‘No Safety in Numbers’: Detecting Deception using a Collective Interviewing Approach

ZARAH VERNHAM

The thesis is submitted in partial fulfilment of the requirements for the award of the degree of Doctor of Philosophy of the University of Portsmouth.

27th January 2015

Supervised by: Professor Aldert Vrij
Dr Sharon Leal
Dr Samantha Mann
“Alone we can do so little; together we can do so much”

Helen Keller
General Abstract

Group interviewing, the topic of investigation in this thesis, has been neglected within the deception detection literature. Chapter 1 introduces the topic, and emphasises the importance of studying collective interviewing (whereby pairs are interviewed simultaneously) in a deception context. Chapter 2 explores the nature of deceit occurring within pairs in a police-style interview setting. Truth-telling pairs had lunch together, whilst lying pairs committed a mock crime. All pairs then had to convince an interviewer they were having lunch together. The interview protocol involved repeated questioning, but no significant differences were found between truth-telling pairs and lying pairs in terms of repetitions, omission errors, commission errors, contradictions, and dominance. The lack of significant findings are discussed with regards to the interview protocol employed. Chapter 3 describes two experiments. The first used an immigration-style interview context, and imposed cognitive load by implementing a forced turn-taking technique. Truth-telling pairs were real couples, whereas lying pairs were friends. All pairs were required to convince an interviewer they were a bona fide couple. Results showed that when forced to turn-take, truth-telling pairs continued on from one another, whereas lying pairs waited and repeated previously said information before continuing. The second experiment, a lie detection study, revealed that the three turn-taking cues improved people’s ability to accurately detect deceit. Chapter 4 is based on the first experiment mentioned in Chapter 3, but applies transactive memory theory to explore whether signs of truthfulness emerge through joint recall. Results showed that truth-telling pairs posed questions and provided cues to one another, handed over remembering responsibility, and finished each other’s sentences more than lying pairs. Chapter 5 discusses a study which applied the verifiability approach to alibi witness scenarios. Truth-telling pairs completed a mission together, whereas lying pairs were separated so that one
completed the mission whilst the other committed a mock crime. All pairs then had to convince an investigator, first individually then collectively, that they completed the mission together. Results revealed that truth-telling pairs provided more checkable details demonstrating they were together, whereas lying pairs provided more uncheckable details. Additionally, the collective statements prompted only the truth-telling pairs to provide more checkable details demonstrating they were together. A comparison of the individual and collective statements for memory consistency and distortion showed that liars repeated more uncheckable details whilst truth-tellers omitted and committed more checkable details. Chapter 6 summarises the main findings obtained in this thesis, discusses the theoretical and practical implications, and suggests ideas for future research.
Chapter 1: General Introduction to Thesis

1.1 Introduction
   1.1.1 Importance of studying deception
   1.1.2 Gap in the deception literature: Collective interviewing

1.2 Thesis outline

1.3 References

Chapter 2: Collective Interviewing to Detect Deceit: The Effects of Memory and Dominance during Repeated Questioning

2.1 Abstract

2.2 Introduction
   2.2.1 Strategies employed by truth-tellers and liars
   2.2.2 Memory
   2.2.3 Dominance
   2.2.4 Hypotheses

2.3 Method
   2.3.1 Participants
   2.3.2 Design
   2.3.3 Procedure
   2.3.4 Manipulation checks
   2.3.5 Coding: Memory variables
   2.3.6 Coding: Dominance

2.4 Results
   2.4.1 General questions
   2.4.1.1 Number of general details given by truth-tellers and liars to the initial and replicate questions
Chapter 3: Experiments 2a and 2b: Collective Interviewing: Eliciting Cues to Deceit using a Turn-Taking Approach

3.1 Abstract

3.2 Introduction

3.2.1 Collective interviewing

3.2.2 Memory: Collaborative and transactive

3.2.3 Imposing cognitive load through forced turn-taking

3.2.4 Deception cue: Number of details

3.2.5 Experiment 2a: Hypotheses

3.3 Experiment 2a: Method

3.3.1 Participants

3.3.2 Design

3.3.3 Procedure

3.3.4 Coding

3.4 Experiment 2a: Results

3.4.1 Pre-interview questionnaire
Chapter 4: Collective Interviewing: A Transactive Memory Approach Towards Identifying Signs of Truthfulness
Chapter 5: Applying the Verifiability Approach and the Social Phenomenon of Memory to the Detection of Deception in Alibi Witness Situations

5.1 Abstract

5.2 Introduction

5.3 Method

5.3.1 Participants

5.3.2 Design

5.3.3 Procedure

5.4 Results

5.4.1 Pre-interview questionnaire

5.4.2 Post-interview questionnaire: Motivation, manipulation checks, and collective interviewing

5.4.3 Occurrence of cues

5.4.4 Hypotheses testing: Transactive memory

5.4.5 Truth-telling pairs’ relationship status

5.4.6 Lying pairs’ friendship status

5.5 Discussion

5.5.1 Transactive memory variables differentiate truth-tellers from liars

5.5.2 Importance of memory in detecting deception

5.5.3 Practical applications

5.5.4 Methodological considerations

5.5.5 Conclusion

5.6 References
5.3.4 Coding the verifiability of the statements ........................................... 152
5.3.5 Coding for consistency and memory distortions .................................... 154
5.3.6 Coding of strategies .............................................................................. 156
5.4 Results ....................................................................................................... 157
5.4.1 Pre-questioning questionnaire ............................................................... 157
5.4.2 Post-questioning questionnaire: Motivation, manipulation checks, and writing statements ........................................................................... 159
5.4.3 Hypotheses testing: Percentage of (un)verifiable details ....................... 160
5.4.4 Hypotheses testing: Applying the verifiability approach to memory consistency and memory distortions ......................................................... 164
5.4.5 Strategies used by truth-tellers and liars ............................................... 168
5.5 Discussion ................................................................................................. 168
5.5.1 Limitation of the verifiability approach ............................................... 172
5.5.2 Practical implications ............................................................................ 173
5.5.3 Conclusion ............................................................................................ 174
5.6 References ............................................................................................... 175

Chapter 6: General Discussion ....................................................................... 181
6.1 General Discussion Outline ...................................................................... 182
6.2 Overview of Main Findings ...................................................................... 182
6.3 Theoretical Implications .......................................................................... 188
   6.3.1 Deception theory .................................................................................. 188
      6.3.1.1 Group deceit .................................................................................... 188
      6.3.1.2 Cognitive load ................................................................................ 188
      6.3.1.3 Cue-based approach ...................................................................... 189
   6.3.2 Importance of memory ....................................................................... 190
   6.3.3 Group dynamics .................................................................................. 193
6.4 Practical Implications ............................................................................... 196
   6.4.1 Immigration: Sham marriages ............................................................. 196
   6.4.2 Police investigations: Alibi witness scenarios .................................... 197
   6.4.3 Additional collective interviewing settings ....................................... 198
6.5 Methodological Considerations ................................................................ 199
   6.5.1 Knowledge of being interviewed collectively .................................... 199
   6.5.2 Lack of lie detection experiments ....................................................... 200
6.5.3 No individual interviewing comparison group ........................................200
6.5.4 Translation of the findings to the field ......................................................201
6.6 Overview of Future Research .................................................................201
6.7 Conclusion ...............................................................................................202
6.8 References ...............................................................................................203

Appendices ..................................................................................................209
Appendix 2.1: Averages and Totals Calculations .............................................210
Appendix 2.2: Proportion Calculations ..............................................................215
Appendix 2.3: Dominance Calculations ...........................................................219
Appendix 3.1: Number of Details (Condition 1) Examples ................................221
Appendix 3.2: Number of Details (Condition 2) Examples .............................225
Appendix 3.3: Turn-Taking Cues (Condition 3) Examples ..............................228
Appendix A: Favourable Ethical Opinion (Chapters 3 and 4) .........................232
Appendix B: Favourable Ethical Opinion (Chapter 5) ......................................233
Appendix C: Journal article published from Chapter 3 ..................................234
Appendix D: Journal article published from Chapter 4 ..................................250
Appendix E: UPR16 Form ..............................................................................259
Declaration

Whilst registered as a candidate for the above degree, I have not been registered for any other research award. The results and conclusions embodied in this thesis are the work of the named candidate and have not been submitted for any other academic award.

Zarah Vernham

WORD COUNT = 45,308 words

(original word count prior to examiners amendments = 44,530 words)
List of Tables

2.1 MANOVA and MANCOVA results for each of the dependent variables for general details..................................................................................................................33

2.2 MANOVA results for each of the proportion dependent variables for general details.................................................................................................................................34

2.3 MANOVA and MANCOVA results for each of the dependent variables for spatial details.................................................................................................................................37

2.4 MANOVA results for each of the proportion dependent variables for spatial details.................................................................................................................................39

2.5 Summary table illustrating the results of verbal cues in predicating deceit across three different ‘collective interviewing’ studies........................................................................................................46

3.1 A list of each of the six interview questions used in this experiment........65

3.2 Classification results for each of the turn-taking variables when taking total number of swaps into account........................................................................................................................................73

3.3 Cues used by observers that significantly differed across the three conditions ... 85

4.1 Expectedness score for each of the six interview questions used in this experiment........................................................................................................................................115

4.2 Classification results for each of the four significant dependent variables (verbal transitions)........................................................................................................................................121

5.1 The intra-class correlation coefficients (or percentage of agreement) for each of the consistency variables and the memory distortion variables........................................156
5.2 Veracity main effects obtained from the pre- and post-questioning questionnaires.................................................................................................................. 158

5.3 Classification results of Veracity for each of the significant dependent variables in the individual and the collective statements ........................................................................... 163

5.4 Veracity main effects obtained for the consistency and memory distortion variables................................................................................................................................. 165

5.5 Classification results of Veracity for each of the significant consistency variables and memory distortion variables.................................................................................................. 167

6.1 Overview of the deception cues measured in the current PhD thesis when a collective interviewing approach was implemented .......................................................................................... 186
Abbreviations

CBCA.................................................................Criteria-Based Content Analysis
CCTV..............................................................Closed-Circuit Television
CJS.................................................................Criminal Justice System
ICC.................................................................Intra-Class Correlation Coefficients
Non-EEA.......................................................Non-European Economic Area
RM.................................................................Reality Monitoring
SUE.................................................................Strategic Use of Evidence
TT.................................................................Turn-Taking
Acknowledgments

Many people have supported me during the completion of my thesis, and I am very grateful to each and every one of them. I would like to say a big thank you to Professor Aldert Vrij who has been an excellent supervisor throughout. Thank you for all the advice and encouragement you have given me. You have been a massive support and I have learnt a great deal from you. I would also like to thank my other two supervisors, Dr Sharon Leal and Dr Samantha Mann, for their continuous support and guidance throughout the completion of my PhD. I have really appreciated all the opportunities all three of you have given me.

Additionally, I would like to thank Dr Galit Nahari and Professor Pär Anders Granhag, who I have had the pleasure of meeting and working alongside. Your contribution and comments on my academic work have been invaluable. Thank you also to the deception detection PhD team, including Lara Warmelink, Shyma Jundi, Dominic Shaw and Sarah Ewens, for assisting me with various parts of my research.

I would like to say a special thank you to Jackie Hillman for always being available to interview my participants and for constantly supporting me when needed. A further special thank you goes to Lucy Akehurst, who has helped me on both a work level and a personal level. You have been a great friend and mentor, and have taught me so much.

Next, I would like to say thank you to my fellow PhD students within the Psychology department, especially Gary Dalton, Gemma Graham, Liam Satchell, and Sarah Rohlfing. You have all contributed to keeping me sane whilst doing my PhD!

Finally, I would like to thank my family and friends outside of the Psychology department who have supported me on my long academic journey. You know who you are!
Dissemination

Conference Presentations


Seminar Presentations


Publications


Chapter 1:  
General Introduction to Thesis
1.1 Introduction

1.1.1 Importance of studying deception

Deception has been studied within various disciplines besides psychology, and this makes creating a definition of deception particularly challenging. However, for the purpose of this thesis, deception is viewed as “a deliberate attempt to mislead others” (DePaulo et al., 2003, pp. 74).

An understanding of deception and its detection is particularly important in criminal investigations as police need appropriate fact-finding interview styles to be able to differentiate truth-telling suspects from lying suspects. Although some guilty suspects will confess to their involvement in an offence, many will deny, minimise or distort the truth (Gozna, 2008). Accuracy rates for practitioner lie catchers in empirical research are generally low, ranging from 45% to 60% (Bond & DePaulo, 2006; Vrij, 2008a). These low accuracy rates are perhaps to be expected given the challenging nature of detecting deceit. For example, there are only subtle differences between truth-tellers and liars, and liars frequently use countermeasures to appear credible. Also, lie catchers often make common errors such as examining the wrong cues or placing emphasis on nonverbal cues (see Vrij, Granhag & Porter, 2010 for a review of the challenges and errors associated with detecting deceit). The ability to reliably detect deception during suspect interviews contributes significantly to the progress of criminal investigations, including the prevention of miscarriages of justice (Gudjonsson, 2003). Therefore, it is important to develop interview protocols that can assist professionals involved with citizen security to focus on the different psychological indicators of truth-tellers and liars, with the aim of eliciting and magnifying the verbal and nonverbal cues to deception. Examples are: ‘Imposing cognitive load’, which exploits the fact that lying is more cognitively taxing than truth-telling (Vrij, Fisher, Mann & Leal, 2008); asking ‘unanticipated spatial and
temporal questions’ that negate benefit of planning for the interview (Vrij et al., 2009); and the ‘strategic use of evidence’ (SUE), which exploits the different strategies used by guilty and innocent suspects and involves the police holding back incriminating evidence until the suspect has given their initial statement (Hartwig, Granhag & Strömwall, 2007).

1.1.2 Gap in the deception literature: Collective interviewing

Deception research has primarily focused on the interviewing of single suspects despite the fact that crimes are frequently committed by pairs of, or multiple, offenders (M’Gloin & Piquero, 2009; Van Mastrigt & Farrington, 2009). Traditionally, police detectives separate suspects as soon as possible prior to interviewing to reduce opportunity for planning of responses, and to increase the suspects’ stress and anxiety (Kassin & Gudjonsson, 2004). To reflect this practice, several studies that have considered pairs of truth-tellers and pairs of liars have involved interviewing the group members individually (e.g. Granhag, Strömwall & Jonsson, 2003; Strömwall, Granhag & Jonsson, 2003; Vrij et al., 2009). Consequently, there is the potential for police to manage numerous statements from several suspects at any one time. When lie catchers have access to multiple statements, they tend to focus on verbal consistency between statements (Strömwall et al., 2003). Although verbal cues are more diagnostic of deceit than nonverbal cues (Vrij, 2008b), research has identified that simply comparing the individual verbal statements of pairs of liars is problematic. This is because statements from lying pairs, although more vague, can appear as consistent as statements from truth-telling pairs due to the provision of an alibi and the pre-planning of their responses whereby they stick to their rehearsed story (Granhag et al., 2003; Strömwall et al., 2003; Vrij, Mann, Leal & Granhag, 2010). Truth-tellers, however, add different elements to their truthful story across time
as they have not pre-planned what to say and memory is inherently reconstructive in nature (Bartlett, 1932; Granhag & Strömwall, 1999).

Although laboratory studies examining individual interviewing are modelled on typical police interview practices, there are several field settings to which collective interviewing, that is, the interviewing of multiple suspects simultaneously, would be better suited. Examples for when collective interviewing could be used include, when there are multiple suspects but only one interviewer available, such as during police stop and searches, at road border controls where cars containing several people are checked, at security checkpoints (e.g., airports), or during house to house enquiries. These tend to be intelligence-gathering contexts where the focus is on preventing actions that may cause harm, rather than catching individuals who have already caused harm and, in settings such as these, it would be more timely and convenient to interview the group members simultaneously in order to gather initial intelligence.

Group interviewing provides a different dynamic and potentially useful insight into detecting deception within groups. That is, it will determine deception at a social level as well as at an individual level, enabling new cues to deceit to be identified from the group that cannot be explored in individuals (e.g. cues stemming from suspects communicating and interacting with one another). Additionally, group interviewing compliments memory research which focuses on collaborative learning and remembering, allowing for alternative theories and concepts to be applied to deception that cannot be applied when interviewing individuals, e.g. transactive memory (Wegner, 1987), collective memory (Barnier & Sutton, 2008), and dominance (Rogers-Millar & Millar, 1979).

Collective interviewing is already part of some existing procedures. For example, in the UK, immigration officers use collective interviewing when attempting
to uncover sham marriages. Also, in the UK, police detectives interview people in groups when making house to house enquiries. In Canada, customs officers carry out collective interviews at airports because groups are deemed to have a ‘similar agenda’ (i.e. the group are travelling together and so it is assumed that they are travelling to the same destination for the same purpose as each other); thus if only one person in the group is examined, this could result in a wasted effort or a missed opportunity. Additionally, if each group member is examined individually then this will not be time-efficient.

Despite this, the issue of collective interviewing has yet to be systematically studied under controlled laboratory conditions, and therefore this PhD thesis will examine collective interviewing as a technique to improve the detection of deception.

1.2 Thesis Outline

The central aim of this PhD thesis is to explore collective interviewing as a technique to improve the detection of deception in forensic settings that would benefit from group interviewing. This PhD thesis constitutes four studies in total described across four chapters. Each experiment takes a different approach to the application of collective interviewing whilst also applying different psychological theories. It is important to note that there is some repetition throughout the thesis. This is because each chapter has been written so that it is independent of all other chapters and so can be read and understood individually. This means there is also a reference section at the end of each chapter.

Chapter 2: Collective Interviewing to Detect Deceit: The Effects of Memory and Dominance during Repeated Questioning

This chapter begins by explaining collective interviewing and detailing three recent collective interviewing studies, which each demonstrated the utility of applying
a collective interviewing approach for eliciting new cues to deceit. Subsequently, the chapter links reconstructive memory (Bartlett, 1932) and the prevalence of dominance within groups (Dunbar & Burgoon, 2005) to deception detection. Finally, an experiment was conducted in which a collective interviewing technique was used on pairs of truth-tellers and pairs of liars in a police-style interview setting. The main findings were that (i) truth-telling pairs gave more general details and more spatial details than lying pairs; (ii) when number of general details or number of spatial details was controlled for, no significant differences emerged between pairs of truth-tellers and pairs of liars in terms of repetitions, omission errors, commission errors, or contradictions; and (iii) dominance did not significantly differentiate between pairs of truth-tellers and pairs of liars when responding to both the general and spatial questions. The fact that this study revealed no effects, which have not previously been identified in other studies, suggests that the interview protocol used in this experiment was not appropriately eliciting the necessary differences between pairs of truth-tellers and pairs of liars. Nevertheless, this does not mean the interview protocol will never work, and therefore the interview protocol was improved upon by implementing new and different interview settings and techniques into the experiments in Chapters 3, 4 and 5.

**Chapter 3: Experiments 2a and 2b: Collective Interviewing: Eliciting Cues to Deceit using a Turn-Taking Approach**

In this chapter, two experiments are reported which were designed to exploit the potential strategies that lying pairs might use, making the task of lying together as a pair more difficult. An immigration-style interview was used whereby real (truth-telling) and pretend (lying) couples were interviewed together in their pairs with the task of convincing an interviewer they were a *bona fide* couple. Experiment 2a
implemented a forced turn-taking technique into the interview schedule. Forced turn-taking is a technique whereby the interviewer states which of the two interviewees is to answer the question and then intervenes every 20 seconds by stopping whichever of the interviewees is responding and asking the other interviewee in the pair to continue from the point at which their partner was stopped. This imposes cognitive load by disrupting the natural recall of information and forcing unwanted interactions between the pair, making the task of lying even more challenging. Consequently, new cues to deceit as a result of this forced turn-taking manipulation were predicted. The main findings were that when forced to turn-take by the interviewer, truth-telling pairs were significantly more able to continue on from one another, whereas lying pairs were significantly more likely to wait and repeat what their partner last said before continuing.

Subsequently, Experiment 2b was conducted. This was a lie detection study to determine whether informing laypeople of the three turn-taking cues (continuations, repetitions, waiting) improved their ability to accurately detect deceit. The main findings were that the three turn-taking cues were useful and easy for laypeople to spot and furthermore, improved their ability to accurately detect deceit considerably. In fact, this study obtained some of the highest lie detection accuracy rates in the research literature. Both experiments 2a and 2b have been published together in one manuscript in the peer-reviewed journal, Psychology, Public Policy and Law.

**Chapter 4: Collective Interviewing: A Transactive Memory Approach Towards Identifying Signs of Truthfulness**

This chapter was based on ‘Collective Interviewing: Eliciting Cues to Deceit using a Turn-Taking Approach’, the study discussed in Chapter 3. However, different dependent variables were measured. In this chapter, the theory of transactive memory
Chapter 1

(Hollingshead, 1998; Wegner, 1987) was applied to an immigration-style collective interview to explore whether signs of truthfulness emerge when measuring joint memory recall. The theory of transactive memory was developed to explain how couples share cognition and ‘think together’ (Wegner, 1987). Consequently, this theory was particularly applicable to the type of setting used within this experiment because real (truth-telling) and pretend (lying) couples were the participants being interviewed together. Signs of truthfulness as opposed to cues to deceit were the focus because the cues measured were believed to occur more in truth-telling couples than in lying couples. In support of transactive memory theory, the main findings were that truth-telling couples posed questions to one another, provided cues to one another, handed over remembering responsibility, and finished each other’s sentences significantly more than lying pairs. This experiment has been published in the *Journal of Applied Research in Memory and Cognition*.

Chapter 5: Applying the Verifiability Approach and the Social Phenomenon of Memory to the Detection of Deception in Alibi Witness Situations

This chapter applies the verifiability approach and the social phenomenon of human memory to the detection of deception in alibi witness scenarios where pairs of participants, consisting of a suspect and an alibi witness, completed both individual statements and a collective statement. The verifiability approach (Nahari, Vrij & Fisher, 2014) proposes that truth-tellers provide more details in their statements that can be checked to prove their innocence, compared to liars who provide details, but only details that cannot be checked in order to prevent their lies from being uncovered by the investigator. Pairs either completed a mission together (truth-tellers) or separately (liars) but were instructed to convince an investigator that they were together on their mission. The main findings were that compared to lying pairs, truth-
telling pairs automatically provided more checkable details that demonstrated they were together, whereas lying pairs provided significantly more uncheckable details. The collective statement prompted truth-telling pairs only to provide significantly more checkable details that demonstrated they were together in comparison to their individual statements. Additionally, and as a result of the repeated questioning, memory consistency (e.g. repetitions and contradictions) and memory distortion (e.g. omission errors and commission errors) were measured between the individual and collective statements, with an emphasis on reconstructive memory (Bartlett, 1932) and the ‘repeat versus reconstruct’ hypothesis (Granhag & Strömwall, 1999). The main findings were that liars repeated significantly more uncheckable details from the individual to the collective statements, whereas truth-tellers omitted and committed more checkable details that demonstrated they had undertaken the mission together.

