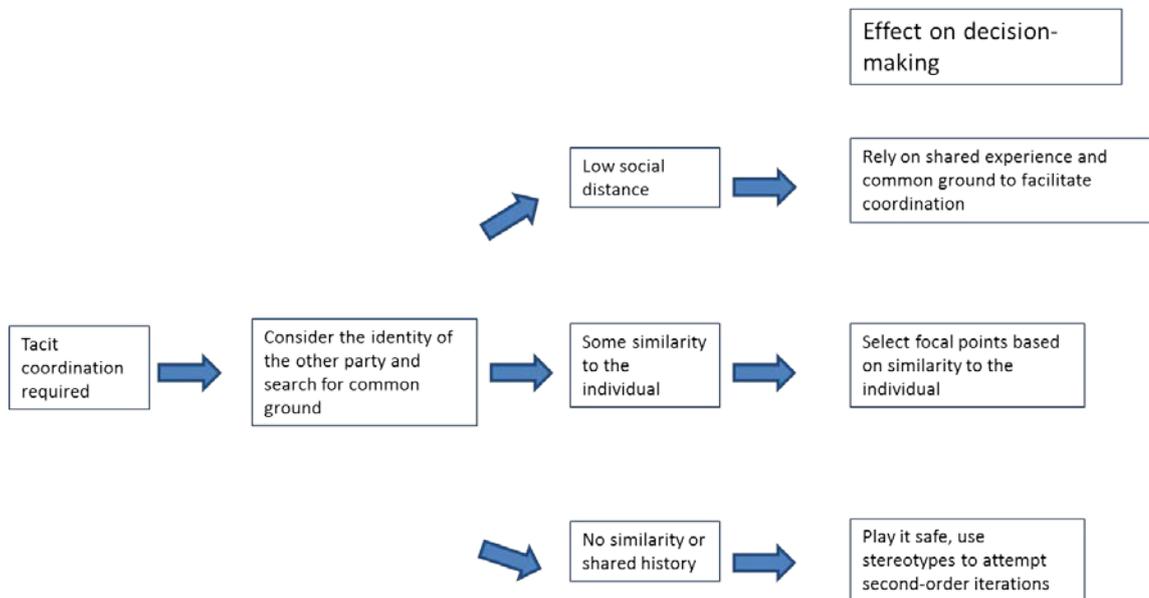
Figure 8. The previously proposed model of the effects of social factors on tacit coordination



The proposed model was very specific in defining the precise effects of each social factor on tacit coordination. The research showed a much more general pattern of behaviour. First, people used social distance. In the treatment where subjects had low social distance, they used past shared experience to enhance their tacit coordination. Next, they relied on stereotypes, both to attempt second-order iteration thinking, or else to broadcast their own intentions as far as the experiment would allow. Next, subjects compared themselves to their partners based on similarity. In the case of the control treatment in Research Question 2, subjects were confident in claiming what they believed to be theirs, possibly through the use of norms and expected behaviour in terms of fairness, closeness and past history within the treatment (“I gave them the last 8, this is mine now”). When partners were very different from the subject, claiming points became tentative and cautious, claiming fewer points than in the control treatment. The only characteristic in which this did not apply was in the gender treatment, where subjects did not behave differently to the control treatment. Perhaps, given South Africa’s unique and recent history, it could be argued that people of similar age and ethnicity are likely to have relatively similar social histories and past experiences, given that segregation was on a racial basis. The adjusted model of the effects of social factors in tacit coordination is provided below. The model is

to be read from left to right as a flow chart of the process which an individual undergoes in a tacit coordination scenario. The column on the right shows the effect of each factor on decision-making and strategies used by individuals to incorporate the identity of tacit coordination partners into their cooperation process. This could be used to predict coordination behaviour based on the identities of two parties or to understand the outcome of a coordination failure or success after the fact.

Figure 9. An adjusted model of the use of social factors in tacit coordination as informed by the research presented in this report.