**Chapter 6: General Discussion**

Finally, the concluding chapter discusses the main findings of this PhD thesis as well as presenting theoretical implications, practical implications, and some suggestions for future research.
1.3 References


Chapter 2:
Collective Interviewing to Detect Deceit:
The Effects of Memory and Dominance
during Repeated Questioning
2.1 Abstract

The interviewing of more than one suspect at the same time has been somewhat neglected within the deception detection literature. The present study explores the nature of deceit occurring within pairs, investigating the types of social cues that may emerge. Truth-telling pairs were friends who ate lunch together at a local restaurant, whereas lying pairs were friends who committed a mock crime together. The task for all pairs was to convince an interviewer that they were having lunch together at the time the crime was committed. The interview protocol involved repeated questioning, and whilst truth-telling pairs provided significantly more details overall than lying pairs, when number of details was controlled for it was found that there were no significant differences between pairs of truth-tellers and pairs of liars in terms of repetitions, omission errors, commission errors and contradictions. Additionally, there was no effect of dominance. Implications and ideas for future research are discussed.
2.2 Introduction

Collective interviewing refers to the interviewing of multiple suspects simultaneously, as opposed to individual interviewing which refers to interviewing each suspect separately. This collective approach is a unique proposition to the interviewing of suspects during criminal investigations, and therefore a new line of research within the deception detection literature. This is because, regardless of the number of individuals believed to be involved in the crime, traditionally police detectives separate suspects as soon as possible prior to interrogation to reduce opportunity for planning of responses, and to increase the suspects’ stress and anxiety (Kassin & Gudjonsson, 2004). As a result of this real-life practice, deception research has focused on developing interview protocols that increase the discrepancies between individual truth-tellers and individual liars, ignoring the effects of group deceit.

Crimes commonly involve pairs or groups of offenders (McGloin & Piquero, 2009; Van Mastrigt & Farrington, 2009), and although interviewing suspects separately is modelled on typical police interview practices, there are several settings whereby interviewing multiple suspects together would be better suited. Examples for when collective interviewing could be used include, when there are multiple suspects but only one interviewer available, such as during police stop and searches, at road border controls where cars containing several people are checked, or at security checkpoints (e.g., airports). These settings tend to involve gathering intelligence to prevent harm rather than gathering evidence to charge someone who has already caused harm. Therefore, as a means of gathering intelligence, it would be more timely and convenient to interview group members simultaneously. Furthermore, group interviewing provides a different dynamic and potentially useful insight into detecting deception within groups, as it will capture deception at a social level as well as at an individual level; thus enabling the identification of cues to deceit that are present in
groups, but which cannot be explored in individuals (e.g., cues stemming from suspects communicating and interacting with one another). The detection of deception within groups is an area of research that has been overlooked, and therefore the current study will apply a collective interviewing approach as a technique to improve the detection of deception with an interview protocol that involves repeated questioning.

Recently, three studies have illustrated the clear potential for using collective interviewing in lie detection. Vrij et al. (2012) examined verbal communication cues in pairs of truth-tellers and pairs of liars. Pairs were friends because this reflects real-life situations in which criminals know each other. The procedure involved 21 pairs of truth-tellers going for lunch in a nearby restaurant. During this time 22 pairs of liars were asked to steal £10 from an office. On returning to the laboratory, the truth-tellers were informed about the stolen money and told that they were going to be interviewed as suspects about their whereabouts at the time the money was taken, and that they should just tell the truth about their time in the restaurant. In contrast, the liars were told that they were going to be interviewed about their activities but that they were not to admit to having taken the money. Instead, they were instructed to prepare an alibi about having gone to a nearby restaurant together for lunch, and to tell that story to the interviewer. All pairs were given as much time as they needed to prepare for the interview and were not informed that they would be interviewed together. Vrij et al. (2012) found that pairs of truth-tellers interrupted and corrected each other more than pairs of liars, as well as adding more information to each other’s accounts in comparison to pairs of liars.

Jundi et al. (2013) used the same procedure as Vrij et al. (2012) but then examined participants’ eye contact as a nonverbal communication cue. They found that pairs of liars tended to make more eye contact with the interviewer than pairs of
truth-tellers, whereas pairs of truth-tellers looked more at each other than pairs of liars. Driskell, Salas and Driskell (2012) investigated the social indicators of deception in pairs of liars and pairs of truth-tellers. They used 26 pairs of police officers or firefighters who had served together as partners. Pairs of truth-tellers were asked to describe a recent event that they had jointly participated in. Pairs of liars were instructed to fabricate a story on the spot that did not actually take place, but that involved them doing something together and was as realistic as possible. All participants had a moment to decide what event they would discuss. Driskell et al. found that pairs of truth-tellers illustrated more synchrony in behaviour and exhibited more interactions (e.g. mutual eye gaze and verbal transitions) than pairs of liars.

Unlike Vrij et al. (2012) and Jundi et al. (2013), Driskell et al. (2012) did not use a formal and time-consuming police-style interview. Instead they used a brief investigative interview, similar to that which might occur during initial screening at a check-point or street corner, thus demonstrating the real-life application of the collective interviewing approach. Furthermore, Driskell et al. used real-life events that were relevant to the participants, increasing their motivation to perform. One weakness of Driskell et al.’s study is that, unlike the studies by Vrij et al. and Jundi et al., the ground truth could not be established. This makes it difficult to measure whether the liars definitely lied and the truth-tellers definitely told the truth. However, determining ground truth and performing a task as participants did in the studies by Vrij et al. and Jundi et al. results in an artificial task that reduces the ecological validity of the study. Despite the minor procedural issues, these three studies show that a collective approach can generate discrepancies between pairs of truth-tellers and pairs of liars that can aid in the detection of deception, with a lack of communication cues and interaction cues (e.g., corrections, interruptions, eye contact with each other) being particularly indicative of deceit. The studies suggest that detecting deception in
a social context is imperative to enhance our understanding of lie detection, thus further studies using a collective interviewing approach will have both theoretical and practical value.

2.2.1 Strategies employed by truth-tellers and liars

Research into the differing strategies employed by truth-tellers and liars during interviews gives insight into the types of deception cues that may arise when interviewing pairs of suspects together, and shows that these cues are likely to vary from those cues present when suspects are interviewed individually. When pairs of truth-tellers are asked to recall a shared event, they exhibit interactions that cannot occur when interviewed individually, and these interactions will occur more frequently in truth-telling pairs than in lying pairs (Vrij et al., 2012). This is because pairs of truth-tellers will communicate with each other during the interview (e.g., by posing questions to one another) and will share their experiences through the joint recall of events. Conversely, liars will be inclined merely to recall what they planned to say, exhibiting fewer interactions as they recall their fabricated story. Truth-tellers believe that the truth will shine through (‘illusion of transparency’; Gilovich, Savitsky & Medvec, 1998) and therefore do not prepare their answers but rely purely on memory, preferring a ‘tell it all’ strategy that aims to provide a detailed description of what actually occurred. However, liars prefer a ‘keep it simple’ strategy to avoid raising suspicion, which results in their statements being less detailed but because they have pre-planned them, just as consistent as statements from truth-telling pairs (Granhag, Strömwall & Jonsson, 2003; Strömwall, Granhag & Jonsson, 2003; Vrij, Mann, Leal & Granhag, 2010).

2.2.2 Memory

The concept of collective interviewing coincides with the memory research which focuses on collective memory. Collective memory examines the social nature
of memory treating past experiences and events as memories shared with others (Barnier & Sutton, 2008; Hirst & Manier, 2008; Rajaram, 2011). The research suggests that group collaboration can aid memory through cross-cueing (where members of the group provide cues to one another that increase recall) and error-pruning (where feedback from other members of the group create discussions that make people realise their recall errors) (Rajaram, 2011; Ross, Blatz & Schryer, 2008). However, human memory is also highly susceptible to misinformation from a variety of sources, particularly other people (Loftus, 2005) and consequently group collaboration can result in ‘memory conformity’ (Gabbert, Memon & Allan, 2003), which reduces the accuracy of memory recall.

Reconstructive memory theory (Bartlett, 1932) states that memory is subject to distortions, such as omission errors (the leaving out of information) and commission errors (the adding in of new information) due to its reconstructive nature. Therefore, truthful suspects will not recall a story word for word (unless instructed to do so; Gauld & Stephenson, 1967), but will instead recreate the details of the story. This theory of reconstructive memory underlies the ‘repeat vs. reconstruct hypothesis’ (Granhag & Strömwall, 1999), which proposes that whilst liars will attempt to repeat what they have previously said, truth-tellers will try to reconstruct what they actually experienced. When the different strategies used by truth-tellers and liars are considered and memory research is taken into account, it is not surprising that the consistency of truth-telling pairs is equal to, or even weaker, than the consistency of lying pairs (e.g. Granhag et al., 2003). When truth-tellers are asked to repeat details, their memory restructures the event so they gain, lose, and change information over time (Baddeley, 1990), thus reducing consistency. This is something that liars do not do as they are merely repeating what they originally prepared, thus promoting consistency. In addition, the ‘reminiscence effect’ shows that repeated questioning can
result in the recall of previously unrecollected items (Payne, 1987), and this effect has been found to be stronger for truthful statements than for deceptive statements (Gran Hag et al., 2003). Therefore, in contradiction to the stereotypical belief that consistency implies truthfulness (see ‘consistency heuristic’ literature; Gran Hag & Strömwall, 2000), it is clear that lie-detectors need to be cautious when interpreting consistent statements as truthful and inconsistent statements as mendacious and therefore incriminating.

2.2.3 Dominance

When we consider interviewing collectively, it is important to mention dominance and its effect within groups. Dominance is defined as a dyadic variable in which one individual’s affirmation of control is met by compliance from another individual (Rogers-Millar & Millar, 1979). It is both context-dependent and relationship-dependent, with dominance being an important aspect of all relationships, particularly close relationships in which people have to depend upon one another to achieve their goals (Dunbar & Burgoon, 2005). There are different dimensions of dominance, but it is essentially a quantitatively orientated concept in which more speech is a measurement of who is dominating the conversation (Linell, Gustavsson & Juvonen, 1988). A study by Hung et al. (2007) provided a framework for detecting deception in group meetings and found that speaking length was associated with dominance, with 85% of dominant people being classified correctly based on number of words spoken. This suggests that dominance could be quantified using collective interviews to see whether there is a veracity effect on dominance.

2.2.4 Hypotheses

The current study used a collective interviewing approach to investigate deception occurring within pairs. Repetitions, omission errors, commission errors, contradictions and dominance were explored as possible cues to deceit, and with the
exception of dominance, these cues were explored both within each single participant and across the pairs of participants as they were interviewed simultaneously. Based on previous memory and deception research it is evident that truth-tellers will provide more details than liars (Vrij, Granhag & Porter, 2010; Hypothesis 1). Furthermore, whilst pairs of truth-tellers will interact more and jointly share the recall of events, ‘true’ memory is reconstructive in nature, therefore it was predicted that truth-telling pairs would correct, change and add in new information, and also leave out information over time (Baddeley, 1990; Bartlett, 1932; Granhag & Strömwall, 1999). Therefore, even when controlling for number of details, it was predicted that truth-telling pairs would exhibit more memory distortions, such as omission errors and commission errors, and would contradict themselves and each other more than lying pairs (Hypothesis 2). Conversely, pairs of liars should have colluded with one another and merely be repeating what they originally said in order to prevent themselves from raising suspicion and appearing incriminating (Granhag & Strömwall, 1999; Granhag et al., 2003; Vrij, Mann, et al., 2010). As a result, it was predicted that lying pairs would repeat themselves and each other more than truth-telling pairs (Hypothesis 3). The final prediction is not so straightforward because the link between dominance and veracity is unclear. However, it is believed that lying pairs should be more inclined to interrupt each other less, agree with each other more, and have fewer interactions (Vrij et al., 2012), resulting in one participant in the pair dominating the interview and speaking more often than the other participant who will have to follow their partners lead. Therefore, it was predicted that lying pairs would have a more dominant character within the pair, whereas truth-telling pairs would illustrate more equal dominance within the pair (Hypothesis 4).
2.3 Method

2.3.1 Participants

A total of 90 participants (45 pairs: 23 truth-telling pairs and 22 lying pairs) from a UK university took part in the current study. However, two truth-telling pairs were excluded because they did not follow the study instructions correctly (i.e. they did not attend the chosen restaurant). The mean age of the remaining 86 participants was 22.04 years (SD = 6.38), 25 were male and 61 were female.

2.3.2 Design

The current study used a between-subjects design with Veracity (truth versus lie) as the only factor and repetitions (themselves or the other participant in their pair), omission errors (themselves or the other participant in their pair), commission errors (themselves or the other participant in their pair), and contradictions (themselves or the other participant in their pair) as the dependent variables.

Dominance was also measured as a possible indicator of Veracity. The current study was designed to investigate whether the dependent variables were predictive of whether the pairs were truth-tellers or liars; thus whether these variables are accurate cues to deceit.

2.3.3 Procedure

The current study used data previously collected by Vrij et al. (2012), in which 21 pairs of truth-tellers and 22 pairs of liars were recruited under the guise of a social communication experiment. This procedure imitated Vrij et al. (2009). Pairs were friends because this reflects real-life criminal networks, and they were randomly allocated to either the lying or truth-telling condition.

Upon arrival at the laboratory, pairs of truth-tellers were told that the study was delayed by 45-minutes and that, as compensation, they could have lunch in a nearby restaurant. A confederate escorted each pair to a predetermined restaurant and
collected them 45-minutes later. When the truth-tellers arrived back at the laboratory they were told that money had been stolen whilst they were at lunch, and that, as suspects, they would be questioned about their activities in the restaurant. Upon arrival at the laboratory, pairs of liars were asked to take £10 from an office and to return to the laboratory to be interviewed about their activities. The pairs of liars were instructed to prepare an alibi, which involved them telling the interviewer that they were having lunch together in a nearby restaurant at the time the money was stolen. Both the pairs of truth-tellers and pairs of liars were given as much time as they wanted to prepare themselves for their interviews but were not informed that they would be interviewed together.

To motivate participants to perform well during the experiment, they were told that if they were believed by the interviewer they would each receive £10. However, if they were not believed they would receive no money and would be required to write a statement detailing their whereabouts during the time the money was stolen. To ensure that the experiment was ethical and equal, all participants were paid £10, and were told at the end of the experiment that the interviewer believed they were telling the truth.

Once the pairs of truth-tellers or liars indicated they were ready, they were taken to a forensic interview suite in which they were interviewed together and informed that they would be video- and audio-recorded. The interviewer was blind to the veracity of the pairs. The interviewer asked questions about each pair’s time in the restaurant using a standardised interview protocol taken from Vrij et al. (2009). This interview protocol distinguished between general questions (e.g. ‘Can you tell me in as much detail as possible what you did while you were in the restaurant?’), spatial questions (e.g. ‘In relation to the front door and where you sat, where were the closest diners?’), and temporal questions (e.g. ‘How long did it take between the staff taking
your order and receiving your food?’). The interviewer never stated who in the pair had to answer each question, therefore the pair could choose which member responded and each member of the pair could say as little or as much as they wanted.

### 2.3.4 Manipulation checks

Manipulation checks were carried out by Vrij et al. (2012). Following the interview each participant completed a post-interview questionnaire separately. Participants were asked to what extent they had felt motivated to appear convincing during the interview. Answers were given on 7-point Likert scales ranging from [1] not at all to [7] very much. The majority of participants (88%) indicated that they were motivated to perform well during the interview (score of 5 or higher on the 7-point Likert scale). Liars were significantly more motivated ($M = 6.27, SD = .90$) than truth-tellers ($M = 5.31, SD = 1.60$), $F(1, 84) = 11.49, p = .001, \eta^2_p = .12, d = .74$. Overall, both truth-tellers and liars reported to have been highly motivated to perform well during the interview.

Whilst the procedure and manipulation checks of this study were carried out by Vrij et al. (2012), it is important to note that, for the purpose of the present experiment, I developed a coding scheme to measure new variables that had not previously been measured by Vrij et al. (2012) (i.e., repetitions, omission errors, commission errors, contradictions, and dominance). I then coded the transcripts for all variables (as did one other person for reliability purposes), did the necessarily calculations, ran the analyses, and wrote up the findings myself (see all future sections in this chapter).

### 2.3.5 Coding: Memory variables

For the purpose of the present experiment, the interview transcripts were coded by two raters who were blind to the hypotheses and veracity status of the pairs. The interview questions were then separated into general questions and spatial questions.
General questions were those that required the participants to give a broad description (e.g. ‘Can you tell me in as much detail as possible what you did while you were in the restaurant?’), and spatial questions were those that required the participants to describe a layout or space between objects (e.g. ‘In relation to the front door and where you sat, where were the closest diners?’). This enabled general details, such as “I went to the bar and ordered two cokes”; and spatial details, such as “the lady was sat to the right of us, close to the window” to be calculated separately for all cues (repetitions, omission errors, commission errors, contradictions, and dominance; see below).

Once all questions had been asked during the first part of the interview, specific questions were repeated in exactly the same format in the second part of the interview. This allowed for the total number of details to the initial questions (first part of the interview) and the total number of details to the replicate questions (second part of the interview) to be calculated. The frequency of repetitions and contradictions were then calculated by both raters. Repetitions were defined as the amount of information said again by a participant from the initial questions to the replicate questions. Contradictions were defined as information given by a participant in the second part of the interview that directly conflicted with what had been said in the first part of the interview. Repetitions and contradictions were divided into four categories; repeating or contradicting information they themselves originally said; and repeating or contradicting information their partner originally said.

The first 15 transcripts were coded and comparisons made between the outputs from both raters to increase accuracy and ensure both raters understood the coding system. The remaining 30 transcripts were coded separately. Inter-rater reliability scores (Pearson correlations) for the 30 transcripts were generally high for both general details (total: \( r = .99 \); repetitions: \( r = .92 \); contradictions: \( r = .63 \)) and spatial
Chapter 2

details (total: $r = .98$; repetitions: $r = .92$; contradictions: $r = .85$). The agreement between the two raters was therefore acceptable and the coding system deemed reliable. New variables were then computed using the coded data (see Appendix 2.1). First, the average scores of the two coders’ total number of initial details, total number of replicate details, and total number of repetitions were calculated. Following this, an agreed contradictions variable was created by comparing each coder’s total contradictions rather than using the average contradictions. This was because there were very few contradictions. If the agreed total was on the boundary then .5 was used. For example, if one rater had one contradiction and the other had two contradictions, but an agreement could not be made then 1.5 was used.

New variables were also calculated for omission errors and commission errors. These were calculated using the total number of initial and replicate details and the repetition variables (see Appendix 2.1). Omission errors were defined as information lost by participants between the initial and replicate questions. Commission errors were defined as information added by participants between the initial and replicate questions. Omission errors and commission errors were divided into four categories; losing or adding information from/to what they themselves originally said; and losing or adding information from/to what their partner originally said.

Repetitions, omission errors, commission errors and contradictions were computed using frequencies (i.e. number of details). These data were analysed using a one-factor between subjects MANCOVA with number of details as a covariate. Repetitions, omission errors and commission errors were then calculated again using proportions of each cue as a function of the number of details (see Appendix 2.2 for how the proportions were computed for each variable). These proportion data were then analysed using a one-factor between subjects MANOVA. All analyses needed to take into account the significant difference between truth-tellers and liars in terms of
the number of details they gave. Therefore, although they are very similar analyses, MANCOVAs with number of details as a covariate and MANOVAs using proportions of each cue to the number of details were conducted and all findings reported in the results section (See Section 2.4).

2.3.6 Coding: Dominance

Dominance was computed and measured in three different ways in order to explore every aspect therein. Dominance variables were calculated separately for participants sitting on the left during the interview and participants sitting on the right during the interview as well as for the initial and replicate details (see Appendix 2.3).

The first way of measuring dominance used an independent samples t-test examining dominance change and how far away from equal dominance the pairs of truth-tellers and pairs of liars were. The proportion of information given by both the left and right participants during the initial and replicate questions were calculated separately for each participant in the pair to measure dominance equality, with 0.5 representing equal dominance. This proportion of information was calculated by dividing the number of details each individual participant gave by the total number of details given by both the participants in the pair. Following this, each participant’s proportion value was subtracted from 0.5 to give a value that represented how far off equal dominance each participant was. Negative values represent above equal dominance and positive values represent below equal dominance. Dominance change was then measured for both the left and right participants by subtracting their repeated dominance scores from their initial dominance scores. Finally, to obtain an overall dominance change score for each pair, the dominance score of the left participant was multiplied by the dominance score of the right participant ignoring the positive/negative sign of their individual values. For example: If the left participant gave 14.50 details and the right participant gave 31.50 details to the initial questions,
then the proportion of information given to the initial questions by the left participant was .32 \((14.50/(14.50+31.50))\) and for the right participant was .68 \((31.50/(14.50+31.50))\). If these are subtracted from 0.5 then the distance from equal dominance for the left participant in the initial questions is .18, and the right participant is -.18. Subsequently, if the left participant gave 19 details and the right participant gave 18 details to the replicate questions, then the proportion of information given to the replicate questions by the left participant was .51 \((19/(19+18))\) and for the right participant was .49 \((18/(19+18))\). If these are subtracted from 0.5 then the distance from equal dominance for the left participant in the replicate questions is -.01, and the right participant is .01. Dominance change for the left participant was then .32 minus .51 which equals -.19, and for the right participant was .68 minus .49 which equals .19. The overall dominance change for the pair was therefore -.19 multiplied by .19 which equalled -.036, but the negative sign was ignored.

The second way of measuring dominance used an independent samples t-test to compare the total dominance change between the most dominant speakers in the initial and replicate questions, and to investigate whether change in dominance significantly differed between pairs of truth-tellers and pairs of liars. The proportion of information scores given during both the initial and replicate questions by the left and right participants were used to compute dominance change, with higher proportion values representing the most dominant character answering those questions. The proportion scores for the most dominant characters in the pair during the initial and replicate questions were added together if the dominant character changed from the initial to replicate questions, but were subtracted from one another if the dominant character remained the same from the initial to replicate questions. This gave the difference in dominance between the most dominant speakers from the initial
to replicate questions. Zero represented no dominance change. Larger values represented greater dominance change from the initial to replicate questions. For example: If the proportion of information given by the left participant was .32 for the initial questions and .51 for the replicate questions, and the proportion of information given by the right participant was .68 for the initial questions and .49 for the replicate questions; then the right participant was the most dominant character when the initial questions were answered, and the left participant became the most dominant character when the replicate questions were answered. Consequently, .51 was added to .68 to give a dominance change of 1.19. If however, the proportion of information given by the left participant was .37 for the initial questions and .43 for the replicate questions, and the proportion of information given by the right participant was .63 for the initial questions and .57 for the replicate questions; then the right participant was the most dominant character throughout answering both the initial and replicate questions. This meant that .57 was subtracted from .63 to give a dominance change of .06.