7.4 Suggestions for Further Research

The results of this research provide a platform for exciting future research on the role of social factors in tacit coordination. The most obvious avenue would be to enlarge the sample to include people of different education levels and social status. While this research provides interesting insight into the behaviour of future business leaders in tacit coordination, a great deal of tacit coordination scenarios arise within teams where not all team members are of the same social standing as the leaders. It would also be of particular interest to refine the study to compare teams within large organisations, by coordinating both research questions simultaneously – considering the demographic makeup and social distance of a partner concurrently.

Another avenue for future research would be to investigate a hierarchy within which social cues are used. The results showed a significant difference between treatments with partners of a different gender and partners of a different ethnicity to the subject. This has been seen in other studies where the salience of nationality is secondary to other personal information but primarily salient when no other information is provided (Bogach & Leibbrandt, 2011). It would be fascinating to understand the interplay of factors influencing tacit coordination as it is likely that in a real-world situation the person on the other side of a coordination scenario is likely to differ from the subject in more than one way.

In a South African context, it would be important to investigate the impact of multiple languages and cultures on tacit coordination. Considering that South Africa has 11 official languages and countless cultures and dialects, assessing the impact that these differences may make in tacit coordination could prove to be useful.

Recent research has suggested that incorporating focal point theory into human-machine interactions can enhance the success of tacit coordination (Zuckerman, Kraus, & Rosenschein, 2011). It would be fascinating to see how subjects would respond to either experiment knowing that there was a machine on the other side.

Finally, an important avenue for this research is to consider its implications in the real world outside the carefully controlled conditions of empirical testing. Case study research into the implementation of lessons learned from this research in formulating multi-national teams, identifying anticompetitive behaviour and inter-firm competitive advantage would be a logical step forward in continuing from the grounding presented in this research report.

7.5 Implications of the research for practitioners

Tacit coordination is ubiquitous and subconscious and forms a part of many social interactions. As often the only information available to people who recognise a need for coordination is the identity of the person on the other side of the interaction, the results of this research could prove invaluable in informing decisions made to influence the social patterns of coordinating requirements. The major stakeholders identified in Chapter 2

were team managers who wish to ensure smooth coordination between departments, multinational or geographically scattered companies, and antitrust regulators. The implication of the research and suggestions for management of tacit coordination for each stakeholder group is outlined below.

7.5.1 Implications for small companies or team managers

In many situations direct communication is not possible and decisions must be made quickly. For example a team member may not always be able to access a manager for confirmation of every decision that needs to be made on a daily basis. While this can be addressed through the creation of processes to standardise responses (Srikanth & Puranam, 2011), this research suggests that reducing social distance between team members would increase coordination within a team. Team managers should promote team building exercises and activities as well as communication between employees in an attempt to decrease social distance and improve coordination. In addition, while diverse teams would be more successful at coordinating with other teams of a diverse nature (Bucci & Tenorio, 2010), care must be taken when teams must coordinate within the group when members are of different ethnicities or ages. This could be addressed through active lowering of social distance. It would also be advisable to understand the difficulties in coordination between people of different social histories and promote explicit communication until such a point where social distance is low enough to render the effects of demographic differences negligible.

7.5.2 Implications for multinational or geographically scattered companies

Teams or organisations that must coordinate when geographically separate require successful tacit coordination to do so. This is further complicated by the fact that people of diverse backgrounds use different methods of decision-making (Henrich et al., 2010) and coordination which can lead to mis-coordination (Bucci & Tenorio, 2010). It is already considered best practice to create common ground through organisational culture and shared past experience in order to facilitate coordination between separate units and offices (Srikanth & Puranam, 2011). This research confirms that shared past experience as indicated by low social distance improves coordination. Team members in different geographic locations should be encouraged to get to know one another, perhaps by way of team building exercises to reduce social distance and facilitate cooperation between units. If this is not feasible due to time and cost implications of exercises, regular verbal

communication and interaction could be encouraged to facilitate people becoming better acquainted. As this research shows that people who differ in terms of their demographic makeup are less confident in coordination than similar people, either decision-makers should be similar in terms of social history or else should be part of diverse teams to create resources of different experience, norms and coordination practices to facilitate successful tacit coordination.