The third way of measuring dominance used a 2 x 2 chi-square test of independence to explore whether there was a relationship between the two categorical variables: Veracity (truth vs. lie) and Dominance change (yes vs. no). The second method above was used to categorise dominance change, which was coded based on who in the pair answered the questions first and whether or not this swapped between the left and right participants from the initial questions to the replicate questions (see Appendix 2.3 for how the dominance variables were computed).

2.4 Results

The results section is divided into general questions (see Section 2.4.1) and spatial questions (see Section 2.4.2). Within each of these sections is firstly a MANOVA comparing the number of details given to the initial and replicate questions by truth-tellers and liars (see Sections 2.4.1.1 and 2.4.2.1). Following this are
MANCOVA analyses of the frequency data and MANOVA analyses of the proportion data. These investigate whether liars and truth-tellers are significantly different in terms of repetitions (themselves or the other participant in the pair), omission errors (themselves or the other participant in the pair), commission errors (themselves or the other participant in the pair) and contradictions (themselves or the other participant in the pair), when number of details is controlled for (see Sections 2.4.1.2 and 2.4.2.2). Finally, there are analyses investigating the link between Veracity and dominance (see Sections 2.4.1.3 and 2.4.2.3). The final part of the results section (see Section 2.4.3) contains the analyses conducted on the data when the deception cues were not divided into themselves and the other participant in the pair, and the number of details was controlled for.

2.4.1 General questions

2.4.1.1 Number of general details given by truth-tellers and liars to the initial and replicate questions. A one-factor between subjects MANOVA was conducted with Veracity (truth versus lie) as the only factor, and number of details given to the initial interview questions and number of details given to the replicate interview questions as the dependent variables. The MANOVA revealed a significant multivariate main effect for Veracity, Wilks’ $\lambda = .80$, $F(2, 40) = 5.11$, $p = .011$, $\eta_p^2 = .20$. In addition, significant univariate main effects for Veracity were obtained for the total number of general details given by pairs of participants to the initial interview questions, $F(1, 41) = 10.46$, $p = .002$, $\eta_p^2 = .20$ (see Table 2.1). Truth-tellers gave significantly more general details to the initial interview questions ($M = 57.36$, $SD = 35.76$) compared to liars ($M = 30.36$, $SD = 15.61$). No significant univariate main effects for Veracity were obtained for the total number of general details given by pairs of participants to the replicate interview questions, $F(1, 41) = 3.50$, $p = .069$, $\eta_p^2 = .08$. 
2.4.1.2 Analyses of repetitions, omission errors, commission errors and contradictions when controlling for number of general details. As a result of the number of general details being significantly different between truth-tellers and liars to the initial interview questions (see Section 2.4.1.1), number of details was controlled for in the following analyses. Two different approaches were used to test whether pairs of truth-tellers and pairs of liars were significantly different in terms of repetitions, omission errors, commission errors and contradictions.

First, a one-factor between subjects MANCOVA was conducted with Veracity (truth versus lie) as the independent variable; *repetitions (themselves or the other participant in their pair)*, *omission errors (themselves or the other participant in their pair)*, *commission errors (themselves or the other participant in their pair)* and *contradictions (themselves or the other participant in their pair)* as the dependent variables; and the total number of general details as the covariate. The MANCOVA revealed no significant multivariate main effect for Veracity, Wilks’ $\lambda = .76$, $F(7, 34) = 1.52, p = .195, \eta^2_p = .24$. In addition, no significant univariate main effects were obtained for any of the dependent variables (see Table 2.1).

Second, the proportion of repetitions, omission errors and commission errors was computed in relation to the number of details. A one-factor between subjects MANOVA was conducted with Veracity (truth versus lie) as the only factor and proportion of *repetitions (themselves or the other participant in their pair)*, *omission errors (themselves or the other participant in their pair)*, and *commission errors (themselves or the other participant in their pair)* as the dependent variables. The MANOVA did not reveal a significant multivariate main effect for Veracity, Wilks’ $\lambda = .96$, $F(5, 37) = .35, p = .882, \eta^2_p = .05$. In addition, no significant univariate main effects were obtained for any of the dependent variables (see Table 2.2).
The analyses above illustrate that when number of general details was controlled for, Veracity (whether a member of a truth-telling pair or a lying pair) has no significant effect on repetitions, omission errors, commission errors, or contradictions. This means that repetitions, omission errors, commission errors and contradictions (when based on general details) are not accurate cues to deceit when using a collective interviewing approach in the context of this study. Therefore, these cues should not be used to differentiate pairs of truth-tellers from pairs of liars.
Table 2.1

**MANOVA and MANCOVA results for each of the dependent variables for general details.**

<table>
<thead>
<tr>
<th></th>
<th>Truth ($N = 21$)</th>
<th>Lie ($N = 22$)</th>
<th>$F$</th>
<th>$F$ (total number of details as covariate)</th>
<th>$p$</th>
<th>$\eta^2_p$</th>
<th>$d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of details given to initial questions</td>
<td>57.36 (35.76)</td>
<td>30.36 (15.61)</td>
<td>10.46</td>
<td>.002*</td>
<td>.20</td>
<td>.98</td>
<td></td>
</tr>
<tr>
<td>Number of details given to replicate questions</td>
<td>24.33 (12.76)</td>
<td>17.23 (12.16)</td>
<td>3.47</td>
<td>.069</td>
<td>.08</td>
<td>.57</td>
<td></td>
</tr>
<tr>
<td>Repeat: Themselves</td>
<td>10.24 (5.37)</td>
<td>5.34 (3.36)</td>
<td>3.30</td>
<td>.077</td>
<td>.08</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td>Repeat: Other participant in pair</td>
<td>5.79 (3.81)</td>
<td>3.66 (2.67)</td>
<td>.24</td>
<td>.628</td>
<td>.01</td>
<td>.65</td>
<td></td>
</tr>
<tr>
<td>Omission errors: Themselves</td>
<td>47.12 (33.22)</td>
<td>25.00 (13.28)</td>
<td>.01</td>
<td>.924</td>
<td>&lt;.01</td>
<td>.87</td>
<td></td>
</tr>
<tr>
<td>Omission errors: Other participant in pair</td>
<td>51.57 (34.11)</td>
<td>26.66 (14.51)</td>
<td>.41</td>
<td>.525</td>
<td>.01</td>
<td>.95</td>
<td></td>
</tr>
<tr>
<td>Commission errors: Themselves</td>
<td>14.10 (8.78)</td>
<td>11.89 (10.11)</td>
<td>3.72</td>
<td>.061</td>
<td>.09</td>
<td>.23</td>
<td></td>
</tr>
<tr>
<td>Commission errors: Other participant in pair</td>
<td>18.55 (10.66)</td>
<td>13.57 (11.25)</td>
<td>1.22</td>
<td>.276</td>
<td>.03</td>
<td>.45</td>
<td></td>
</tr>
<tr>
<td>Contradict: Themselves</td>
<td>.67 (1.15)</td>
<td>.14 (.35)</td>
<td>1.81</td>
<td>.186</td>
<td>.04</td>
<td>.62</td>
<td></td>
</tr>
<tr>
<td>Contradict: Other participant in pair</td>
<td>.48 (.68)</td>
<td>.23 (.53)</td>
<td>.17</td>
<td>.679</td>
<td>&lt;.01</td>
<td>.41</td>
<td></td>
</tr>
</tbody>
</table>

*p < .005
Table 2.2

**MANOVA results for each of the proportion dependent variables for general details.**

<table>
<thead>
<tr>
<th></th>
<th>Truth (N = 21) Mean (SD)</th>
<th>Lie (N = 22) Mean (SD)</th>
<th>F</th>
<th>p</th>
<th>$\eta_p^2$</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of details given to initial questions</td>
<td>57.36 (35.76)</td>
<td>30.36 (15.61)</td>
<td>10.46</td>
<td>.002*</td>
<td>.20</td>
<td>.98</td>
</tr>
<tr>
<td>Number of details given to replicate questions</td>
<td>24.33 (12.76)</td>
<td>17.23 (12.16)</td>
<td>3.47</td>
<td>.069</td>
<td>.08</td>
<td>.57</td>
</tr>
<tr>
<td>Repeat: Themselves</td>
<td>19.51 (10.08)</td>
<td>18.24 (9.01)</td>
<td>.19</td>
<td>.666</td>
<td>.01</td>
<td>.13</td>
</tr>
<tr>
<td>Repeat: Other participant in pair</td>
<td>12.00 (10.52)</td>
<td>13.05 (9.28)</td>
<td>.12</td>
<td>.730</td>
<td>&lt;.01</td>
<td>.11</td>
</tr>
<tr>
<td>Omission errors: Themselves</td>
<td>80.49 (10.08)</td>
<td>79.48 (10.39)</td>
<td>.10</td>
<td>.749</td>
<td>&lt;.01</td>
<td>.10</td>
</tr>
<tr>
<td>Omission errors: Other participant in pair</td>
<td>88.00 (10.52)</td>
<td>84.68 (13.45)</td>
<td>.81</td>
<td>.374</td>
<td>.02</td>
<td>.27</td>
</tr>
<tr>
<td>Commission errors: Themselves</td>
<td>54.71 (18.94)</td>
<td>61.39 (21.96)</td>
<td>1.14</td>
<td>.293</td>
<td>.03</td>
<td>.33</td>
</tr>
<tr>
<td>Commission errors: Other participant in pair</td>
<td>69.63 (14.89)</td>
<td>67.32 (18.44)</td>
<td>.20</td>
<td>.654</td>
<td>.01</td>
<td>.14</td>
</tr>
</tbody>
</table>

*p < .005
2.4.1.3 Dominance. An independent samples t-test was conducted to see if there was a significant difference between Veracity (truth vs. lie) and dominance equality. Veracity was the independent variable. Dominance was the dependent variable and was measured based on how far away the pairs were from equal dominance on the general questions. Dominance equality did not significantly differ between pairs of truth-tellers ($M = .06, SD = .10$) and pairs of liars ($M = .12, SD = .17$), $t(41) = -1.51, p = .139$.

A further independent samples t-test was conducted to see if there was a significant difference in total dominance change between pairs of truth-tellers and pairs of liars from the initial to replicate general questions. Veracity (truth vs. lie) was the independent variable and dominance change the dependent variable. Dominance change did not significantly differ between pairs of truth-tellers ($M = .47, SD = .58$) and pairs of liars ($M = .74, SD = .66$), $t(41) = -1.40, p = .168$.

A 2 x 2 chi-square test of independence was conducted on the data to investigate whether there was a significant association between Veracity (truth vs. lie) and whether there was change in dominance between the left and right participants from the initial to replicate general questions (yes vs. no). Veracity was the independent variable and dominance change the dependent variable. The test showed that there was no significant association between Veracity and the occurrence of dominance change, $\chi^2 (1) = 1.31, p = .252$.

2.4.2 Spatial questions

2.4.2.1 Number of spatial details given by truth-tellers and liars to the initial and replicate questions. A one-factor between subjects MANOVA was conducted with Veracity (truth versus lie) as the only factor, and number of details given to the initial interview questions and number of details given to the replicate interview questions as the dependent variables. The MANOVA revealed a significant
multivariate main effect for Veracity, Wilks’ $\lambda = .86$, $F(2, 40) = 3.30$, $p = .047$, $\eta_p^2 = .14$. In addition, significant univariate main effects for Veracity were obtained for the total number of spatial details given by pairs of participants to the initial interview questions, $F(1, 41) = 4.42$, $p = .042$, $\eta_p^2 = .10$; and for the total number of spatial details given by pairs of participants to the replicate interview questions, $F(1, 41) = 6.56$, $p = .014$, $\eta_p^2 = .14$ (see Table 2.3). Truth-tellers gave significantly more spatial details to the initial questions ($M = 18.19$, $SD = 12.30$) and to the replicate questions ($M = 12.17$, $SD = 8.01$) in comparison to liars ($M = 11.64$, $SD = 7.74$ and $M = 7.23$, $SD = 4.12$, respectively).

2.4.2.2 Analyses of repetitions, omission errors, commission errors and contradictions when controlling for number of spatial details. As a result of the number of spatial details being significantly different between truth-tellers and liars to the initial and replicate interview questions (see Section 2.4.2.1), number of details was controlled for in the following analyses. Two different approaches were conducted to test whether pairs of truth-tellers and pairs of liars were significantly different in terms of repetitions, omission errors, commission errors and contradictions.

First, a one-factor between subjects MANCOVA was conducted with Veracity (truth versus lie) as the independent variable; repetitions (themselves or the other participant in their pair), omission errors (themselves or the other participant in their pair), commission errors (themselves or the other participant in their pair) and contradictions (themselves or the other participant in their pair) as the dependent variables; and the total number of spatial details as the covariate. The MANCOVA revealed no significant multivariate main effect for Veracity, Wilks’ $\lambda = .84$, $F(5, 36) = 1.34$, $p = .269$, $\eta_p^2 = .16$. In addition, no significant univariate main effects for Veracity were obtained for any of the dependent variables (see Table 2.3).
Table 2.3

**MANOVA and MANCOVA results for each of the dependent variables for spatial details.**

<table>
<thead>
<tr>
<th></th>
<th>Truth (N = 21) Mean (SD)</th>
<th>Lie (N = 22) Mean (SD)</th>
<th>F (total number of details as covariate)</th>
<th>p</th>
<th>ηp²</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of details given to initial questions</td>
<td>18.19 (12.30)</td>
<td>11.64 (7.74)</td>
<td>4.42</td>
<td>.042*</td>
<td>.10</td>
<td>.64</td>
</tr>
<tr>
<td>Number of details given to replicate questions</td>
<td>12.17 (8.00)</td>
<td>7.23 (4.12)</td>
<td>6.56</td>
<td>.014*</td>
<td>.14</td>
<td>.78</td>
</tr>
<tr>
<td>Repeat: Themselves</td>
<td>6.19 (5.59)</td>
<td>4.23 (3.22)</td>
<td>1.28</td>
<td>.265</td>
<td>.03</td>
<td>.43</td>
</tr>
<tr>
<td>Repeat: Other participant in pair</td>
<td>1.60 (1.78)</td>
<td>1.45 (1.68)</td>
<td>.23</td>
<td>.633</td>
<td>.01</td>
<td>.09</td>
</tr>
<tr>
<td>Omission errors: Themselves</td>
<td>12.00 (8.05)</td>
<td>7.41 (6.70)</td>
<td>.01</td>
<td>.929</td>
<td>&lt;.01</td>
<td>.62</td>
</tr>
<tr>
<td>Omission errors: Other participant in pair</td>
<td>16.60 (12.19)</td>
<td>10.18 (7.06)</td>
<td>.19</td>
<td>.666</td>
<td>.01</td>
<td>.65</td>
</tr>
<tr>
<td>Commission errors: Themselves</td>
<td>5.98 (4.72)</td>
<td>3.00 (2.47)</td>
<td>2.36</td>
<td>.132</td>
<td>.06</td>
<td>.79</td>
</tr>
<tr>
<td>Commission errors: Other participant in pair</td>
<td>10.57 (7.51)</td>
<td>5.77 (4.10)</td>
<td>.89</td>
<td>.351</td>
<td>.02</td>
<td>.79</td>
</tr>
<tr>
<td>Contradict: Themselves</td>
<td>.19 (.40)</td>
<td>.14 (.35)</td>
<td>.39</td>
<td>.537</td>
<td>.01</td>
<td>.31</td>
</tr>
<tr>
<td>Contradict: Other participant in pair</td>
<td>.14 (.36)</td>
<td>.05 (.21)</td>
<td>1.68</td>
<td>.202</td>
<td>.04</td>
<td>.31</td>
</tr>
</tbody>
</table>

*p < .05
Second, the proportion of repetitions, omission errors and commission errors was computed in relation to the number of details. A one-factor between subjects MANOVA was conducted with Veracity (truth versus lie) as the only factor and proportion of repetitions (themselves or the other participant in their pair), omission errors (themselves or the other participant in their pair), and commission errors (themselves or the other participant in their pair) as the dependent variables. The MANOVA did not reveal a significant multivariate main effect for Veracity, Wilks’ $\lambda = .98, F(4, 38) = .18, p = .947, \eta_p^2 = .02$. In addition, no significant univariate main effects were obtained for any of the dependent variables (see Table 2.4).

The analyses above show that when number of spatial details was controlled for, Veracity (whether a member of a truth-telling pair or a lying pair) has no significant effect on repetitions, omission errors, commission errors, or contradictions. This means that repetitions, omission errors, commission errors and contradictions (when based on spatial details) are not accurate cues to deceit when using a collective interviewing approach in the context of this study. Therefore, these cues should not be used to differentiate pairs of truth-tellers from pairs of liars.
Table 2.4

MANOVA results for each of the proportion dependent variables for spatial details.

<table>
<thead>
<tr>
<th></th>
<th>Truth (N = 21)</th>
<th>Lie (N = 22)</th>
<th>F</th>
<th>P</th>
<th>$\eta_p^2$</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of details given to initial questions</td>
<td>18.19 (12.30)</td>
<td>11.64 (7.74)</td>
<td>4.42</td>
<td>.042*</td>
<td>.10</td>
<td>.64</td>
</tr>
<tr>
<td>Number of details given to replicate questions</td>
<td>12.17 (8.00)</td>
<td>7.23 (4.12)</td>
<td>6.56</td>
<td>.014*</td>
<td>.14</td>
<td>.78</td>
</tr>
<tr>
<td>Repeat: Themselves</td>
<td>29.30 (15.50)</td>
<td>27.61 (15.52)</td>
<td>.13</td>
<td>.723</td>
<td>&lt;.01</td>
<td>.11</td>
</tr>
<tr>
<td>Repeat: Other participant in pair</td>
<td>9.78 (14.32)</td>
<td>12.37 (12.92)</td>
<td>.39</td>
<td>.537</td>
<td>.01</td>
<td>.19</td>
</tr>
<tr>
<td>Omission errors: Themselves</td>
<td>70.70 (15.50)</td>
<td>72.39 (15.52)</td>
<td>.13</td>
<td>.723</td>
<td>&lt;.01</td>
<td>.11</td>
</tr>
<tr>
<td>Omission errors: Other participant in pair</td>
<td>90.22 (14.32)</td>
<td>87.63 (12.92)</td>
<td>.39</td>
<td>.537</td>
<td>.01</td>
<td>.19</td>
</tr>
<tr>
<td>Commission errors: Themselves</td>
<td>56.36 (21.27)</td>
<td>61.22 (24.23)</td>
<td>.49</td>
<td>.489</td>
<td>.01</td>
<td>.21</td>
</tr>
<tr>
<td>Commission errors: Other participant in pair</td>
<td>82.09 (18.22)</td>
<td>80.32 (19.49)</td>
<td>.09</td>
<td>.761</td>
<td>&lt;.01</td>
<td>.09</td>
</tr>
</tbody>
</table>

*p<.05
2.4.2.3 Dominance. An independent samples t-test was conducted to see if there was a significant difference between Veracity (truth vs. lie) and dominance equality. Veracity was the independent variable. Dominance was the dependent variable and was measured based on how far away the pairs were from equal dominance on the spatial questions. Dominance equality did not significantly differ between pairs of truth-tellers \((M = .10, SD = .13)\) and pairs of liars \((M = .10, SD = .24)\), \(t(41) = .03, p = .974\).

A further independent samples t-test was conducted to see if there was a significant difference in total dominance change between pairs of truth-tellers and pairs of liars from the initial to replicate spatial questions. Veracity (truth vs. lie) was the independent variable and dominance change the dependent variable. Dominance change did not significantly differ between pairs of truth-tellers \((M = .59, SD = .61)\) and pairs of liars \((M = .44, SD = .61)\), \(t(41) = .82, p = .416\).

A 2 x 2 chi-square test of independence was conducted on the data to investigate whether there was a significant association between Veracity (truth vs. lie) and whether there was change in dominance between the left and right participants from the initial to replicate spatial questions (yes vs. no). Veracity was the independent variable and dominance change the dependent variable. The test showed that there was no significant association between Veracity and the occurrence of dominance change, \(\chi^2 (1) = .60, p = .438\).

2.4.3 Total number of repetitions, omission errors, commission errors and contradictions

Further analyses were conducted to explore whether the dependent variables were significantly different between pairs of truth-tellers and pairs of liars, when they were not divided into themselves and the other participant in their pair, and the number of details was controlled for.
2.4.3.1 General details. A one-factor between-subjects MANCOVA was conducted with Veracity (truth versus lie) as the independent variable; total repetitions, total omission errors, total commission errors and total contradictions as the dependent variables; and the total number of general details as the covariate. The MANCOVA revealed no significant multivariate main effect for Veracity, Wilks’ $\lambda = .80$, $F(4, 37) = 2.36$, $p = .071$, $\eta_p^2 = .20$. In addition, no significant univariate main effects for Veracity were obtained for any of the dependent variable totals (see Table 2.5 in Section 2.5).

2.4.3.2 Spatial details. A one-factor between-subjects MANCOVA was conducted with Veracity (truth versus lie) as the independent variable; total repetitions, total omission errors, total commission errors and total contradictions as the dependent variables; and the total number of spatial details as the covariate. The MANCOVA revealed no significant multivariate main effect for Veracity, Wilks’ $\lambda = .85$, $F(3, 38) = 2.22$, $p = .102$, $\eta_p^2 = .15$. In addition, no significant univariate main effects for Veracity were obtained for any of the dependent variable totals (see Table 2.5 in Section 2.5).

2.5 Discussion

The aim of the current study was to examine whether repetitions, omission errors, commission errors, contradictions and/or dominance are cues to deceit in pairs when using a collective interviewing approach whereby pairs are interviewed simultaneously.

Overall, truth-telling pairs gave more general details and more spatial details than lying pairs, which supports Hypothesis 1 and previous deception research (e.g. Vrij, Granhag, et al., 2010). This is not surprising given that truth-tellers find it easier to provide information because they have actually experienced what they are recalling and therefore do not fear that the extra details will incriminate them. In addition, when
number of general details or number of spatial details was controlled for, no significant differences emerged between pairs of truth-tellers and pairs of liars in terms of repetitions, omission errors, commission errors, and contradictions. Consequently, Hypotheses 2 and 3 were rejected. These findings conflict with memory theories, which state that memory is reconstructive in nature and influenced by the presence of other people, suggesting truth-tellers should lose, change and gain more information than liars when asked to repeat specific details (Baddeley, 1990; Bartlett, 1932; Gabbert et al., 2003; Loftus, 2005). Furthermore, the findings are contrary to previous deception literature, particularly the ‘repeat vs. reconstruct’ hypothesis studies (e.g. Granhag & Strömwall, 1999; Granhag et al., 2003) and the recent collective interviewing study by Vrij et al. (2012), which propose that truth-telling pairs make more errors than lying pairs, and lying pairs make more repetitions than truth-telling pairs.