7.5.3 Implications for antitrust regulators

The difficulty of monitoring tacit coordination is that it leaves no evidence of collusion, despite the results of tacit collusion rendering artificially high prices, as seen in the milk example in Texas (Lee, 1999). The difficulty in identifying and monitoring concerted practices is that they are subtle, and detection of collusion is typically managed through the discovery of evidence (Rey, 2003) and the only way to detect tacit collusion would be through monitoring and regulating of prices, which most regulators are not willing to do (Rey, 2004). Currently, South African competition law does not prohibit tacit collusion, but rather the concerted practices in which cooperation is achieved without a formal agreement in place. These concerted practices, such as posting pricelists may indicate tacit collusion (Harrington, 2011), which is notoriously difficult to detect or to prove (Mezzanotte, 2011). To identify such collusion would require a substantial amount of time and effort, and so identifying potential colluders would be beneficial in reducing the strain on resources of monitoring large groups of companies. The results of this research show that antitrust regulators should focus on companies with decision-makers who know one another, and who are relatively similar in age and ethnicity. Similar people who know one another are more likely to be able to collude tacitly successfully without needing to resort to explicit communication. While this is a logical solution, this research provides empirical data to support the strategy.

7.6 Concluding note

This research aimed to understand the effect of the identity and demographic makeup of participants on tacit coordination. This was examined by way of two research questions. The first question asked whether social distance affected the ability of subjects to coordinate. This was tested through measuring coordination on a table of closed sets for picking and guessing. People who knew each other well significantly outperformed pairs of strangers in coordinating. The second research question investigated whether or not

subjects altered coordination behaviour as a response to the demographic characteristics the person with whom they were required to coordinate. This was tested with a resource sharing game where subjects had to share points between themselves and a partner, assuming that the partner had already made their own selection and mis-coordination carried significant cost. Subjects claimed significantly fewer resources from partners who differed from them in ethnicity and in age, but there was no effect of gender. This confirms the results from existing literature which show that people of diverse backgrounds use different coordinating norms and rules which can make coordination difficult. The fact that gender did not have an effect on behaviour could be a result of gender being a non-salient focal point in a society where racial issues are very prevalent. In addition, considering recent racial segregation, people of similar age and ethnicity are likely to have similar social history and past experiences and therefore similar coordination techniques. The research report concluded with a proposed model for the role of social factors in tacit coordination, suggestions for future research and suggestions for stakeholders in using this research to promote successful coordination in teams, and for antitrust regulators to detect tacit collusion.

Appendix 1: closed sets for picking and guessing to determine the influence of social distance on coordination

Name of participant _____

Name of partner _____

How well do you know your partner (please select from the choices below)

Very well (close friend/family)

Relatively well (friend or colleague)