The rejection of Hypotheses 2 and 3 was not expected. The fact that the current study revealed no effects suggests that the interview protocol used in the study was not appropriately eliciting the necessary differences between pairs of truth-tellers and pairs of liars. The interview protocol was developed around questions known to successfully differentiate individual truth-tellers from individual liars; perhaps such questions are less applicable to elicit cues to deceit in a collective interviewing setting when pairs are being interviewed. Nevertheless, this does not mean that the interview protocol will never work. Perhaps it will work if a different interview style is introduced. An interesting manipulation to implement into the interview is ‘turn-taking’. Turn-taking means that the interviewer will state which of the two participants is to commence answering the question. The interviewer will then intervene by stopping whichever participant is responding and asking the other participant in the pair to continue from the point at which their partner was stopped.
Lying is mentally taxing (Zuckerman, DePaulo & Rosenthal, 1981), and previous deception research with single suspects has shown that ‘imposing cognitive load’ elicits and magnifies the verbal and nonverbal cues to deception (Vrij, Fisher, Mann & Leal, 2008). Turn-taking should be more cognitively demanding for lying pairs than for truth-telling pairs because they are required to concentrate on what they are saying as well as what their partner is saying. Furthermore, this technique goes beyond the liars’ preparations, and if the question is unanticipated and one person in the pair is forced to fabricate, the other individual in the pair is then forced to continue with that fabrication. This is challenging and requires the individuals to have good improvisation skills, especially when trying to make the story appear honest and coherent. Turn-taking should therefore increase the discrepancies between pairs that enable the identification of deceit.

The fourth hypothesis predicted that lying pairs will have a more dominant character within the pair, whereas truth-telling pairs will illustrate more equal dominance within the pair. Dominance did not significantly differentiate between pairs of truth-tellers and pairs of liars when responding to either the general or the spatial questions; therefore Hypothesis 4 was rejected. These non-significant findings may be a consequence of dominance remaining stable regardless of whether you are a truth-teller or a liar. Dominance is an important aspect of all relationships (Dunbar & Burgoon, 2005); thus it may be present in both truth-telling and lying groups resulting in it having no veracity effect. Furthermore, interactional dominance suggests dominance can be measured via communicative actions and responses, with the most dominant individual being the one who directs and controls other individual’s actions to a greater extent (Linell, Gustavsson & Juvonen, 1988). Consequently, dominance requires interaction between the group members. Recent deception research has revealed that truth-telling pairs interact more with one another than lying pairs (e.g.
Driskell et al., 2012; Vrij et al., 2012); hence it may well be that the interactions between the truth-telling pairs results in them actually having a more dominant individual within the pair. It may well be that dominance was not measured in the most appropriate way during this study because dominance based on how the pairs were interacting together was not measured. It could thus be measured via nonverbal behaviour (e.g. eye contact, facial expressions, posture or gestures) (e.g. Burgoon & Le Poire, 1999). This is something that warrants further investigation.

Suspects are typically interviewed individually. Participants in the current study were not informed that they would be interviewed together; therefore it is possible that the pairs of participants prepared for the interview and developed strategies based on the belief they would be interviewed separately. It would be of interest to further explore whether informing participants they would be interviewed together prior to them preparing for the interview will lead to them employing different strategies. It is predicted that being informed about being interviewed collectively will make lying pairs develop socially shared deceptive strategies that focus not only on the fabricated story and ‘keeping it simple’ but also on how they should behave in order to appear convincing, e.g. sitting still and looking at the interviewer. It is unlikely, however, that it will occur to them to discuss how they should communicate and interact together, making these social cues important to measure when interviewing collectively.

Please note that it is not suggested here that collective interviewing should replace individual interviewing. Hence, there was no individual interviewing condition implemented into the current study. Instead, it is suggested that it be employed as a ‘new’ or ‘additional’ approach to individual interviewing. Therefore, the collective interview could be used in isolation whereby, if the group raises suspicion in a collective interview, the police take the required actions they would
normally take after interviewing individuals who raise suspicion (e.g., calling for assistance, collecting further evidence). Alternatively, collective interviewing could act as an initial screening process to determine whether suspects then need to be interviewed individually. Collective interviewing is not just limited to pairs; it could also be applied when interviewing more than two suspects.

A police-style interview setting was used in this study because it has previously been used successfully to detect deception in individuals (Vrij et al., 2009). However, ecological validity is lacking insofar as the setting is not necessarily applicable to a collective interviewing technique. Police interviews are formal, time consuming and tend to focus on past activities, whereas collective interviewing would be more applicable to field interviews, which are informal and more likely to focus on intentions. A further study warrants an environment in which collective interviewing is more relevant, for example; police stop and search, insurance claims, border control, or immigration interviews where couples are applying for one to obtain British Citizenship. It is important to explore new ways of detecting deceit outside the police interview setting due to increasing threats to security.

None of the cues explored in the current study (i.e. repetitions, omission errors, commission errors and contradictions) significantly differentiated between pairs of truth-tellers and pairs of liars. In spite of this, previous collective interviewing studies have shown that certain verbal cues can be indicative of deception in pairs (see Table 2.5). Interruptions, corrections, the adding in of information, verbal transitions, posing questions to one another, and the use of assent words have all been found to significantly differentiate pairs of truth-tellers from pairs of liars (Driskell et al., 2012; Vrij et al., 2012) and therefore these verbal cues should be the focus of future deception research that uses a collective interviewing approach.
Table 2.5
Summary table illustrating the results of verbal cues in predating deceit across three different ‘collective interviewing’ studies.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>F (Significance)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Truth (N = 21)</td>
<td></td>
<td></td>
<td>Truth (N = 20)</td>
</tr>
<tr>
<td>Lie (N = 22)</td>
<td></td>
<td></td>
<td>Lie (N = 22)</td>
</tr>
<tr>
<td>Interruptions</td>
<td>8.57 (8.45)</td>
<td>9.34 (.004)***</td>
<td>9.34 (.004)***</td>
</tr>
<tr>
<td>Corrections</td>
<td>1.48 (1.75)</td>
<td>12.39 (.001)***</td>
<td>12.39 (.001)***</td>
</tr>
<tr>
<td>Additional information</td>
<td>30.86 (13.80)</td>
<td>9.63 (.003)***</td>
<td>9.63 (.003)***</td>
</tr>
<tr>
<td>Verbal transitions</td>
<td>7.19 (4.79)</td>
<td>.84 (1.01)</td>
<td>28.09 (&lt;.001)***</td>
</tr>
<tr>
<td>Posing questions</td>
<td>.64 (.65)</td>
<td>.25 (.36)</td>
<td>10.91 (.003)***</td>
</tr>
<tr>
<td>First person plural usage</td>
<td>3.52 (1.94)</td>
<td>3.18 (1.91)</td>
<td>.44 (.513)</td>
</tr>
<tr>
<td>Use of words related to social</td>
<td>12.51 (4.90)</td>
<td>10.20 (2.12)</td>
<td>2.96 (1.89)</td>
</tr>
<tr>
<td>processes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of assent words (e.g. “yes” or “agree”)</td>
<td>.77</td>
<td>.27</td>
<td>11.05</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>-------</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td>(.63)</td>
<td>(.41)</td>
<td>(.003)***</td>
</tr>
<tr>
<td>General repetitions</td>
<td>16.02</td>
<td>9.00</td>
<td>2.55</td>
</tr>
<tr>
<td></td>
<td>(7.74)</td>
<td>(5.35)</td>
<td>(.118)</td>
</tr>
<tr>
<td>General omission errors</td>
<td>98.69</td>
<td>51.66</td>
<td>.13</td>
</tr>
<tr>
<td></td>
<td>(67.13)</td>
<td>(27.67)</td>
<td>(.718)</td>
</tr>
<tr>
<td>General commission errors</td>
<td>32.64</td>
<td>25.45</td>
<td>2.42</td>
</tr>
<tr>
<td></td>
<td>(18.83)</td>
<td>(21.20)</td>
<td>(.128)</td>
</tr>
<tr>
<td>General contradictions</td>
<td>1.14</td>
<td>.36</td>
<td>1.24</td>
</tr>
<tr>
<td></td>
<td>(1.68)</td>
<td>(.66)</td>
<td>(.272)</td>
</tr>
<tr>
<td>Spatial repetitions</td>
<td>7.79</td>
<td>5.68</td>
<td>2.99</td>
</tr>
<tr>
<td></td>
<td>(5.96)</td>
<td>(3.39)</td>
<td>(.091)</td>
</tr>
<tr>
<td>Spatial omission errors</td>
<td>28.60</td>
<td>17.59</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td>(19.84)</td>
<td>(13.21)</td>
<td>(.872)</td>
</tr>
<tr>
<td>Spatial commission errors</td>
<td>16.55</td>
<td>8.77</td>
<td>2.18</td>
</tr>
<tr>
<td></td>
<td>(11.13)</td>
<td>(5.57)</td>
<td>(.148)</td>
</tr>
<tr>
<td>Spatial contradictions</td>
<td>.33</td>
<td>.18</td>
<td>1.31</td>
</tr>
<tr>
<td></td>
<td>(.58)</td>
<td>(.50)</td>
<td>(.260)</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01; ***p < .005; ****p < .001
2.5.1 Conclusion

Whilst the current study revealed no significant results, previous studies have shown the potential for using a collective interviewing approach in the area of lie detection (e.g. Driskell et al., 2012; Jundi et al., 2013; Vrij et al., 2012). The current study illustrates the need for an intervention to be implemented into the collective interview if lie catchers are to magnify the discrepancies between pairs of truth-tellers and pairs of liars, as well as exploit the strategies used by lying pairs. This intervention should correspond with previous lie detection research, go beyond liars’ preparations, and make the task of lying more challenging for deceptive pairs. Further studies exploring collective interviewing as a lie detection technique would be beneficial.
2.6 References


Chapter 3:

Experiments 2a and 2b:

Collective Interviewing: Eliciting Cues to Deceit using a Turn-Taking Approach

Published as:

3.1 Abstract

Group interviewing provides useful insight into the social indicators of deception. The present study investigated turn-taking as a technique for enhancing novel cues to deceit. ‘Turn-taking’ is a technique whereby the interviewer states which of the two interviewees is to answer the question and then intervenes every 20 seconds by stopping whichever of the interviewees is responding and asking the other interviewee in the pair to continue from the point at which their partner was stopped. In the present experiment, truth-tellers were real couples who had been in relationship for at least one year and cohabiting. Lying pairs were friends who pretended to be in a relationship for at least one year and cohabiting. All ‘couples’ were interviewed together in their pairs about their real or fictitious relationship. It was found that when forced to turn-take, truth-telling pairs were significantly more able to continue on from one another, whereas lying pairs were significantly more likely to repeat what their partner last said before continuing. Additionally, lying pairs waited before speaking after being told to turn-take significantly more than truth-telling pairs. A subsequent lie detection study revealed that these three turn-taking cues improved people’s ability to accurately detect deceit considerably. Implications for simultaneous interviewing are discussed.
3.2 Introduction

Deception research has primarily focused on interviewing single suspects despite the fact that crimes are frequently committed by pairs or multiple offenders (McGloin & Piquero, 2009; Van Mastrigt & Farrington, 2009). One reason for interviewing suspects individually is that police detectives traditionally separate suspects as soon as possible prior to interrogation to reduce opportunity for the planning of responses (Kassin & Gudjonsson, 2004). Consequently, several studies that have considered pairs of truth-tellers and pairs of liars have involved interviewing group members individually (e.g. Granhag, Strömwall & Jonsson, 2003; Strömwall, Granhag & Jonsson, 2003; Vrij, Leal, et al., 2009). Despite individual interviewing generally reflecting real-life police interviewing contexts, there are several field settings in which collective interviewing (interviewing of two or more individuals together at the same time) would be more suited. For example, when there are multiple suspects but only one interviewer available, such as during police stop and searches, at road border controls where cars containing several people are checked, or at security checkpoints (e.g. airports). In such settings it would make logical sense to interview people together about joint activities, because it would be a more timely and convenient means of gathering intelligence.

Each year more than 200 million people cross the UK Border, and each year the UK Border Agency checks over 100 million people arriving at UK airports and considers around 3.5 million applicants to visit, live, work and study in the UK (Home Office UK Border Agency, 2011–2015). Securing border control and controlling migration is important not only in the UK, but also worldwide, for identifying threats from organised crime, terrorism, smuggling, trafficking, and illegal immigration, each of which frequently involves groups of individuals (Home Office UK Border Agency, 2010). Sometimes collective interviewing is part of an existing procedure for security
reasons. For example, in Canada, customs officers carry out collective interviews at airports because groups are deemed to have a ‘similar agenda’ (i.e. the group are travelling together and so it is assumed that they are travelling to the same destination for the same purpose as each other), and thus if only one person in the group is examined, this could result in a wasted effort or a missed opportunity (A. Leach, Canadian former customs officer, personal communication, 12th November 2013).

In addition, in the UK, the situation occurs whereby one member of a couple is British and the other needs to seek British Citizenship in order to be with their partner. In order to marry and achieve citizenship couples are expected, at one potential stage, to be interviewed simultaneously. It is estimated that around 35,000 marriages in the UK every year involve a non-European Economic Area (non-EEA) national. The Home Office (2013) estimates that between 4,000 and 10,000 applications to stay in the UK are made on the basis of sham marriages (marriages of convenience whereby the couple are not genuine). An example of a sham marriage is one individual getting married to gain entry into the UK, whilst the other individual in the couple is getting married for a financial reward. Sham marriages are on the increase, and they frequently involve individual facilitators or organised crime groups that increase the profits for criminal activity (Home Office, 2013). If a sham marriage is uncovered it often leads to imprisonment with the non-EEA national being arrested and deported from the UK (Home Office, 2013). Due to the increasing problems and risks associated with immigration, the present study explored the application of collective interviewing in an ‘obtaining citizenship’ interview setting. The study was divided into two experiments, the first experiment identified three unique cues that emerge when a turn-taking manipulation is implemented into a collective interview, and the second experiment explored whether observers can recognise these cues to discriminate between pairs of truth-tellers and pairs of liars.
3.2.1 Collective interviewing

Collective interviewing is different from individual interviewing. Collective interviewing can help determine deception at a social level rather than just at an individual level, and can enable the identification of cues to deceit that are present in groups, which cannot be explored in individuals, for example, cues stemming from suspects communicating and interacting with one another.

Recently, four studies have illustrated the clear potential for using collective interviewing to elicit cues to deceit. Vrij et al. (2012) found that pairs of truth-tellers interrupted and corrected each other more than pairs of liars, as well as adding more information to each other’s accounts in comparison to pairs of liars. Jundi, Vrij, Mann, et al. (2013) found that pairs of liars made more eye contact with the interviewer than pairs of truth-tellers, whereas pairs of truth-tellers looked more at each other than pairs of liars. Driskell, Salas and Driskell (2012) found that pairs of truth-tellers illustrated more synchrony in behaviour and exhibited more interactions (e.g. mutual eye gaze and verbal transitions) than pairs of liars, and Jundi, Vrij, Hope, Mann and Hillman (2013) found that, compared to lying pairs, truth-telling pairs posed more questions to one another during a timeline task.

These four studies show that a collective approach can generate discrepancies between pairs of truth-tellers and pairs of liars that can aid in the detection of deception, with communication cues and interaction cues (e.g. corrections, interruptions, eye contact, verbal transitions) being particularly indicative of deceit. Corrections, interruptions and verbal transitions are unique to collective interviewing and cannot be measured when individuals are interviewed. Eye contact with the interviewer, of course, can be measured in individuals. However, whereas eye contact is not a diagnostic cue to deceit in individuals (DePaulo et al., 2003) it is a diagnostic cue to deceit when pairs of interviewees are interviewed (Jundi, Vrij, Mann, et al.,
2013). A possible reason why, in collective interviews, truth-tellers display less eye contact with interviewers than liars is that in collective interviews truth-tellers communicate more with each other than liars, and when people communicate with each other they tend to look at each other (Jundi, Vrij, Mann, et al., 2013). In sum, collective interviewing is different from interviewing individuals; thus, cues that are not diagnostic of deceit when individuals are interviewed may become diagnostic of deceit when dyads or groups are interviewed.

**3.2.2 Memory: Collaborative and transactive**

A collective interview approach coincides with the memory research which focuses on collaborative learning and remembering. Collaborative memory refers to how people collectively recall information alongside others (Rajaram & Pereira-Pasarin, 2010), and can be applied to deception research, particularly the strategies that truth-tellers and liars employ. When pairs of truth-tellers are asked to recall a shared event, they exhibit interactions that cannot be unveiled when interviewed individually and these interactions tend to occur more frequently for the truth-telling pairs than for the lying pairs. Truth-tellers prefer a ‘tell it all’ strategy that aims to provide a detailed description of what actually occurred (Granhag et al., 2003; Strömwall et al., 2003; Vrij, Mann, Leal & Granhag, 2010). Pairs of truth-tellers will collectively recall information by sharing their experiences and communicating with one another (e.g. by posing questions to one another or correcting each other’s accounts; Jundi, Vrij, Hope, et al., 2013; Vrij et al., 2012).

Liars’ dominant strategy is to prepare answers to possible questions and to keep their stories simple (Granhag et al., 2003; Strömwall et al., 2003; Vrij, Granhag & Porter, 2010). Therefore, lying pairs tend to exhibit fewer interactions as they merely recall their fabricated story (Driskell et al., 2012; Vrij et al., 2012). In addition, when answering unexpected questions to which they have not prepared an answer,
lying pairs need to rely on their individual cognitive ability to create a story that makes sense and matches with what their partner is saying (Wegner, 1987). This latter activity can be mentally taxing and this cognitive load can be further increased by forcing turn-taking.

**3.2.3 Imposing cognitive load through forced turn-taking**

Previous deception research with individual liars and individual truth-tellers has attempted to introduce new interview strategies that focus on the different psychological states experienced by liars and truth-tellers. One of the strategies identified is ‘imposing cognitive load’, which has been found to elicit and magnify verbal and nonverbal cues to deception making the differences between liars and truth-tellers more pronounced (Vrij, Fisher, Mann & Leal, 2008). Lying is often more mentally taxing than truth-telling (Zuckerman, DePaulo & Rosenthal, 1981), and perhaps particularly in interview settings, in part because lying includes more tasks than truth-telling. Liars focus on their storytelling, but also on making a convincing impression and scrutinising the interviewer to check whether they believe them (Buller & Burgoon, 1996). Truth-tellers merely focus on their storytelling (Buller & Burgoon, 1996). Consequently, liars have fewer cognitive resources left over to cope when mentally taxing interventions are implemented into the interview schedule (Vrij et al., 2008).

When recalling information as a pair or group, the group members interact with each other resulting in a naturally occurring turn-taking pattern (Sacks, Schegloff & Jefferson, 1974). This pattern emerges when one person speaks then stops, and then another person continues then stops, and the sequence is repeated with the other person then taking over again. This cyclical sequence back and forth between members of the group only finishes once all members have nothing else left to say. Turn-taking automatically shapes the communication and reporting of information
amongst the group members, and consists of two essential characteristics; (i) frequency, which refers to the amount of times turn-taking occurs; and (ii) control of contribution, which refers to the amount of control each individual has over what to say and how much to say (Woodburn, Arnott, Newell & Procter, 1991). The present experiment exploited this naturally occurring turn-taking speech pattern by introducing a mentally taxing intervention whereby the interviewer forced turn-taking between the pairs within the collective interview. Forced turn-taking meant that the interviewer stopped whichever member of the pair was recalling, and asked the other member in the pair to continue from the point at which their partner was stopped. The interviewer did this repeatedly between the members until the pair had finished answering the interview question.

Forced turn-taking instigates social interactions between pairs of interviewees and should be more cognitively demanding for lying pairs than for truth-telling pairs for several reasons. First, pair members are required to concentrate on what they are saying as well as what their partner is saying; the latter may be mentally difficult when the partner is telling a fabricated story. Second, forced turn-taking takes away pair members' ability to choose who answers each of the questions, removing the effects of any dominant characters who tend to speak more frequently (Hung et al., 2007), an effect that is often present within close relationships (Dunbar & Burgoon, 2005). In lying pairs, it means that the pair member who is most eloquent or most comfortable with lying loses the ability to control the interview. Third, interrupting somebody’s turn has been found to violate the natural flow of recall and inhibit the ability of the individual to continue with their turn (Coates, 2004). Finally, forced turn-taking removes any retrieval strategy adopted by the pairs (Basden, Basden, Bryner & Thomas III, 1997). If the question is unanticipated and one person in the pair is forced to fabricate, the other individual in the pair is then forced to continue
with that fabrication; hence, it requires the members of the pair to have rapid thinking and good improvisation skills (Vrij, Granhag & Mann, 2009). If one or both of the pair lacks such skills, they will have difficulty continuing on from one another, requiring them to create more time to think before providing new information. Therefore, cues reflecting increased cognitive demand such as repetitions and waiting will be valuable in deception detection.

Lying pairs are already using more cognitive resources than truth-telling pairs, and the forced turn-taking technique will place a higher level of cognitive load onto each member of the pair. Consequently, forced turn-taking will be more demanding for lying pairs than truth-telling pairs which will result in cues to deceit emerging, some of which have not yet been identified in deception research; continuations and repetitions. Speech onset delays (waiting) are also likely to emerge when forced turn-taking is implemented.

3.2.4 Deception cue: Number of details

Deception research with individuals has found that individual truth-tellers provide significantly more details when recalling events than individual liars (DePaulo et al., 2003; Vrij, 2008; Vrij, Granhag, et al., 2010). As a result, it is worthwhile to consider whether number of details remains a significant cue to deceit when more than one individual is interviewed together at the same time, and also when the turn-taking technique is implemented. There is no theoretical reason evident as to why number of details will not be a cue to deceit in collective interviews. As is the case in individual interviews, in collective interviews, truth-tellers should find it easier to provide details and should not fear that the extra detail will incriminate them. Overall, it is suggested that turn-taking will act as a stimulant to say more and so all pairs (truth-tellers and liars) will feel they need to provide extra information when the interviewer asks them to swap and continue with the story. This is a similar notion to that postulated by Leal,
Vrij, Warmelink, Vernham and Fisher (2013) who found that when a very detailed model statement was played to participants prior to them giving their own statements, the number of details within the statements from both truth-tellers and liars increased. It is believed that differences between truth-tellers and liars in the amount of details which are likely to arise in the non-turn-taking questions should also theoretically arise in the forced turn-taking questions.

3.2.5 Experiment 2a: Hypotheses

The overall aim of the present experiment is to investigate whether important cues to deceit can be identified to enhance the detection of deception in ‘couples’ (i.e. pairs) by forcing turn-taking (as a way of increasing cognitive load) into the interview schedule. It is hypothesised that forced turn-taking will impose cognitive load and thus be more difficult for lying pairs compared to truth-telling pairs. Consequently, truth-telling pairs will be significantly more able than lying pairs to instantly continue on from one another when forced to turn-take; whereas lying pairs, perhaps to buy time to consider what to say, will be significantly more likely than truth-telling pairs to repeat what their partner last said before continuing when forced to turn-take (Hypothesis 1). Additionally, as a result of cognitive load, it is hypothesised that lying pairs will be significantly more likely than truth-telling pairs to wait (i.e. pause) when forced to turn-take by the interviewer (Hypothesis 2). It is also hypothesised that the turn-taking interview questions will elicit more details than the non-turn-taking interview questions from the truth-telling and lying pairs together (Hypothesis 3). Based on the frequent research that shows that individual truth-tellers provide significantly more details when recalling information than individual liars (Vrij, Granhag, et al., 2010), it is also predicted that the total number of details provided will remain significantly greater for pairs of truth-tellers than pairs of liars regardless of
whether or not the interview question involves the forced turn-taking technique (Hypothesis 4).

3.3 Experiment 2a: Method

3.3.1 Participants

A total of 92 participants (45 males and 47 females) from the University of Portsmouth took part in this study. Their mean age was 22.64 years ($SD = 5.90$). A t-test revealed that age significantly differed between truth-telling pairs ($M = 24.77$ years, $SD = 7.02$) and lying pairs ($M = 20.32$ years, $SD = 3.04$), $t(65.23) = 4.01, p < .001, d = .95$; however, when age was used as a covariate in all the proceeding analyses it did not change any of the experimental findings reported in the Results section (see Section 3.4). Truth-telling pairs ($N = 24$) were real couples who had been in a relationship for at least one year and cohabiting. Lying pairs ($N = 22$) were friends who were told only to take part as a pretend couple if they had never been intimate with one another and did not live together. The lying pairs had to be of the same sexual orientation; thus of the opposite sex to one another if they were both heterosexual and of the same sex if they were both homosexual. Of all 46 pairs who participated in this study, 45 were heterosexual and one was homosexual. The one homosexual pair was a female lying couple.

3.3.2 Design

This study used a mixed design with Veracity (truth versus lie) as the between-subjects factor and Turn-taking (absent versus present) as the within-subjects factor. Which three of the six questions were used as turn-taking questions differed for each pair and was controlled for so that the truth-telling group and the lying group were matched on turn-taking combinations. This counterbalancing technique removed any effects of question order from influencing the findings; thus, any significant differences found between pairs of truth-tellers and pairs of liars would be a result of
the forced turn-taking manipulation itself, not the order in which the turn-taking questions occurred.

### 3.3.3 Procedure

Upon arrival at the Psychology Department, all pairs were asked to go for coffee (paid for by the researchers) for approximately 30 minutes. They were instructed to prepare, during coffee, for the interview and talk about their ‘real’ or ‘pretend’ relationship, discussing (i) how they met, (ii) how they spend time together, and (iii) where they live (the interview then focused on these issues). They were also informed that they would be interviewed together at the same time. Therefore, if differences between truth-tellers and liars were to emerge, this would not be because the collective interview setting took the pairs by surprise. Once the pairs returned to the department and stated they were ready to be interviewed, they individually completed pre-interview questionnaires. The pre-interview questionnaire asked participants to rate on 7-point Likert scales the sufficiency (ranging from [1] insufficient to [7] sufficient), quality (ranging from [1] very poor to [7] very good), and usefulness (ranging from [1] pointless to [7] useful) of their preparation discussion. It also asked the participants to rate how much they discussed with their partner what to say during the interview (ranging from [1] not at all to [7] thoroughly).

A collective interview in which pairs were interviewed together then took place. The interview was audio- and video-recorded. All interviews involved one interviewer who was blind to the veracity of the couple. The interview schedule comprised six interview questions (see Table 3.1) and included the turn-taking manipulation, which took place during three questions.
Table 3.1

*A list of each of the six interview questions used in this experiment.*

<table>
<thead>
<tr>
<th>Interview questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ‘Can you describe in as much detail as possible how and when you first met. Please give as much information as you can about your first interaction, the location you were at, and so on’.</td>
</tr>
<tr>
<td>2. ‘Can you describe in as much detail as possible your first date and when this was. Think about the location and the sights and sounds you experienced’.</td>
</tr>
<tr>
<td>3. ‘Describe your home’.</td>
</tr>
<tr>
<td>4. ‘Please draw the exterior of your bedroom on this piece of A3 paper... Now describe in as much detail as you can your bedroom starting from the left-hand wall and moving all the way around the outline. Please describe everything including furnishings, décor, etc.’</td>
</tr>
<tr>
<td>5. ‘Describe a recent memorable day that you spent together hour by hour (this must not be your wedding day if you are married)’.</td>
</tr>
<tr>
<td>6. ‘Can you describe in as much detail as possible your last holiday or trip away together? Please give as much information as you can about the location, what you did, the sights you experienced, and so on’.</td>
</tr>
</tbody>
</table>

Forced turn-taking worked as follows: The interviewer stated which of the two participants was to answer the question (each participant was asked to start answering a question, and for the third turn-taking question the pair could choose who started answering), and then intervened every 20 seconds by stopping whichever of the participants was responding and asking the other participant in the pair to continue from the point at which their partner was stopped. This continued until the pair had finished answering the question. Therefore, although each participant only had 20
seconds (the time-frame which was decided based upon two previous pilot studies) for each turn in which to provide details, they could have as many turns as they wanted, and could continue providing detail until they indicated they could no longer take a turn and had no more information to give in response to the interview question. Each of the questions in Table 3.1 were possible forced turn-taking questions, and which three questions were used for forced turn-taking and which three were not was counterbalanced for each pair (hence turn-taking was a within-subjects manipulation). The three questions that did not involve the forced turn-taking manipulation instead promoted spontaneous speech and natural turn-taking. The task for all couples was to convince the interviewer that they were a *bona fide* couple who had been in a relationship for at least one year and were now living together. Thus, real couples just had to tell the truth, whilst pretend couples had to describe a fabricated relationship.

To motivate participants to perform well during the experiment, they were told that if they were believed by the interviewer they would each receive £5. However, if they were not believed they would receive no money and would be required to write a statement about their relationship with the other individual in their pair.

Following participation, a post-interview questionnaire was completed individually and at this stage all participants were instructed to be truthful about their experience of the interview and the strategies they had used. In this questionnaire, participants were asked to rate on a 7-point Likert scale from [1] not at all motivated to [7] extremely motivated, the extent to which they felt motivated to appear convincing during the interview. They were also asked to rate their confidence that they would receive £5 and their confidence about whether or not they would have to write a statement (both on 7-point Likert scales from [1] not at all likely to [7] very likely).
Truth-tellers were asked an additional open question about how long, in number of months, they had been in a romantic relationship with their interview partner. This relationship length variable was used in correlation analyses along with each of the turn-taking dependent variables as a means of examining whether or not relationship length was associated with any of the dependent variables, and therefore confounding the effect of Veracity.

Conversely, liars were given an additional post-interview questionnaire to explore whether they actually met the inclusion criteria and had not been in a previous intimate relationship with their interview partner. The first part of this questionnaire asked an open question about how long, in number of months, the liars had been friends with one another. It then measured on four different 7-point Likert scales how they rated their friendship with their interview partner. This included questions about friendliness (ranging from [1] strangers to [7] best friends), intimacy (ranging from [1] distant to [7] intimate), importance (ranging from [1] unimportant to [7] important) and trustfulness (ranging from [1] distrusting to [7] trusting). Each individual that made up the lying pair gave their own rating for each of the four questions. The ratings from the four questions were then added together to give a total friendship-closeness rating for each individual within each pair. The average rating for each pair was obtained providing an overall friendship-closeness score for each lying pair. The friendship length and the friendship-closeness variables were inputted into correlation analyses along with each of the turn-taking dependent variables to determine whether friendship length or friendship-closeness were associated with any of the dependent variables, and therefore confounding the effect of Veracity.

To ensure that the experiment was ethical and equal for all participants, the experimenter told all participants at the end of the experiment (following the post-
interview questionnaires) that the interviewer believed they were telling the truth, and so all participants were paid £5.

3.3.4 Coding

The interviews were each transcribed, and the interview transcripts coded by a rater who was blind to the hypotheses and veracity status of the pairs. Each of the six questions were coded separately.

The dependent variables; (i) number of swaps instigated by interviewer, (ii) continuations when swapping, (iii) repetitions when swapping, and (iv) waiting before continuing or repeating after swapping were coded only for the three interview questions in which the turn-taking manipulation was implemented. Number of swaps instigated by interviewer was the number of times the interviewer forced turn-taking between the pair. Continuations when swapping and repetitions when swapping measured the smoothness in which the pair were able to swap when forced to turn-take by the interviewer. If the pair were able to instantly (i.e. without pausing or repeating previous information) continue on from one another when the interviewer forced swapping, then this was counted as a continuation when swapping and the pair was given a score of 1 (the absence of a continuation was given a score of 0). If, when being forced to turn-take, the member of the pair taking over first repeated any of the information that their partner last said before continuing with the story, then this was counted as a repetition when swapping and the pair was given a score of 1 (the absence of a repetition was given a score of 0).

Waiting before continuing or repeating after swapping was an objective measure based on whether each member of the pair immediately continued or repeated after swapping, or paused (e.g. ‘err’, ‘umm’, ‘erm’, or a gap of non-speech for three seconds or longer) before continuing or repeating after swapping. This was a dichotomous variable, that is, if the participant paused or stuttered when forced to take
over from their partner, then this was counted as waiting and a score of 1 was given (if there was no waiting, a score of 0 was given). The frequency of each of these turn-taking variables was computed for each pair.

To take into account the number of swaps instigated by the interviewer, the turn-taking dependent variables; (i) total number of continuations when swapping, (ii) total number of repetitions when swapping, and (iii) total number of times members of the pair waited before continuing or repeating after swapping, were divided by the total number of swaps for each pair during the forced turn-taking questions. This created three new dependent variables that were inputted into the analyses; (i) average number of continuations per swap, (ii) average number of repetitions per swap, and (iii) average number of times participants waited before continuing or repeating per swap.

Verbal cues were coded using the total number of details provided for both the turn-taking and non-turn-taking interview questions. This meant that three different frequencies could be computed; (i) total number of details for all six interview questions, (ii) total number of details for the three turn-taking questions only, and (iii) total number of details for the three non-turn-taking questions only. A detail was coded only if it was new information that had never been said previously by either member of the pair.

A second coder, also blind to the hypotheses and veracity status of the pairs, coded 16 of the 46 transcripts for each of the dependent variables; (i) total number of swaps instigated by interviewer, (ii) total number of continuations when swapping, (iii) total number of repetitions when swapping, (iv) total waiting before continuing or repeating after swapping, and (v) total number of details. Intra-class correlation coefficients (ICCs) were then calculated between the two individual raters for each of the five dependent variables. The inter-rater reliability between the two coders was
very good with each of the ICCs demonstrating good agreement between the two raters (swaps instigated by interviewer: ICC = 1.00; continuations when swapping: ICC = .94; repetitions when swapping: ICC = .83; waiting before continuing or repeating after swapping: ICC = .86; number of details: ICC = .95).

3.4 Experiment 2a: Results

3.4.1 Pre-interview questionnaire

Four one-way ANOVAs were conducted to examine if there was a significant difference between truth-tellers and liars in terms of how they rated their preparation discussion prior to being interviewed. There was no significant difference between truth-tellers and liars in terms of how they rated their preparation discussion in terms of sufficiency \((F(1, 90) = .01, p = .918, \eta_p^2 < .01, d = .03)\), and being good \((F(1, 90) = .96, p = .330, \eta_p^2 = .01, d = .20)\). However, liars rated the preparation discussion as more useful \((M = 5.89, SD = .97, 95\% \text{ CI} [5.41, 6.36])\) than truth-tellers \((M = 4.15, SD = 1.99, 95\% \text{ CI} [3.69, 4.60])\), \(F(1, 90) = 27.65, p < .001, \eta_p^2 = .24, d = 1.11\). Liars also stated that they discussed with their partner about what to say during the interview significantly more thoroughly \((M = 5.45, SD = 1.62, 95\% \text{ CI} [3.47, 4.24])\), \(F(1, 90) = 33.30, p < .001, \eta_p^2 = .27, d = 1.21\).

3.4.2 Post-interview questionnaire: Motivation, manipulation checks, collective interviewing and forced turn-taking

The vast majority of participants indicated that they were motivated to appear convincing during the interview, with 80.3% of the sample scoring 5 or higher on the 7-point Likert scale. Liars were significantly more motivated \((M = 6.09, SD = .86, 95\% \text{ CI} [5.60, 6.58])\) than truth-tellers \((M = 4.85, SD = 2.10, 95\% \text{ CI} [4.39, 5.32])\) to appear convincing, \(F(1, 90) = 13.19, p < .001, \eta_p^2 = .13, d = .77\). In terms of confidence, truth-tellers reported that they were more confident \((M = 6.04, SD = 1.37, 95\% \text{ CI} [5.54, 6.54])\)
95% CI [5.61, 6.48]) than liars (M = 4.48, SD = 1.68, 95% CI [4.02, 4.93]) that they would receive £5, F(1, 90) = 24.21, p < .001, ηp² = .21, d = 1.02. Truth-tellers also believed they were less likely (M = 2.71, SD = 1.73, 95% CI [2.26, 3.16]) than liars (M = 4.36, SD = 1.40, 95% CI [3.89, 4.84]) that they would have to write a statement, F(1, 90) = 25.26, p < .001, ηp² = .21, d = 1.05.

3.4.3 Hypotheses testing: Turn-taking variables

A one-way ANOVA was conducted examining the difference between truth-tellers and liars in terms of the total number of swaps instigated by the interviewer during the turn-taking questions. There was no significant difference between truth-tellers (M = 8.83, SD = 8.00, 95% CI [5.94, 11.73]) and liars (M = 9.05, SD = 5.78, 95% CI [6.03, 12.07]) with regard to the total number of swaps, F(1, 44) = .01, p = .919, ηp² < .01, d = .03.

A one-factor between-subjects MANOVA was conducted with Veracity (truth versus lie) as the only factor and average number of continuations per swap, average number of repetitions per swap, and average number of times participants waited before continuing or repeating per swap as the dependent variables. The MANOVA revealed a significant multivariate main effect for Veracity, Wilks’ λ = .29, F(3, 42) = 34.21, p < .001, ηp² = .71. Additionally, significant univariate main effects for Veracity were obtained for the average number of continuations per swap, F(1, 44) = 10.42, p = .002, ηp² = .19, d = .96; average number of repetitions per swap, F(1, 44) = 56.95, p < .001, ηp² = .56, d = 2.19; and average number of times participants waited before continuing or repeating per swap, F(1, 44) = 24.82, p < .001, ηp² = .36, d = 1.49. Truth-tellers were able to continue their story significantly more often than liars when instructed to swap by the interviewer (M = .70, SD = .35, 95% CI [.58, .82] and M = .43, SD = .19, 95% CI [.31, .55], respectively), whereas liars were significantly more likely to repeat what their partner last said then continue when instructed to
swap by the interviewer ($M = .52, SD = .21, 95\% \text{ CI } [.45, .60]$), in comparison to truth-tellers ($M = .13, SD = .14, 95\% \text{ CI } [.06, .21]$). This supports Hypothesis 1. Furthermore, when asked to swap by the interviewer liars waited before speaking significantly more often than truth-tellers ($M = .71, SD = .24, 95\% \text{ CI } [.60, .82]$ and $M = .33, SD = .27, 95\% \text{ CI } [.22, .43]$, respectively), supporting Hypothesis 2.

Three discriminant analyses were conducted on each of the three significant turn-taking variables separately to investigate the nature of their relationship with Veracity. The discriminant analyses revealed that all three turn-taking variables were individually significant predictors of Veracity when number of swaps was once again taken into consideration (see Table 3.2). The cross-validated classification results revealed high accuracy rates (around the 80\% mark) for all three variables.
Table 3.2

Classification results for each of the turn-taking variables when taking total number of swaps into account.

<table>
<thead>
<tr>
<th>Turn-taking variable</th>
<th>Chi-square</th>
<th>Wilks’ lambda (significance)</th>
<th>Total percentage of cases correctly classified</th>
<th>Percentage of truth-tellers correctly classified</th>
<th>Percentage of liars correctly classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuations per swap</td>
<td>9.23</td>
<td>.81 (.002)</td>
<td>76.1%</td>
<td>79.2%</td>
<td>72.7%</td>
</tr>
<tr>
<td>Repetitions per swap</td>
<td>36.12</td>
<td>.44 (&lt;.001)</td>
<td>84.8%</td>
<td>91.7%</td>
<td>77.3%</td>
</tr>
<tr>
<td>Waiting per swap</td>
<td>19.46</td>
<td>.64 (&lt;.001)</td>
<td>82.6%</td>
<td>79.2%</td>
<td>86.4%</td>
</tr>
</tbody>
</table>
3.4.4 Verbal cues: Total number of details

A mixed-design ANOVA was conducted with the Turn-taking manipulation as the within-subjects factor, comprising two levels; total number of details within the three turn-taking questions for each pair and total number of details within the three non-turn-taking questions for each pair. Veracity was the between-subjects factor. Turn-taking had a significant effect on the total number of details provided by each pair, $F(1, 44) = 7.99$, $p = .007$, $\eta^2_p = .15$, $d = .42$, with all pairs together providing significantly more details to the turn-taking questions ($M = 209.54$, $SD = 103.73$, 95% CI [178.74, 240.35]) compared to the non-turn-taking questions ($M = 168.02$, $SD = 94.31$, 95% CI [140.01, 196.03]). This supports Hypothesis 3. Veracity also had a significant effect on the total number of details provided by each pair, $F(1, 44) = 4.05$, $p = .050$, $\eta^2_p = .08$, $d = .60$, with pairs of truth-tellers ($M = 424.75$, $SD = 183.02$, 95% CI [356.44, 493.06]) providing significantly more details overall than pairs of liars ($M = 326.09$, $SD = 145.20$, 95% CI [254.74, 397.44]). The Turn-taking X Veracity interaction effect was not significant, $F(1, 44) = .21$, $p = .651$, $\eta^2_p = .01$.

3.4.5 Truth-telling pairs’ relationship status

Pearson’s correlation analyses were conducted to test the association between relationship length and each of the turn-taking dependent variables. The correlations revealed that there were no significant associations between relationship length ($M = 41.92$, $SD = 44.74$), and total number of swaps, $r(22) = -.10$, $p = .638$; average number of continuations per swap, $r(22) = .23$, $p = .280$; average number of repetitions per swap, $r(22) = -.11$, $p = .612$; or average number of times participants waited before

\footnote{Despite the interaction effect not being significant, a significant difference was found between pairs of truth-tellers and pairs of liars in terms of how many details they provided in the non-turn-taking questions, $F(1, 44) = 4.36$, $p = .043$, $\eta^2_p = .09$, $d = .62$, but not in terms of how many details they provided in the turn-taking questions, $F(1, 44) = 1.98$, $p = .167$, $\eta^2_p = .04$, $d = .42$. Hypothesis 4 cannot be supported.}
continuing or repeating per swap, \( r(22) = .24, p = .252 \). Hence, no links were found between relationship length and turn-taking.

### 3.4.6 Lying pairs’ friendship status

Analyses from the liars’ self-reports about how friendly they actually were as a pair indicated that most the lying pairs reported being friendlier than was desired for the inclusion criteria of this study. That is, they were recruited as a pair only if they stated they were friends who were of the same sexual orientation, who had never been intimate, never been in a romantic relationship, and never lived together. However, liars obtained a mean of 5.73 (\( SD = .95, 95\% \ CI [5.44, 6.02] \)) for friendliness on a Likert scale of 1 (strangers) to 7 (best friends); a mean of 4.91 (\( SD = 1.25, 95\% \ CI [4.53, 5.29] \)) for intimacy on a Likert scale of 1 (distant) to 7 (intimate); a mean of 5.91 (\( SD = 1.07, 95\% \ CI [5.58, 6.24] \)) for the importance of their friendship with their interview partner on a Likert scale of 1 (unimportant) to 7 (important); and a mean of 6.07 (\( SD = 1.21, 95\% \ CI [5.70, 6.44] \)) for how trusting they were of their partner on a Likert scale of 1 (distrusting) to 7 (trusting). Despite this, the results were still significant, demonstrating that even when good friends lie together, cues to deceit still emerge in a collective interview situation. This strengthens the effect Veracity had on each of the dependent variables. Furthermore, Pearson’s correlation analyses were conducted to test the association between friendship-closeness and each of the turn-taking dependent variables. The correlations revealed that there were no significant associations between friendship-closeness (\( M = 22.61, SD = 3.27 \)), and total number of swaps, \( r(20) = -.30, p = .169 \); average number of continuations per swap, \( r(20) = -.17, p = .438 \); average number of repetitions per swap, \( r(20) = .21, p = .352 \); and average number of times participants waited before continuing or repeating per swap, \( r(20) = -.04, p = .859 \).
Pearson’s correlation analyses were also conducted to test the association between friendship length and each of the turn-taking dependent variables. The correlations revealed that there were no significant associations between friendship length ($M = 14.39$, $SD = 14.30$), and total number of swaps, $r(20) = -.07$, $p = .754$; average number of continuations per swap, $r(20) = -.02$, $p = .941$; average number of repetitions per swap, $r(20) = -.04$, $p = .851$; and average number of times participants waited before continuing or repeating per swap, $r(20) = .05$, $p = .813$. These analyses suggest that neither friendship-closeness nor friendship length were related to turn-taking.

3.5 Experiment 2a: Discussion

3.5.1 Hypotheses 1 and 2: Turn-taking variables

Truth-telling pairs were able to continue their story significantly more often than lying pairs when forced to swap by the interviewer, whereas lying pairs were significantly more likely than truth-telling pairs to repeat what their partner last said when forced to swap by the interviewer (Hypothesis 1). Additionally, lying pairs were significantly more likely than truth-telling pairs to wait before speaking when the interviewer forced turn-taking (Hypothesis 2). Forced turn-taking eliminates the interviewees’ control, removes any retrieval strategies the pair are using (Basden et al., 1997), and disrupts the natural flow of recall, inhibiting the individuals’ ability to spontaneously continue when forced to swap (Coates, 2004). The ability to continue on from one another when forced to turn-take is easier for truth-tellers because they both actually experienced the event and know what one another are reporting. They are using their memory to collectively recall a shared event (Rajaram & Pereira-Pasarin, 2010). Conversely, liars face difficulty in this forced turn-taking and buy themselves time by waiting before speaking and by repeating what their interview partner last said.
The combination of waiting and repetition, displayed by liars, further demonstrates how difficult the forced turn-taking task was for them. It provides insight into liars’ meta-cognition about making a credible impression. Liars are probably aware that waiting too long before answering makes a suspicious impression on observers (Global Deception Team, 2006; Strömwall, Granhag & Hartwig, 2004; Vrij, Akehurst & Knight, 2006), and they therefore decide not to wait too long. However, since they still do not know what to say they buy further time by repeating what the other person has said.