Acquaintance

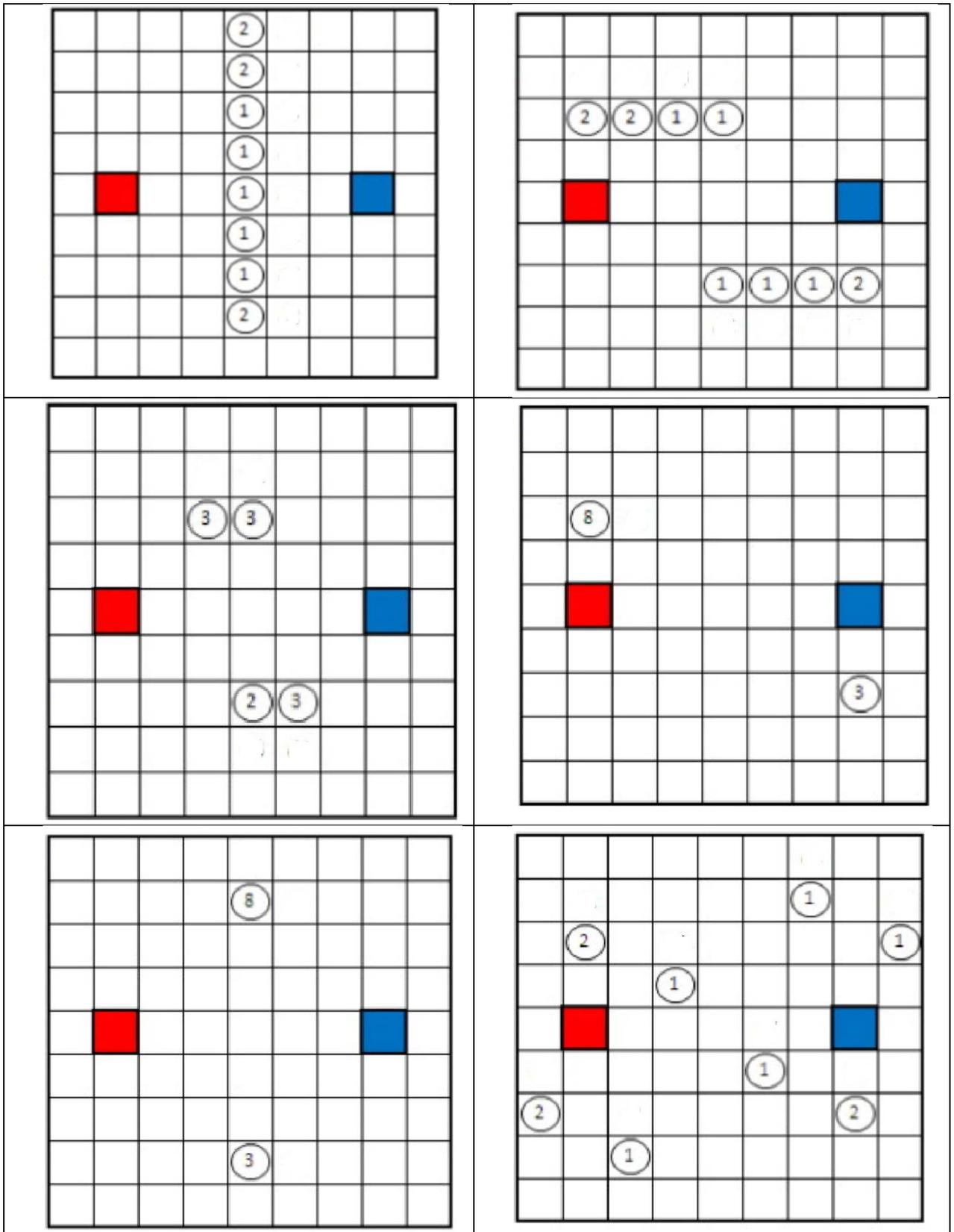
I know them by sight but we are not well acquainted

I don't know this person

Closed sets for picking and guessing

Category	Option 1	Option 2	Option 3	Option 4	Option 5
City	JOHANNESBURG	NELSPRUIT	MAFIKENG	CAPE TOWN	BLOEMFONTEIN
Fruit	ORANGE	MANGO	APPLE	PEAR	BANANA
Sport	TENNIS	CRICKET	SOCCER	SWIMMING	RUGBY
Number	1	2	5	7	10
Supermarket	PICK N PAY	SPAR	CHECKERS	WOOL-WORTHS	SHOPRITE
Flower	SUNFLOWER	ROSE	PROTEA	DAISY	SWEETPEA
Furniture	DESK	COUCH	TABLE	BED	CHAIR
Car	HONDA	MERCEDES	FORD	FERRARI	BMW
Fast food	KFC	MCDONALDS	BURGER KING	NANDOS	STEERS
Animal	LION	MONKEY	DOG	TIGER	CAT
Colour	GREEN	BLACK	RED	YELLOW	BLUE
Metal	ALUMINIUM	GOLD	IRON	SILVER	STEEL
Drink	WATER	JUICE	BEER	TEA	COKE
Superhero	SUPERMAN	BATMAN	SPIDERMAN	IRONMAN	THE HULK

Appendix 2: grids provided for point allocation against partners of different demographic treatments



Appendix 3: demographic information sheet completed by subjects prior to the start of experiments

Please complete the following:

Name _____

Age _____

Gender _____

Ethnic group with which you identify _____

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