3.5.2 Hypotheses 3 and 4: Number of details and turn-taking

The pairs of participants provided significantly more details to the turn-taking questions than the non-turn-taking questions (Hypothesis 3). The increased number of details from the turn-taking interview questions is likely to be because the pairs felt they needed to provide extra information when the interviewer forced them to swap and continue with the story. This turn-taking technique thus acted as a hidden stimulation to say more. This is similar to Leal et al. (2013) who found that presenting a very detailed model statement increased the amount of detail reported by both truth-tellers and liars. Truth-tellers used the model statement to get an idea of the types of information they needed to provide, which increased their recall. Apparently, liars also felt they needed to talk more as a response to the detailed model statement. This is, for investigative interviewing, an important finding because the main aim of such interviews is to gather information (Bull, 2010; Fisher, 2010; Meissner, Redlich, Bhatt & Brandon, 2012). If a technique can be implemented into the interview schedule that results in more details being provided by truth-tellers, it gives investigators more opportunity to check that their statement is correct. In the case of liars, it will increase the chances of them ‘slipping up’ and providing information that is incriminating.
Pairs of truth-tellers provided significantly more details than pairs of liars to the non-turn-taking questions. This is consistent with previous research that has frequently found number of details to be a significant cue when distinguishing individual truth-tellers from individual liars (DePaulo et al., 2003). This is not surprising because like individual truth-tellers, pairs of truth-tellers actually experienced the event so the recall of information is less difficult and the truth-tellers do not fear that any extra detail will incriminate them (Vrij, 2008). Lying pairs, on the other hand, are fabricating their story making it more difficult to recall. They are also fearful of saying something that will incriminate them.

Pairs of truth-tellers and pairs of liars provided a similar number of details when answering the turn-taking interview questions (rejecting Hypothesis 4). Since number of details successfully discriminated between pairs of truth-tellers and pairs of liars in the non-turn-taking questions but not in the turn-taking questions this suggests that forced turn-taking makes the cue ‘number of details’ less reliable. However, this should not be problematic. First, since ‘number of details’ remained a cue to deceit in the non-turn-taking questions, investigators can introduce forced turn-taking in conjunction with non-turn-taking, so that in the non-turn-taking questions the investigators focus on detail and in the forced turn-taking questions they focus on the turn-taking dependent variables. Second, it could be argued that there will be a cognitive overload for an investigator to focus on the three turn-taking dependent variables as well as on the total number of details in the forced turn-taking questions, making examining the number of details perhaps redundant when turn-taking is implemented.
3.6 Experiment 2b: Discriminating Between Truths and Lies

The fact that collective interviewing reveals new cues to deceit that have not yet been identified does not automatically mean that observers will be able to discriminate better between pairs of truth-tellers and pairs of liars when they are informed about the turn-taking cues. This second experiment therefore investigated whether the turn-taking cues developed during the first experiment could be accurately identified so that laypersons could correctly classify pairs based upon their veracity. This is a relevant addition to the research, as someone could argue that the cues obtained in the first experiment are only relevant if observers are able to spot them. It is suggested that the cues – continuations, repetitions and waiting – can easily be recognised allowing for observers to accurately discriminate between the pairs and detect deceit. Therefore, it is hypothesised that observers who are informed about continuations, repetitions and waiting during the turn-taking interview questions will be better able to discriminate between pairs of truth-tellers and pairs of liars, compared to observers who only have access to the non-turn-taking interview questions or who have access to the turn-taking interview questions but are not informed about the turn-taking cues (Hypothesis 5).

3.7 Experiment 2b: Method

3.7.1 Participants

A total of 90 observers with a mean age of 35.33 years ($SD = 13.41$) took part in this experiment, 40 were male and 50 were female. Of the 90 observers, 29 were single and 61 were in a relationship (of whom 5 were engaged and 31 were married). An analysis of covariance demonstrated that the relationship status of the observers had no effect on the experimental findings reported in the results section (see Section 3.8). All observers who took part in this lie detection experiment were volunteers who
were not compensated for participating. Additionally, they had not partaken as part of any couple in experiment 2a.

3.7.2 Design

This study used a 3 x 2 between-subjects design with Condition (non-turn-taking versus turn-taking control versus turn-taking cues) as the first between-subjects factor and Veracity (truth versus lie) as the second between-subjects factor. A total of 90 observers were randomly allocated to one of three conditions (30 observers in each condition). Observers read only one interview transcript consisting of three interview questions with responses from either one ‘real’ (truth-telling) or one ‘pretend’ (lying) couple. Hence, within each condition 15 observers judged a lying couple and 15 different observers judged a truth-telling couple. Of the 46 transcripts obtained in Experiment 2a, one truth-telling pair and one lying pair were used as examples leaving 44 transcripts to be judged in Experiment 2b consisting of 21 lying pairs and 23 truth-telling pairs. Each transcript was divided into two parts: A non-turn-taking part and a turn-taking part. This resulted in 21 lying non-turn-taking parts, 23 truth-telling non-turn-taking parts, 21 lying turn-taking parts, and 23 truth-telling turn-taking parts. In Condition 1 (non-turn-taking), observers were required to judge veracity when the turn-taking technique was not implemented, whereas in Conditions 2 (turn-taking control) and 3 (turn-taking cues) the turn-taking manipulation was implemented. For Condition 1 (non-turn-taking) 15 of the 21 lying transcripts and 15 of the 23 truth-telling transcripts were randomly used. For Conditions 2 and 3 (turn-taking), 30 lying transcripts and 30 truth-telling transcripts were needed (60 in total) from the 21 lying and 23 truth-telling transcripts available (44 in total). This meant that a random sample of 16 turn-taking transcripts were used twice in Conditions 2 and 3, but no transcript was used twice in the same condition. That is, the same transcript could be used in Conditions 2 and 3 but never twice in Condition 2 or twice in Condition 3.
3.7.3 Procedure

Observers were recruited using an opportunity sample and asked to read and sign an informed consent form. They first completed a few demographic details and were then allocated to one of the three conditions and given instructions to read depending on what condition they were allocated. All instructions told the observers about the first experiment stating that truth-telling couples and lying couples had been interviewed in pairs about their ‘real’ or ‘pretend’ relationship and that their task was to now read a transcript and judge the veracity of the pair being questioned in their transcript. The instructions then described specific cues the observers were to look for depending on their condition.

In Condition 1 (non-turn-taking), observers were told that number of details often distinguishes truth-tellers from liars [an accurate fact, DePaulo et al., 2003] with truth-tellers providing more details than liars. They were informed of the different types of details that may be present and shown an example response from both a truth-telling pair and a lying pair in which different types of details were highlighted (see Appendix 3.1). They were then required to read one transcript that did not include the turn-taking manipulation and asked to judge, based on number of details, whether they thought the pair being interviewed were a truth-telling couple or a lying pair.

In Condition 2 (turn-taking control), observers were again told that number of details often distinguishes truth-tellers from liars, with truth-tellers providing more details than liars. They were informed about the turn-taking manipulation and of the different types of details that may be present. They were then shown an example response from both a truth-telling pair and a lying pair when turn-taking was implemented into the interview schedule, and the different types of details were again highlighted (see Appendix 3.2). They were then required to read one transcript with the turn-taking manipulation present. Observers were once again asked to judge, based
on number of details, whether they thought the pair being interviewed were a truth-telling couple or a lying pair. This instruction meant that the observers in Conditions 1 and 2 were asked to judge detail globally and subjectively, rather than objectively through counting every single detail. Research has demonstrated that observers can make accurate subjective judgements of the number of details that appear in a statement (Vrij, Evans, Akehurst & Mann, 2004).

In Condition 3 (turn-taking cues), observers were informed about the turn-taking manipulation and instructed to look out for three turn-taking cues; continuations, repetitions and waiting. Each of the cues were defined and the observers were informed that continuations tend to occur more often amongst truth-telling pairs whereas repetitions and waiting tend to occur more often amongst lying pairs. They were provided with an example response from both a truth-telling pair and a lying pair when turn-taking was implemented into the interview schedule. Each of the three cues were highlighted in the examples (see Appendix 3.3). They were then asked to read one transcript that included the turn-taking manipulation and asked to judge, based on the three turn-taking cues, whether they thought the pair being interviewed were a truth-telling couple or a lying pair. Each of the turn-taking cues were not explicitly stated within the transcripts that the observers were asked to read; instead, observers merely used the definitions of the cues they were provided with to identify whether the cues were present in their transcript. Waiting was illustrated on the transcripts by utterances such as “erm” and “umm” or by “… ” (which was indicative of a pause of three seconds or longer).

In all conditions observers were asked to report what cues they had used to make their veracity judgement. This was an open-ended question recorded qualitatively. Participation took approximately 15 minutes.
Interview transcripts were chosen as the materials of this lie detection study (as opposed to video clips) so that the observers focused only on the verbal content of what the pairs were saying as opposed to the nonverbal content and how the pair behaved. By focusing on the text/speech only, the pure effect and the potential of the turn-taking manipulation could be observed without the observers being influenced by other factors.

The cues reported to have been used by the 90 observers were coded and computed per condition. A total of 13 different cues were mentioned by the observers; number of details, unnecessary details, continuations, repetitions, waiting, consistency, plausibility, feelings, equality, lack of memory, cross-checking of information, own relationship beliefs, and natural interactions. Each cue could only be mentioned once by each observer. To measure the reliability of the coding, a second rater coded the cues reported by 24 observers (eight observers from each condition). An inter-rater reliability analysis, using the Kappa statistic, revealed high agreement between the two raters in allocating the cues to the 13 categories ($\kappa = .68, p < .001$).

Manipulation checks were conducted to explore what cues observers were using in each of the three conditions. Additionally, both truth accuracy (truth transcripts) and lie accuracy (deceptive transcripts) were measured for all 90 observers by giving the observer a 1 if their veracity judgement was correct and a 0 if their veracity judgement was incorrect.

3.8 Experiment 2b: Results

3.8.1 Manipulation check: What cues do observers use to make their veracity judgement?

To explore what cues the observers were using to make their veracity judgement, a MANOVA was conducted with Condition (non-turn-taking versus turn-taking control versus turn-taking cues) as the only factor and each of the 13 cues as
the dependent variables. The MANOVA revealed a significant multivariate main effect for Condition, Wilks’ $\lambda = .28$, $F(26, 150) = 5.21$, $p < .001$, $\eta^2_p = .47$.

Additionally, significant univariate main effects for Condition were obtained for six of the 13 cues (see Table 3.3).

Tukey post-hoc tests revealed significant differences between Condition 1 (non-turn-taking) and Condition 3 (turn-taking cues) for four of the six significant cues; number of details, continuations, repetitions, and waiting. Significant differences were also found between Condition 2 (turn-taking control) and Condition 3 (turn-taking cues) for all six of the significant cues. There were no significant differences between Condition 1 (non-turn-taking) and Condition 2 (turn-taking control) in terms of the cues used (see Table 3.3). Observers reported to have used the appropriate cues (as instructed) in each of the conditions. That is, observers in Conditions 1 and 2 used number of details as their cue to judging veracity significantly more than those in Condition 3, whereas the observers in Condition 3 used continuations, repetitions and waiting as their cues to judging veracity significantly more than those in Conditions 1 and 2.
Table 3.3

*Cues used by observers that significantly differed across the three conditions.*

<table>
<thead>
<tr>
<th></th>
<th>Condition 1 (non-turn-taking)</th>
<th>Condition 2 (turn-taking control)</th>
<th>Condition 3 (turn-taking cues)</th>
<th>F</th>
<th>P</th>
<th>$\eta_{p}^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Details</td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.97$^b$</td>
<td>.18</td>
<td>.83$^b$</td>
<td>.38</td>
<td>.40$^a$</td>
<td>.50</td>
</tr>
<tr>
<td>Unnecessary details</td>
<td>.03$^{ab}$</td>
<td>.18</td>
<td>.00$^a$</td>
<td>.00</td>
<td>.17$^b$</td>
<td>.38</td>
</tr>
<tr>
<td>Continuations</td>
<td>.00$^a$</td>
<td>.00</td>
<td>.20$^a$</td>
<td>.41</td>
<td>.60$^b$</td>
<td>.50</td>
</tr>
<tr>
<td>Repetitions</td>
<td>.00$^a$</td>
<td>.00</td>
<td>.03$^a$</td>
<td>.18</td>
<td>.50$^b$</td>
<td>.51</td>
</tr>
<tr>
<td>Waiting</td>
<td>.17$^a$</td>
<td>.38</td>
<td>.07$^a$</td>
<td>.25</td>
<td>.63$^b$</td>
<td>.50</td>
</tr>
<tr>
<td>Consistency</td>
<td>.13$^{ab}$</td>
<td>.35</td>
<td>.10$^a$</td>
<td>.31</td>
<td>.37$^b$</td>
<td>.49</td>
</tr>
</tbody>
</table>

*Note. Only means (in rows) with different superscript differ significantly from each other (p < .05)*
3.8.2 Hypothesis Testing: Lie detection experiment

The overall accuracy rate was 57.8% across all three conditions (truth accuracy = 60.0%, lie accuracy = 55.6%). A 3 x 2 between-subjects ANOVA was conducted with Condition (non-turn-taking versus turn-taking control versus turn-taking cues) as the first between-subjects factor, Veracity (truth versus lie) as the second between-subjects factor, and accuracy rate as the dependent variable. The ANOVA revealed a significant univariate main effect for Condition, $F(2, 84) = 3.38, p = .039, \eta_p^2 = .08$. There was no significant main effect for Veracity, $F(1, 84) = .19, p = .668, \eta_p^2 < .01$, nor was there a significant Condition X Veracity interaction effect, $F(2, 84) = .33, p = .724, \eta_p^2 = .01$. Observers in ‘Condition 1 non-turn-taking’ obtained an accuracy rate of 46.7% (truth accuracy = 53.3%, lie accuracy = 40.0%), observers in ‘Condition 2 turn-taking control’ obtained an accuracy rate of 50% (truth accuracy = 53.3%, lie accuracy = 46.7%), and observers in ‘Condition 3 turn-taking cues’ obtained an accuracy rate of 76.7% (truth accuracy = 73.3%, lie accuracy = 80.0%). The total accuracy rate in Condition 3 ($M = .77, SD = .43, 95\% CI [.59, .94]$) was significantly higher than the total accuracy rate in Condition 1 ($M = .47, SD = .51, 95\% CI [.29, .64]$), $F(1, 56) = 5.97, p = .018, \eta_p^2 = .10, d = .64$, and the total accuracy rate in Condition 2, ($M = .50, SD = .51, 95\% CI [.33, .68]$), $F(1, 56) = 4.67, p = .035, \eta_p^2 = .07, d = .57$. The difference in total accuracy rate between Conditions 1 and 2 was not significant, $F(1, 56) = .06, p = .803, \eta_p^2 < .01, d = .06$. These findings support Hypothesis 5.

3.9 Experiment 2b: Discussion

Experiment 2b demonstrated that asking participants to use the turn-taking cues to detect deception facilitated their ability to discriminate between pairs of truth-tellers and pairs of liars. Participants who were given a transcript involving the turn-taking manipulation and instructed to look for the three turn-taking cues
(continuations, repetitions, waiting) were better at distinguishing between truth-telling pairs and lying pairs than those participants who were not given the turn-taking manipulation or were given the turn-taking manipulation but not informed of the three turn-taking cues (Hypothesis 5). In fact, the accuracy rate for both truths (73.3%) and lies (80%) were very high for the observers who were informed about the turn-taking cues and amongst the highest accuracy rates ever found in verbal lie detection research (see Vrij, 2008 for overviews of such research).

These high accuracy rates reflect the clear potential of forced turn-taking on the ability to distinguish between pairs of truth-tellers and pairs of liars. Demonstrating its true potential is necessary, but this is only a first step. The next logical step would be to examine what accuracy rates could be achieved in real-life interviews. Until then, caution should be used when interpreting the high accuracy levels, because it cannot be said for sure whether similar accuracy rates will be obtained in such real-life interviews. Perhaps real-life interviews will enable investigators to discriminate between lies and truths even better than when interview transcripts are used, because a strong, yet unidentified, diagnostic cue to deceit could emerge in such settings in addition to the cues examined in the present experiment. Alternatively, the real-time interviews will create noise and will lead to lower accuracy rates, either through the interpretation of non-diagnostic nonverbal cues or because the observers will use their own first impression of the pair to judge whether they are a real or pretend couple (Ambardy & Skowronski, 2008; Carney, Colvin & Hall, 2007).

3.10 Experiments 2a & 2b: General Discussion

The use of a collective interviewing approach was examined to detect deception, with a turn-taking manipulation being implemented within the interview to increase cognitive load. It was found that turn-taking elicited novel and detectable
cues to deceit that significantly discriminated between pairs of truth-tellers and pairs of liars. These cues were continuations, repetitions and waiting, and each achieved impressive accuracy levels.

3.10.1 Additional forced turn-taking manipulations

The forced turn-taking technique used in the present study clearly elicited new cues that were indicative of deceit in pairs of interviewees. However, there are implications for further manipulations using the forced turn-taking technique. First, more than two interviewees could be interviewed at the same time and the turn-taking implemented amongst all group members. The same findings as were found here could reasonably be expected because such a situation will not change the underlying principle of forced turn-taking. Second, interviewees could be informed that forced turn-taking is going to take place and how this affects the variables identified in the present study and/or the strategies employed by truth-tellers and liars could be examined. In terms of strategy, the problem liars have is that they do not know which questions will be asked. However, to ‘beat’ the forced turn-taking manipulation, they should come up with a strategy that also works when questions are asked that they have not expected. It is thought that this will be a challenging task. Third, instructions could be implemented into the turn-taking manipulation, for example, by telling the pairs or groups that they must not repeat information when asked to swap and/or that they must swap as quickly as possible. This should further enhance the cognitive load that liars experience when confronted with forced turn-taking.

3.10.2 Additional collective interview settings and manipulations

Future studies should consider alternative settings in which collective interviewing could be implemented. For example, house to house enquiries, police ‘stop and search’ scenarios, insurance claims, road border control, and security checkpoints. It is believed that the findings of the present study could be applied to
other environments because the theoretical rationale upon which the findings are based (i.e., cognitive load) will remain the same regardless of the setting in which two or more people are being interviewed together. Additionally, it would be interesting to explore the effect that the turn-taking manipulation has when multiple witnesses are interviewed together at the same time, as opposed to multiple suspects.

To emphasise, it is not suggested that collective interviewing should replace individual interviewing. Instead, it is suggested that it be employed as a ‘new’ or ‘additional’ approach to individual interviewing. Therefore, the collective interview could be used in isolation whereby if the group raises suspicion in a collective interview, investigators take the required actions they would normally take after interviewing individuals who raise suspicion (e.g. calling for assistance, collecting further evidence). Alternatively, collective interviewing could act as an initial screening process to determine whether suspects then need to be interviewed individually. Collective interviewing is not just limited to pairs; it can also be applied when interviewing more than two suspects.

The present study assumed equal status between the pairs. In real life, situations occur in which one member has a higher status with a greater degree of responsibility and esteem than the other member. Future studies should consider pairs or groups with varying degrees of status to explore how this influences collective interview situations. In addition, in real-life it could be that an alibi witness backs up the story of a suspect, by pretending to be with the suspect at a given time when this was not the case. In this example, the alibi witness can be truthful about their activities, whilst the suspect has to completely lie about their activities. Importantly, although suspect-alibi situations may have an effect on natural turn-taking, it is not foreseen that it will influence forced turn-taking, as in the latter situation, the pair
members can no longer control which pair member provides which piece of information.

**3.10.3 Methodological considerations**

Two methodological issues deserve further discussion. First, with hindsight it is perhaps unfortunate that the status of the truth-teller’s relationship was not documented. That is, the degree to which the truth-tellers were intimate, friendly, trusting, and important to one another was not recorded as it was with the lying pairs in the study. Truth-telling couples are likely to differ on these four ‘closeness’ variables depending on how they feel within their relationship and on the stage they are at within their relationship (e.g. engagement vs. marriage; children vs. no children); therefore it could be that intimacy, friendliness, trustfulness, and importance influence truth-tellers’ ability to continue each other’s train of thought when forced to turn-take. Had the truth-tellers been asked more about their relationship at the time of the experiment then degree of intimacy, friendliness, trustfulness, and importance could have been used as control variables strengthening the findings obtained.

Nevertheless, the length of the relationship (which is perhaps, to some extent, an indicator of relationship stage) was recorded, and analyses of relationship length demonstrated that this was not associated with the truth-telling pair’s ability to take turns. In addition, although relationship-closeness was not measured in truth-tellers, it was measured in liars but did not correlate with any of the turn-taking dependent variables, implying that relationship-closeness is not associated with a pair’s ability to take turns.

Second, the truth-telling pairs always told a story about their real romantic relationship, whereas the lying pairs always told a false story about a fictitious romantic relationship. This means that not only did veracity differ between the two conditions, but so did relationship status. Therefore, it may well be that the findings
obtained were due to truth-telling pairs having more experience of communicating shared events with one another. Despite this, the lying pairs were friends who were closer to one another and more familiar with one another than required to meet the study criteria (see Section 3.4.6). This strengthens the findings obtained. Furthermore, neither the friendship-closeness nor the friendship length of the lying pairs were associated with turn-taking. Hence, it would seem that it is veracity that influences turn-taking ability, not relationship status. Using pairs of individual liars who were friends and familiar with one another makes the study more applicable to real-life whereby pairs pretending to be in a relationship, e.g. during immigration interviews, are likely to be known to each other, and not complete strangers.

3.10.4 Policy implication

The main aim for immigration agencies is to distinguish between genuine couples and fake couples. Given the high number of marriages that involve a non-EEA national believed to be a sham (4,000-10,000 per year in the UK; Home Office, 2013), and the connection that sham marriages have with organised crime groups and increased criminality, it is important to reduce the chances of these occurring. In 2013, the Home Office identified the need for increased interviewing of immigration applicants to help “root out abuse of British visas and improve the integrity of our immigration system” (pp. 48). When the genuineness of a relationship is being investigated, documentary evidence is examined, the couple are interviewed in-depth and/or a home visit will occur. It is during the investigative stages that techniques need to be implemented in order to detect potential sham relationships and prevent them from occurring. Collective interviewing and the implementation of forced turn-taking is one method that could increase the detection accuracy of genuine and fake relationships, and this is important because it will help with the identification of sham relationships and with the possible prosecution of those who may be involved in
criminal activity (including organised crime, trafficking, perjury, facilitating or conspiring to illegal immigration).

**3.10.5 Theoretical implications**

The present study fills a gap within the deception literature whereby group deceit has been ignored. Specifically, this research provides support for previous collective interviewing studies into deception (e.g. Driskell et al., 2012; Jundi, Vrij, Hope et al., 2013; Jundi, Vrij, Mann, et al., 2013; Vrij et al., 2012) and shows the potential for exploring the social indicators of deception as well as the individual indicators.

Additionally, a collective approach fits well with the research in the memory literature which focuses on collective memory and collaborative recall (e.g. Barnier & Sutton, 2008; Blumen, Rajaram & Henkel, 2013; Harris, Paterson & Kemp, 2008). Of particular relevance to the current study is that of transactive memory theory, which postulates that people who are actually in a close relationship (truth-tellers) share remembering (Wegner, 1987), thus knowing one another’s memory expertise, that is, each person in the pair knows what they are to remember as well as what the other person in their pair is to remember (Hollingshead & Brandon, 2003). Consequently, encoding, storing and recalling information is more interactive and communicative between members of a pair that are recalling an actual shared event compared to a pair that are recalling a fabricated event. These interactive and communicative behaviours during joint recall have been associated with the development of other cues indicative of truthfulness, including posing questions to one another, providing cues to one another, handing over remembering responsibility, and finishing each other’s sentences (Vernham, Vrij, Leal, Mann & Hillman, 2014).

---

2 This is the study reported in Chapter 4 of this PhD thesis.
3.10.6 Conclusion

The present study demonstrated that forced turn-taking can be an efficient method for eliciting cues to deceit, and that these cues can only be detected within a collective interview setting whereby two or more individuals are interviewed together at the same time. Continuations when turn-taking, repetitions when turn-taking, and waiting when turn-taking, are important cues to deceit which are easy and quick for investigators (and laypersons) to notice.
3.11 References


Chapter 3


Chapter 4:

Collective Interviewing: A Transactive Memory Approach towards Identifying Signs of Truthfulness

Published as:

4.1 Abstract

Group interviewing, which as mentioned earlier in this thesis has been neglected in the deception literature, also coincides with collective memory research. The present experiment applies the transactive memory theory to a collective interviewing situation and explores whether signs of truthfulness emerge through measuring joint memory recall. Truth-tellers were real couples who had been in a relationship for at least one year and cohabiting. Lying pairs were friends who pretended to be in a relationship for at least one year and cohabiting. All couples were interviewed in their pairs about their ‘real’ or ‘fictitious’ relationships. It was found that truth-telling pairs posed questions to one another, provided cues to one another, handed over remembering responsibility, and finished each other’s sentences significantly more than lying pairs, supporting the idea that real couples have a transactive memory system, unlike pretend couples. Implications for a collective interview approach that considers memory within deception detection are discussed.
4.2 Introduction

Cognitive psychology, specifically memory research, has developed over the years through the exploration of not only individual memory, but also collaborative learning, collaborative remembering, and joint recall (e.g. Barnier & Sutton, 2008; Blumen, Rajaram & Henkel, 2013; Harris, Paterson & Kemp, 2008). Collective memory examines the social nature of memory by treating past experiences and events as memories shared with others (Barnier & Sutton, 2008; Hirst & Manier, 2008; Rajaram, 2011). It explores how individuals collectively recall information together (Rajaram & Pereira-Pasarin, 2010). The research suggests that group collaboration can aid memory through cross-cueing (where members of the group provide cues to one another that increase recall) and error-pruning (where feedback from other members of the group create discussions that make people realise their recall errors) (Rajaram, 2011; Ross, Blatz & Schryer, 2008).

Deception research has primarily focused on interviewing single suspects despite the fact that crimes are frequently committed by pairs or multiple offenders (McGloin & Piquero, 2009; Van Mastrikt & Farrington, 2009). Therefore, it seems relevant to explore how group members lie or tell the truth together. Collective interviewing is a new approach to lie detection that coincides with the existing research into collective memory by focusing on the joint recall of events when two or more individuals are interviewed together at the same time. Although suspects are typically separated from their group members immediately within police interview settings and interviewed individually (Kassin & Gudjonsson, 2004), there are alternative situations whereby it would be more suitable, timely and convenient to interview group members simultaneously, for example, during house to house enquiries, at road border controls where cars containing several people are checked, or at security checkpoints (e.g. airports). Importantly, collective interviewing is already
part of some existing procedures. For example, in Canada, immigration officers at airports carry out collective interviews, and in the UK, couples are expected, at one potential stage, to be interviewed simultaneously in order for one to obtain British Citizenship.

Four recent studies have illustrated the clear potential for using collective interviewing to elicit social cues to deceit, specifically communication and interaction cues. Vrij et al. (2012) examined verbal communication cues and found that pairs of truth-tellers interrupted and corrected each other more than pairs of liars, as well as adding more information to each other’s accounts. Jundi, Vrij, Mann, et al. (2013) examined nonverbal communication cues and found that pairs of liars made more eye contact with the interviewer than pairs of truth-tellers, whereas pairs of truth-tellers looked more at each other than pairs of liars. Driskell, Salas and Driskell (2012) investigated the social indicators of deception within a transactive memory framework and found that pairs of truth-tellers demonstrated more synchrony in behaviour and exhibited more interactions (e.g. mutual eye gaze and verbal transitions) than pairs of liars. Finally, Jundi, Vrij, Hope, Mann and Hillman (2013) applied the theory of transactive memory to a timeline task in which pairs had to work together to illustrate on paper the length of time each part of their experimental task had taken. The authors found that truth-telling pairs, compared with lying pairs, posed more questions to one another during the timeline task. These four studies show that a collective approach can generate discrepancies between pairs of truth-tellers and pairs of liars in the way they communicate.

The aim of the present experiment was to apply a collective interviewing approach to the setting of being interviewed simultaneously to achieve British Citizenship. Similar to the studies by Driskell et al. (2012) and Jundi, Vrij, Hope, et al. (2013), the present experiment explores differences between truth-telling and lying
couples within the context of transactive memory. However, the present experiment differs from the previous studies in some important ways. First, Driskell et al. (2012) focused on generic verbal transitions defining them broadly in terms of back- and forth-verbal exchange (i.e. the number of times an individual elaborated or responded immediately after their partner). Conversely, the present experiment explores the specific types of verbal transitions used by the pairs, focusing on the fundamental memory cues that emerge through collaborative recall and remembering and that may be an indication of truthfulness. Second, whilst Driskell et al. (2012) and Jundi, Vrij, Hope, et al. (2013) both measured posing questions to one another, it was thought to be relevant to replicate this measurement within a different context in the present experiment. That is, whereas Driskell et al. (2012) used a brief investigative interview (similar to that which might occur during initial screenings at security checkpoints) and Jundi, Vrij, Hope, et al. (2013) measured the number of questions posed to one another whilst the pair completed a timeline task, the present experiment measures the frequency of questions posed to one another during a lengthy immigration-type interview. Third, an extra factor was added to the present experiment to explore the influence of question type, an area that has been investigated in previous deception research and been shown to be important. For example, Vrij et al. (2009) found that asking unanticipated questions about central topics increased the discrepancies between pairs of liars’ statements because they had not been able to prepare answers to these questions. These discrepancies were not found between pairs of truth-tellers’ statements because they were relying purely on memory. To take the expectedness of the interview questions into consideration, the present experiment splits the interview into anticipated questions (which pairs may have planned for) and unanticipated interview questions (which negate the benefit of planning for the interview).
4.2.1 Transactive memory

The theory of *Transactive Memory* is concerned with how groups (and individuals) process and structure information with regard to past events. The theory was developed to describe how people in close intimate relationships share cognition and ‘think together’ (Wegner, 1987). It proposes that people in close relationships have a specialised memory system or ‘division of labour’ for encoding, storing and retrieving information (Hollingshead, 1998; Wegner, 1987). This is particularly relevant to the present experiment whereby ‘real’ (truth-telling) or ‘fictitious’ (lying) couples were the focus.

Transactive memory theory postulates that people who are actually in a close relationship (truth-tellers) share remembering, also knowing each other’s memory expertise (i.e. each person knows what they are to remember as well as what the other person in the relationship is to remember) (Hollingshead & Brandon, 2003). This results in a transactive memory system that is greater than the total of both the individual memories (Wegner, Erber & Raymond, 1991; Wegner, Giuliano & Hertel, 1985). Over time, the individuals within the pair (couple) update their transactive memory systems, improving them and making them more efficient. This transactive memory system is active at all three stages of memory formation and recall: Encoding, storing, and retrieving. First, when information is encoded regarding a shared experience, responsibility for information is divided and shared between the members of the pair (Hollingshead & Brandon, 2003). Second, when information is stored, each individual within the pair has remembering responsibilities, knowing what their role is, what they are to remember, and what information their partner has access to (Wegner et al., 1991). Third, retrieval of information is social and interactive as the individuals within the pair communicate considerably with one another to retrieve as much information as possible. The communication with one another and the
discussion of incoming information enhances their individual recollections. Hollingshead (1998) refers to the transaction memory search whereby group members who have experienced a past shared event make instinctive use of their transactive memory system to increase recall by posing questions to one another to check information or find out information, cuing one another to remind one another of further information, and handing over remembering responsibility to whoever best remembers that part of the event. These interactive and communicative behaviours between the group members help one another tap into their different memory domains and trigger further information, increasing recall. Consequently, it should be the truth-telling couples in the present experiment that demonstrate the use of a transactive memory system, and therefore display these fundamental interactive and communicative behaviours during their joint recall.

Conversely, pairs of individuals who are fabricating their relationship and inventing (or at least partially inventing) shared events will need to mislead or deceive investigators, and in order for these lying pairs to be able to do this, they will need to illustrate the same pattern of responses as the truth-telling pairs. This will be difficult for them to do without the shared memory system for encoding, storing and retrieving information that truth-telling pairs have. Research has shown that deceptive communication is characterised by the absence of social and interactive behaviours and that this is likely to be due to the fact that at the time of recall, deceptive pairs do not retrieve information from a transactive memory system, unlike truth-telling pairs (Driskell et al., 2012). Instead, lying pairs will rely on a combination of individual processes, which means that each member needs to rely on their individual cognitive ability to create a story that makes sense and matches with what the other individual in their pair is saying (Hintz, 1990). Retrieval of information in lying pairs is therefore an individual cognitive task which will result in lying pairs exhibiting fewer
interactions as they recall their fabricated story (Driskell et al., 2012; Vrij et al., 2012), and only providing prepared answers to expected questions (Granhag, Strömwall & Jonsson, 2003; Strömwall, Granhag & Jonsson, 2003; Vrij, Mann, Leal & Granhag, 2010). Additionally, lying pairs will focus on appearing credible when investigated (DePaulo, LeMay & Epstein, 1991; DePaulo et al., 2003), and due to the misconceptions held by people with regards to the cues that imply deceit (Vrij, 2008a), the lying pairs in particular will avoid certain behaviours, e.g. correcting and interrupting one another (Vrij et al., 2012), posing questions to one another (Driskell et al., 2012), and admitting a lack of memory (Porter & Yuille, 1996). This again will make the memory cues arising from transactive memory more apparent in truth-telling pairs who believe the truth will shine through (‘illusion of transparency’; Gilovich, Savitsky, & Medvec, 1998) and are not as concerned with appearing credible, and hence do not avoid particular communications and interactions.

To summarise, truth-telling pairs are likely to encode, store, and recall information through a transactive memory system, whereas lying pairs are likely to encode, store and recall information at an individual level. Consequently, two people recalling an actual jointly experienced event will do so in a different manner than two people who are attempting to recall a fabricated event. Thus, collective interviewing should elicit differences between pairs of truth-tellers and pairs of liars in the transactional information search (Hollingshead, 1998) enabling signs of truthfulness as a result of memory differences between pairs of truth-tellers and pairs of liars to be detected. The focus of the present experiment is verbal transitions, but more specifically, the consideration of four different types of verbal transitions that pairs demonstrate when retrieving information through their transactive memory systems. These four verbal transitions are; posing questions to one another, providing cues to
one another, the handing over of remembering responsibility, and finishing each other’s sentences.

4.2.2 Hypotheses

Overall, truth-telling pairs are expected to exhibit more of each type of verbal transition than lying pairs when interviewed together about their ‘relationship’. Hence, the present experiment focuses on signs of truthfulness as opposed to signs of deceit. Based on the frequency of each type of verbal transition during the interview, it was hypothesised that truth-telling couples will pose questions to one another to check information or find out information more than lying pairs (Hypothesis 1), provide cues to one another more than lying pairs (Hypothesis 2), hand over remembering responsibility more than lying pairs (Hypothesis 3), and finish each other’s sentences more than lying pairs (Hypothesis 4). It is believed that this last measure, finishing each other’s sentences, will reveal truth because according to transactive memory, truth-telling couples will know what the other person is saying, and will say it (e.g. Hollingshead, 1998; Hollingshead & Brandon, 2003; Wegner et al., 1991). Consequently, truth-telling pairs will interrupt one another and automatically complete each other’s sentences, which lying pairs will not do through fear that these interruptions will raise suspicion and imply deceit (Vrij et al., 2012).

Additionally, the present experiment explores the effect that the expectedness of the interview question has on the frequency of each of the verbal transitions. Previous research has revealed that asking unexpected interview questions surprises liars and negates the benefit of planning for the interview, requiring the liars to ‘think on the spot’ (Vrij et al., 2010). Consequently, more cues to deceit will emerge from liars’ responses to unanticipated questions compared with anticipated questions, which they are able to prepare for (DePaulo et al., 2003). Furthermore, pairs of liars interviewed individually show less overlap in their responses to unanticipated
questions compared with anticipated questions (Vrij et al., 2009). In contrast, truth-tellers respond similarly to both anticipated and unanticipated questions, and when pairs of truth-tellers are interviewed individually they show similar amounts of overlap when responding to both anticipated and unanticipated questions. The findings above indicate the relevance of measuring the effect of expectedness of the interview question. However, no hypothesis regarding this issue will be formulated because of the uncertainty in how expectedness will affect each of the verbal transitions when pairs of participants are interviewed collectively.

4.3 Method

4.3.1 Participants

Participants were recruited via online advertisements, the University of Portsmouth staff and student portals, and word of mouth. All participants were told prior to signing up to the study that it was an experiment investigating whether they could convince an interviewer that they were in a romantic relationship with their selected interview partner.

A total of 92 participants (45 males and 47 females) from the University of Portsmouth took part in this study. The mean age was 22.64 years ($SD = 5.90$). Truth-telling pairs ($N = 24$) were real couples who had been in a relationship for at least one year and cohabiting. Lying pairs ($N = 22$) were friends who were told only to take part as a pretend couple if they had never been intimate with one another and did not live together. The lying pairs had to be of the same sexual orientation; thus of the opposite sex to one another if they were both heterosexual and of the same sex if they were both homosexual. Of all 46 pairs who participated in this study, 45 were heterosexual and one was homosexual. The one homosexual pair was a female lying pair.
4.3.2 Design

This experiment used a mixed design with Veracity (truth versus lie) as the between-subjects factor and Expectedness (anticipated interview questions versus unanticipated interview questions) as the within-subjects factor. *Posing questions to one another, providing cues to one another, handing over of remembering responsibility, and finishing each other’s sentences* were the dependent variables (the four verbal transitions measured).

4.3.3 Procedure

Upon arrival at the Psychology Department, all pairs were asked to go for coffee (paid for by the researchers) for approximately 30 minutes. They were instructed to prepare during coffee for the interview and talk about their ‘real’ or ‘pretend’ relationship, discussing (i) how they met, (ii) how they spend time together, and (iii) where they live (the interview then focused on these issues). They were also informed that they would be interviewed together at the same time. Therefore, if differences between truth-tellers and liars were to emerge, this would not be because the collective interview setting took the pairs by surprise. Once the pairs returned to the department and stated they were ready to be interviewed, they were separated to individually complete pre-interview questionnaires. These were completed to obtain an understanding of how much the pairs had prepared for the interview and whether the preparation discussions differed between truth-telling pairs and lying pairs. The pre-interview questionnaire asked participants to rate on 7-point Likert scales the thoroughness (ranging from [1] incomplete to [7] thorough), sufficiency (ranging from [1] insufficient to [7] sufficient), quality (ranging from [1] very poor to [7] very good), and usefulness (ranging from [1] pointless to [7] useful) of their preparation discussion. It also asked the participants to rate how much they discussed with their partner what to say during the interview (ranging from [1] not at all to [7] thoroughly).
A collective interview in which pairs were interviewed together in the same room then took place. The interview was audio- and video-recorded. All interviews involved one interviewer who was blind to the veracity of the couple. The interview schedule comprised six interview questions (see Table 4.1). The task for all couples was to convince the interviewer that they were a bona fide couple who had been in a relationship for at least one year and were now living together. Thus, real couples just had to tell the truth, whilst pretend couples had to describe a fabricated relationship.

To motivate participants to perform well during the experiment, they were told that if they were believed by the interviewer they would each receive £5. However, if they were not believed they would receive no money and would be required to write a statement about their relationship with the other individual in their pair. To ensure that the experiment was ethical and fair to all participants, the experimenter told them at the end of the experiment that the interviewer believed they were telling the truth and so all participants were paid £5.

Following the collective interview, the pair were separated to individually complete a post-interview questionnaire. At this stage all participants were instructed to be truthful about their experience of the interview and the strategies they used. In this questionnaire, participants were asked to rate on a 7-point Likert scale from [1] not at all motivated to [7] extremely motivated, the extent to which they felt motivated to appear convincing during the interview. They were also asked to rate their confidence in receiving £5 and their confidence about whether or not they would have to write a statement (both on 7-point Likert scales from [1] none at all to [7] very likely). Additionally, participants were asked to rate on 7-point Likert scales (ranging from [1] easy to do to [7] difficult to do) the extent to which they found being interviewed collectively easy or difficult to do. Finally, to explore how honest participants reported to have been in the interview, they rated on scales from 0% to
100% with 10% intervals the extent to which they told the truth during the interview and the extent to which they lied during the interview.

Truth-tellers were asked an additional open question about how long, in number of months, they had been in a romantic relationship with their interview partner. This relationship length variable was used in correlational analyses along with each of the dependent variables as a means of examining whether or not relationship length was associated with any of the four verbal transitions, and therefore confounding the effect of Veracity.

Conversely, liars were given an additional post-interview questionnaire to explore whether they actually met the inclusion criteria and had not been in a previous intimate relationship with their interview partner. They completed this questionnaire on their own and in separate rooms. The first part of this questionnaire asked an open question about how long, in number of months, the liars had been friends with one another. It then measured on four different 7-point Likert scales how they rated their friendship with their interview partner. This included questions about friendliness (ranging from [1] strangers to [7] best friends), intimacy (ranging from [1] distant to [7] intimate), importance (ranging from [1] unimportant to [7] important) and trustfulness (ranging from [1] distrusting to [7] trusting). Each individual that made up the lying pair gave their own rating for each of the four questions. The ratings from the four questions were then added together to give a total friendship-closeness rating for each individual within each pair. The average rating for each pair was obtained providing an overall friendship-closeness score for each lying pair. The friendship length and the friendship-closeness variables were inputted into correlational analyses along with each of the dependent variables to determine whether friendship length or friendship-closeness were associated with any of the four verbal transitions, and therefore confounding the effect of Veracity.
4.3.4 Coding

The interviews were transcribed and the transcripts were coded by a rater who was blind to the hypotheses and veracity status of the pairs. All four dependent variables (verbal transitions) were coded for all six interview questions separately and the total frequency that each variable occurred within the interview across the six questions was calculated for each pair.

*Posing questions to one another* was the number of times a member of the pair asked their interview partner a question, usually to check information or find out information (e.g. “Did we watch two movies that night or just one?” or “Was I working that day?”). *Providing cues to one another* was the number of times members of the pair cross-cued – that is, when one member of the pair stated something that reminded their interview partner of additional information (e.g. one member of the pair might say “We watched something but I can’t remember the name of it now”, and the other member of the pair might say “The thing we were watching was a soap called Chalkhill Lives”, which results in the first member of the pair then responding with a remark, such as “Oh yeah, I remember now”). An exchange such as the previous example would be counted as one cross-cue. The *handing over of remembering responsibility* was the number of times members of the pair passed over the conversation depending on who best remembers what. Participants would state that they do not remember the information as thoroughly as their partner so would automatically ask their partner to tell that part of the event (using phrases, such as “You remember this better than me, why don’t you explain it?” Or “Do you want to explain this? I know you like telling this story”). *Finishing each other’s sentences* was the number of times one member of the pair started saying something and then the other member of the pair interrupted and spontaneously finished off their sentence (e.g. one member of the pair might start saying “We went on the banana boat and...”,
then the second member of the pair will complete the sentence and say “...and we fell off into the cold water”). All four of these dependent variables were deemed appropriate for measuring transactive memory based on existing memory literature (e.g. Driskell et al., 2012; Hollingshead, 1998; Wegner, 1987).

A second coder, also blind to the hypotheses and veracity status of the pairs, coded 16 of the 46 transcripts for the total number of times each of the four dependent variables occurred. Intra-class correlation coefficients (ICCs) were then calculated between the two individual raters. The inter-rater reliability between the two coders was very good with each of the ICCs demonstrating good agreement between the two raters (posing questions to one another: ICC = .95; providing cues to one another: ICC = .87; handing over remembering responsibility: ICC = .62; finishing each other’s sentences: ICC = .92). The ICC for the handing over of remembering responsibility variable was not as high as the other three variables because this verbal transition did not occur often within the dataset.
Table 4.1

*Expectedness score for each of the six interview questions used in this experiment.*

<table>
<thead>
<tr>
<th>Interview question</th>
<th>Expectedness score</th>
<th>Expectedness category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ‘Can you describe in as much detail as possible how and when you first met. Please give as much information as you can about your first interaction, the location you were at, and so on’.</td>
<td>1.20</td>
<td>Anticipated question</td>
</tr>
<tr>
<td></td>
<td>(range = 1-3)</td>
<td></td>
</tr>
<tr>
<td>2. ‘Can you describe in as much detail as possible your first date and when this was. Think about the location and the sights and sounds you experienced’.</td>
<td>1.50</td>
<td>Anticipated question</td>
</tr>
<tr>
<td></td>
<td>(range = 1-3)</td>
<td></td>
</tr>
<tr>
<td>3. ‘Describe your home’.</td>
<td>4.30</td>
<td>Unanticipated question</td>
</tr>
<tr>
<td></td>
<td>(range = 1-7)</td>
<td></td>
</tr>
<tr>
<td>4. ‘Please draw the exterior of your bedroom on this piece of A3 paper... Now describe in as much detail as you can your bedroom starting from the left-hand wall and moving all the way around the outline. Please describe everything including furnishings, décor, etc.’</td>
<td>6.65</td>
<td>Unanticipated question</td>
</tr>
<tr>
<td></td>
<td>(range = 5-7)</td>
<td></td>
</tr>
<tr>
<td>5. ‘Describe a recent memorable day that you spent together hour by hour (this must not be your wedding day if you are married)’.</td>
<td>3.95</td>
<td>Unanticipated question</td>
</tr>
<tr>
<td></td>
<td>(range = 2-7)</td>
<td></td>
</tr>
<tr>
<td>6. ‘Can you describe in as much detail as possible your last holiday or trip away together? Please give as much information as you can about the location, what you did, the sights you experienced, and so on’.</td>
<td>2.20</td>
<td>Anticipated question</td>
</tr>
<tr>
<td></td>
<td>(range = 1-5)</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL Expectedness score</strong></td>
<td><strong>19.80</strong></td>
<td></td>
</tr>
</tbody>
</table>
4.3.5 Anticipated questions: Pilot study

A pilot study was conducted as a manipulation check to investigate how expected each of the six interview questions would be when participants were informed that they were going to be interviewed together with their partner about their relationship. The Expectedness of the interview questions was measured because, despite the experimenter thinking that a particular question would be unexpected, it might be that in fact, the participants would not find that question particularly unexpected, and may therefore have developed a pre-planned answer when given the opportunity to prepare for the interview. Consequently, this would have resulted in the Expectedness variable being weak at best, and may have affected participants’ responses and interactions whilst answering the questions.

Twenty participants were recruited with a mean age of 34.00 years ($SD = 12.61$): Eleven were male and nine were female. No participants from this pilot study took part in the main study. Each participant was given a brief summary of the present experiment. After reading the summary, participants were given a short questionnaire in which they were asked to rate on a Likert scale of 1 (anticipated) to 7 (not anticipated) the extent to which they would expect that each of the six interview questions used in the present experiment, would be asked during an interview with their partner regarding their relationship. Thus, the higher the score, the less the question was expected. Table 4.1 shows the Expectedness of each of the six interview questions used during this experiment. The three interview questions with the lowest Expectedness scores were then categorised as the anticipated interview questions (Expectedness scores ranged from 1.20 to 2.20), and the three interview questions with the highest Expectedness scores were then categorised as the unanticipated interview questions (Expectedness scores ranged from 3.95 to 6.65). Eight new variables were then computed for each pair: Total frequency for each of the four
dependent variables across the three anticipated questions only, and total frequency for each of the four dependent variables across the three unanticipated questions only.

4.4 Results

4.4.1 Pre-interview questionnaire

Five one-way ANOVAs were conducted to examine if there was a significant difference between truth-tellers and liars in terms of how they rated their preparation discussion prior to being interviewed. There was no significant difference between truth-tellers and liars in terms of how they rated their preparation discussion in terms of thoroughness ($F(1, 90) = .93, p = .339, \eta_p^2 = .01, d = .20$), sufficiency ($F(1, 90) = .01, p = .918, \eta_p^2 < .01, d = .03$), and how good they found it ($F(1, 90) = .96, p = .330, \eta_p^2 = .01, d = .20$). However, liars rated the preparation discussion as significantly more useful ($M = 5.89, SD = .97, 95\% CI [5.41, 6.36]$) than truth-tellers ($M = 4.15, SD = 1.99, 95\% CI [3.69, 4.60]$), $F(1, 90) = 27.65, p < .001, \eta_p^2 = .24, d = 1.11$. Liars also stated that they discussed with their partner about what to say during the interview significantly more thoroughly ($M = 5.45, SD = .90, 95\% CI [5.06, 5.89]$) than truth-tellers ($M = 3.86, SD = 1.62, 95\% CI [3.47, 4.24]$), $F(1, 90) = 33.30, p < .001, \eta_p^2 = .27, d = 1.21$.

4.4.2 Post-interview questionnaire: Motivation, manipulation checks, and collective interviewing

The vast majority of participants indicated that they were motivated to appear convincing during the interview, with 80.3\% of the sample scoring 5 or higher on the 7-point Likert scale. Liars were significantly more motivated ($M = 6.09, SD = .86, 95\% CI [5.60, 6.58]$) than truth-tellers ($M = 4.85, SD = 2.10, 95\% CI [4.39, 5.32]$) to appear convincing, $F(1, 90) = 13.19, p < .001, \eta_p^2 = .13, d = .77$. In terms of confidence, truth-tellers reported that they were more confident ($M = 6.04, SD = 1.37, 95\% CI [5.61, 6.48]$) than liars ($M = 4.48, SD = 1.68, 95\% CI [4.02, 4.93]$) that they
would receive £5, $F(1, 90) = 24.21, p < .001, \eta^2 = .21, d = 1.02$. Truth-tellers were also more confident ($M = 2.71, SD = 1.73, 95\% CI [2.26, 3.16]$) than liars ($M = 4.36, SD = 1.40, 95\% CI [3.89, 4.84]$) that they would not have to write a statement, $F(1, 90) = 25.26, p < .001, \eta^2 = .22, d = 1.05$.

A one-way ANOVA further showed that liars found being interviewed together significantly more difficult than truth-tellers ($M = 3.09, SD = 1.80, 95\% CI [2.57, 3.62]$ and $M = 2.10, SD = 1.70, 95\% CI [1.60, 2.61]$, respectively), $F(1, 90) = 7.29, p = .008, \eta^2 = .08, d = .57$.

Finally, two one-way ANOVAs showed that truth-tellers ($M = 98.96\%, SD = 3.71, 95\% CI [94.11, 103.80]$) reported having stayed closer to the truth than liars ($M = 51.82\%, SD = 24.14, 95\% CI [46.76, 56.88]$), $F(1, 90) = 200.27, p < .001, \eta^2 = .69, d = 2.73$, and liars ($M = 51.14\%, SD = 25.26, 95\% CI [45.85, 56.42]$) reported to lie significantly more than truth-tellers ($M = .83\%, SD = 3.47, 95\% CI [-4.23, 5.89]$), $F(1, 90) = 186.6, p < .001, \eta^2 = .68, d = 2.79$.

### 4.4.3 Occurrence of cues

It could be argued that for a cue to become a useful indicator of truthfulness it should occur frequently amongst truth-tellers. That is, it could be that a cue is more frequently used by truth-tellers than liars, but if only a small minority of truth-tellers use that particular cue, then it is of limited value in lie detection as the absence of the cue does not provide meaningful information. Therefore, the occurrence of each of the transactive memory cues was measured: All 46 pairs (100\% of lying pairs and 100\% of truth-telling pairs) posed questions to one another at least twice during the interview; 32 out of 46 pairs (36.36\% of lying pairs and 100\% of truth-telling pairs) provided cues to one another at least once during the interview; 10 out of 46 pairs (4.55\% of lying pairs and 37.5\% of truth-telling pairs) demonstrated the handing over of remembering responsibility at least once during the interview; and 38 out of 46
pairs (63.64% of lying pairs and 100% of truth-telling pairs) finished each other’s sentence at least once during the interview. These percentages indicate that, perhaps with the exception of the handing over of remembering responsibility, the transactive memory cues, thought to be used by truth-telling pairs, were indeed used by the truth-tellers in the present sample.

4.4.4 Hypotheses testing: Transactive memory

A 2 x 2 mixed-design MANOVA was conducted with Veracity (truth versus lie) as the between-subjects factor, Expectedness (anticipated interview questions versus unanticipated interview questions) as the within-subjects factor, and (i) posing questions to one another, (ii) providing cues to one another, (iii) handing over of remembering responsibility, and (iv) finishing each other’s sentences as the dependent variables. The MANOVA revealed a significant multivariate main effect for Veracity, Wilks’ $\lambda = .42$, $F(4, 41) = 14.18, p < .001, \eta^2_p = .58$. Significant univariate main effects for Veracity were obtained for all four dependent variables: Posing questions to one another, $F(1, 44) = 6.32, p = .016, \eta^2_p = .13, d = .75$; providing cues to one another, $F(1, 44) = 16.94, p < .001, \eta^2_p = .28, d = 1.23$; handing over of remembering responsibility, $F(1, 44) = 7.51, p = .009, \eta^2_p = .15, d = .83$; and finishing each other’s sentences, $F(1, 44) = 47.22, p < .001, \eta^2_p = .52, d = 2.05$. In support of Hypotheses 1–4, truth-telling pairs, more than lying pairs, posed questions to one another ($M = 15.83, SD = 10.62, 95\% \text{ CI} [12.27, 19.40]$; $M = 9.41, SD = 5.80, 95\% \text{ CI} [5.69, 13.13]$), provided cues to one another ($M = 3.79, SD = 2.87, 95\% \text{ CI} [2.82, 4.77]$; $M = .91, SD = 1.66, 95\% \text{ CI} [-.11, 1.93]$), handed over remembering responsibility ($M = .63, SD = .97, 95\% \text{ CI} [.33, .92]$; $M = 0.05, SD = .21, 95\% \text{ CI} [-.26, .35]$), and finished each other’s sentences ($M = 5.92, SD = 2.95, 95\% \text{ CI} [4.95, 6.89]$; $M = 1.14, SD = 1.46, 95\% \text{ CI} [.12, 2.15]$). The MANOVA also revealed a significant multivariate main effect for Expectedness, Wilks’ $\lambda = .80$, $F(4, 41) = 2.75, p = .041, \eta^2_p = .21$, but
at a univariate level no significant effects for Expectedness were obtained for any of the dependent variables ($F$-values ranged from .01 to 2.77; $p$-values ranged from .103 to .919). The multivariate Expectedness X Veracity interaction effect was not significant, Wilks’ $\lambda = .84$, $F(4, 41) = 2.01$, $p = .110$, $\eta_p^2 = .16$, nor were any of the four univariate effects for the Expectedness X Veracity interaction ($F$-values ranged from .03 to 3.27; $p$-values ranged from .077 to .862).

Discriminant analyses were conducted on each of the significant dependent variables separately to investigate the nature of their relationship with Veracity. The individual discriminant analyses revealed that all four dependent variables were individually significant predictors of Veracity (see Table 4.2). The cross-validated classification results reveal that finishing each other’s sentences in particular was a diagnostic sign of truthfulness with 87% of truth-tellers and liars classified correctly based on this cue.
Table 4.2

Classification results for each of the four significant dependent variables (verbal transitions).

<table>
<thead>
<tr>
<th>Transactive memory variable</th>
<th>Chi-square</th>
<th>Wilks’ lambda (significance)</th>
<th>Total percentage of cases correctly classified</th>
<th>Percentage of truth-tellers correctly classified</th>
<th>Percentage of liars correctly classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posing questions to one another</td>
<td>5.84</td>
<td>.87 (.016)</td>
<td>65.2%</td>
<td>54.2%</td>
<td>77.3%</td>
</tr>
<tr>
<td>Providing cues to one another</td>
<td>14.17</td>
<td>.72 (&lt;.001)</td>
<td>71.7%</td>
<td>54.2%</td>
<td>90.9%</td>
</tr>
<tr>
<td>Handing over remembering responsibility</td>
<td>6.86</td>
<td>.85 (.009)</td>
<td>65.2%</td>
<td>37.5%</td>
<td>95.5%</td>
</tr>
<tr>
<td>Finishing each other’s sentences</td>
<td>31.71</td>
<td>.48 (&lt;.001)</td>
<td>87.0%</td>
<td>83.3%</td>
<td>90.9%</td>
</tr>
</tbody>
</table>
4.4.5 Truth-telling pairs’ relationship status

Pearson’s correlational analyses were conducted to test the association between relationship length and each of the four dependent variables. The correlations revealed that there were no significant associations between relationship length ($M = 41.92$, $SD = 44.74$), and posing questions to one another, $r(22) = -.19$, $p = .369$; providing cues to one another, $r(22) = -.34$, $p = .105$; handing over remembering responsibility, $r(22) = -.19$, $p = .371$; or finishing each other’s sentences, $r(22) = -.22$, $p = .307$.

4.4.6 Lying pairs’ friendship status

Analyses from the liars’ self-reports about how friendly they actually were as a pair indicated that the lying pairs reported being friendlier than was desired for the inclusion criteria of this study. That is, they were recruited as a pair only if they stated they were friends who were of the same sexual orientation, who had never been intimate, never been in a romantic relationship, and never lived together. However, liars obtained a mean of 5.73 ($SD = .95$, 95% CI [5.44, 6.02]) for friendliness on a Likert scale of 1 (strangers) to 7 (best friends); a mean of 4.91 ($SD = 1.25$, 95% CI [4.53, 5.29]) for intimacy on a Likert scale of 1 (distant) to 7 (intimate); a mean of 5.91 ($SD = 1.07$, 95% CI [5.58, 6.24]) for the importance of their friendship with their interview partner on a Likert scale of 1 (unimportant) to 7 (important); and a mean of 6.07 ($SD = 1.21$, 95% CI [5.70, 6.44]) for how trusting they were of their partner on a Likert scale of 1 (distrusting) to 7 (trusting). Despite this, Veracity still had a significant effect on the frequency of each of the four verbal transitions, demonstrating that even when good friends lie together, signs of truthfulness still emerge in a collective interview situation. Furthermore, Pearson’s correlational analyses were conducted to test the association between friendship-closeness and each of the four dependent variables. The correlations revealed that there were no
significant associations between friendship-closeness ($M = 22.61$, $SD = 3.27$), and posing questions to one another, $r(20) = .16$, $p = .492$; providing cues to one another, $r(20) = .30$, $p = .174$; or finishing each other’s sentences, $r(20) = .18$, $p = .419$.

However, the correlations did reveal a significant association between friendship-closeness and the handing over of remembering responsibility, $r(20) = -.55$, $p = .007$. This significant finding needs to be interpreted with caution because the chances of making a Type I Error are increased due to multiple correlations being conducted at the same time.

Pearson’s correlational analyses were also conducted to test the association between friendship length and each of the four dependent variables. The correlations revealed that there were no significant associations between friendship length ($M = 14.39$, $SD = 14.30$), and posing questions to one another, $r(20) = .20$, $p = .379$; providing cues to one another, $r(20) = .35$, $p = .116$; handing over remembering responsibility, $r(20) = -.13$, $p = .561$; or finishing each other’s sentences, $r(20) = -.15$, $p = .499$. The absence of significant correlations in both truth-tellers and liars suggest that it is Veracity and real shared events that influenced the emergence of the transactive memory cues rather than the relationship status of the pairs.

### 4.5 Discussion

#### 4.5.1 Transactive memory variables differentiate truth-tellers from liars

Truth-telling pairs posed questions to one another to check information or find out information, provided cues to one another, handed over remembering responsibility, and finished each other’s sentences significantly more than lying pairs, supporting Hypotheses 1–4. The effect sizes were large (ranging from $d = .75$ to $d = 2.05$) suggesting that each of the verbal transitions should be easily identified and taught to investigators (e.g. police interviewers, fraud investigators, and immigration officers). Additionally, the findings were not dependent upon the Expectedness of the
interview questions. Hence, the four verbal transitions were elicited by truth-telling pairs and not elicited by lying pairs regardless of whether the interview question was anticipated or unanticipated. This is a positive finding because it suggests that the signs of truthfulness measured in the present experiment will not be dependent upon the Expectedness of the interview question suggesting that the four verbal transitions are robust indicators of truthfulness.

The truth-telling pairs did illustrate more interactive and communicative behaviours in comparison to lying pairs who worked more on an individual basis in alignment with previous collective interviewing studies (Driskell, et al., 2012; Jundi, Vrij, Hope, et al., 2013; Jundi, Vrij, Mann, et al., 2013; Vrij et al., 2012). Although previous research suggests that liars plan what to say to expected questions (Vrij et al., 2010), this study implies lying pairs do not plan how to interact or communicate with one another during a collective interview, which makes it more difficult for them to behave like truth-telling couples when answering both expected and unexpected interview questions. Additionally, the natural recall of shared events from the truth-telling couples’ transactive memory system means that they unconsciously interact and increase their retrieval of information together (Hollingshead, 1998), which occurs regardless of whether the interview question is anticipated or unanticipated.

Overall, the present experiment focused on the differences between truth-tellers and liars based upon memory research, and demonstrated that memory, particularly transactive memory, can be used as a process for eliciting signs of truthfulness that are not influenced by interview question type.

4.5.2 Importance of memory in detecting deception

It is widely acknowledged that memory plays an important role in deception (Sporer & Schwandt, 2006; Verschuere, Ben-Shakhar & Meijer, 2011; Walczyk, Igou, Dixon & Tcholakian, 2013). Verbal veracity assessment tools, such as Reality
Monitoring, are very much based on memory and postulate that memories of actual events differ from fabrications in predictable ways, including in terms of sensory or affective information (Johnson & Raye, 1998). However, in deception research memory is often also viewed as a ‘problem’. If truth-tellers do not remember accurately or efficiently then their answers may sound like liars’ answers because their answers will be vague and less detailed (Sporer & Schwandt, 2006; Walczyk et al., 2013). If liars do not remember accurately and efficiently then their physiological responses may look similar to those of truth-tellers because they will not recognise the relevant items in a Concealed Information Polygraph Test (Verschuere et al., 2011).

The present experiment has demonstrated that there is a good opportunity to differentiate truths from lies if truth-tellers do not remember clearly, because the cues identified in the present experiment should then arise.

Hence, as opposed to truth-tellers sounding like liars due to providing a lack of detail, liars can be classified correctly because they will lack the presence of each of the verbal transitions. Thus, they will rarely pose questions to one another, provide cues to one another, hand over remembering responsibility, or finish each other’s sentences – memory cues that will emerge from truth-tellers. Whilst liars were classified with relatively high accuracy rates for all four verbal transitions, truth-tellers were classified with low accuracy rates for three of the four verbal transitions. These low accuracy rates for truth-tellers are a concern due to the risk of false-positives (i.e. classifying a pair as deceptive when they are in fact truthful). However, the overall classification accuracy rates for these three verbal transitions were high and still significant. Additionally, the results revealed that finishing each other’s sentences in particular was very successful in classifying correctly both truth-tellers (83.3%) and liars (90.9%).
Evidently, the memory cues examined herein arise in collective interviews and are not suitable to individual interviews. In the latter interview setting, cues such as spontaneous corrections, admitting lack of memory, and raising doubt about one’s own testimony are sometimes examined. They are part of Criteria-Based Content Analysis (CBCA; Köhnken, & Steller, 1988) and truth-tellers include such cues more often than liars do (DePaulo et al., 2003; Vrij, 2008b). However, it is postulated here that these cues are less diagnostic than the collective cues measured in the present experiment. For example, Vrij (2008b) reported that spontaneous corrections emerged as a diagnostic cue to deceit in only eight of the 26 studies (31%) in which they were examined. Similarly, admitting lack of memory emerged as a cue to deceit in nine out of 23 studies (39%) and raising doubts in four out of 20 studies (25%) examined. One reason is that such cues do not occur frequently in any case. Vrij (2005) reviewed CBCA field studies and noted that spontaneous corrections, admitting lack of memory, and raising doubt about one’s own testimony appeared in only a minority of the statements that were analysed (in 40%, 46% and 4% of the statements, respectively). The benefit of the transactive memory cues is that truth-tellers use them frequently.

**4.5.3 Practical applications**

The immigration paradigm setting used in this experiment, in which couples were interviewed to judge whether their relationship was real or pretend, was particularly good for applying transactive memory theory because transactive memory was developed around intimate couples. This setting is becoming increasingly relevant as ‘immigration’ is high up the political agenda, with many Western countries trying to prevent illegal immigration. Detecting lies in the type of citizenship interviews examined in the present experiment can serve this purpose.
The four verbal transitions identified from this experiment should work under conditions in which pairs know each other well and are being interviewed collectively about actual shared experiences. Other collective interview situations where these verbal transitions are likely to occur include couples being interviewed with the aim of adopting a child, interviews at road and airport border controls, and interviews where both members of a couple are suspects (which happens frequently in suspected fraudulent insurance claims such as car insurance, tax claims, damage to property, theft, etc). Institutions that deal with immigration, adoption, security or fraud would benefit from understanding social interactions and how pairs, specifically couples, behave together and recall information when questioned collectively. If the correct questions are asked and the collective interviewing technique applied then the transactive memory variables are likely to emerge and these will help investigators determine whether the individuals that form the pair (or group) require further questioning, either individually or again collectively.

It could be argued that the immigration paradigm will not reveal the verbal transitions identified in this study if one member of the pair is more dominant than the other, or if a pair member notices ‘errors’ during the interview in what their partner is saying, but refrains from correcting them through fear that they will then not be believed. Recent collective interviewing studies have considered these two issues. First, a study by Vernham, Vrij, Mann, Leal, and Hillman (2014)\(^1\) used a forced turn-taking technique that took away the control from the pair of who responded to the interview question. This technique involved the interviewer stating which of the two participants was to answer the question, and then intervening every 20 seconds by stopping whichever of the participants was responding and asking the other participant

\(^{1}\) This is the study reported in Chapter 3 of this PhD thesis.
in the pair to continue from the point at which their partner was stopped. This
continued until the pair had finished answering the question. This turn-taking
technique could be applied to the current immigration scenario as a way of preventing
dominant characters from influencing the findings. Second, a study by Vrij et al.
(2012) demonstrated that truth-telling pairs are not afraid to correct one another, add
information to each other’s accounts or interrupt each other, and they do actually do
this significantly more than lying pairs. Therefore, the fear that truth-telling pairs will
not correct ‘errors’ is not warranted.

Future research should consider whether the verbal transitions identified
during this experiment still emerge when close, but not intimate, friends are being
interviewed together about past shared events (e.g., close friends who claim to have
been to a restaurant, shopping mall, or sport venue together at the time a crime took
place). Additionally, it would be interesting to explore whether the verbal transitions
emerge in ‘suspect-alibi’ situations to help law enforcement with the identification of
false alibi witnesses. The verbal transitions should emerge more distinctly if two
individuals are actually describing a shared event that took place at the time the crime
was being committed and to a much lesser extent if a false alibi witness is being
provided.

4.5.4 Methodological considerations

Two methodological issues deserve further discussion. First, the truth-telling
pairs always told a story about their real romantic relationship, whereas the lying pairs
always told a false story about a fictitious romantic relationship. This means that not
only did Veracity differ between the two conditions, but so did relationship status.
Therefore, it could be argued that the findings obtained were due to truth-telling pairs
having more experience of communicating shared events with one another. However,
the relationship length of the truth-telling pairs and the friendship length of the lying
pairs were not associated with the occurrence of the dependent variables, and the friendship-closeness of the lying pairs significantly correlated with only one of the four dependent variables. Since this finding could reflect a Type I Error, the findings suggest that the friendship length and friendship-closeness of the lying pairs were not associated with the occurrence of the dependent variables, which suggests that it is Veracity that influences the four verbal transitions, not relationship status.

Second, it would seem that some of the responses made by lying pairs were reflective of transactive memory processes because on occasion they did display each of the verbal transitions measured. Consequently, the study would have benefitted from the inclusion of a condition in which the lying pairs were asked to tell the truth as a way of determining whether they would have then exhibited the same communicative and interactive cues as the truth-telling pairs. This would have made it clearer as to whether the significantly reduced number of verbal transitions made by lying pairs was due to a lack of transactive memory or whether it was the consequence of some other phenomenon. Nevertheless, the fact that the lying pairs knew each other well and were probably engaging in ‘embedded lies’ (whereby they change specific details of a true story rather than telling a blatant lie that is entirely untruthful; Vrij et al., 2010) implies that the findings from the present experiment are likely to be related to the absence of a transactive memory system in lying pairs and the presence of one in truth-telling pairs.

4.5.5 Conclusion

The present experiment demonstrated that memory is important within deception research and can lead to cues indicative of truthfulness. In particular, differences between truth-tellers and liars can be elicited in the transactional information search. A collective approach fits well with the current research into memory and fills a gap within the deception literature whereby group deceit has been
largely ignored. Additionally, the present experiment demonstrates the importance of exploring the whole spectrum of veracity, not just identifying signs of deception but also signs of truthfulness.
4.6 References


Chapter 5:

Applying the Verifiability Approach and the Social Phenomenon of Memory to the Detection of Deception in Alibi Witness Situations

To be submitted for publication to Law and Human Behavior as:

Vernham, Z., Vrij, A., Nahari, G., Leal, S., & Mann, S. Applying the verifiability approach and the social phenomenon of memory to the detection of deception in alibi witness situations.
5.1 Abstract

The application of alibi witness scenarios to the detection of deception has been overlooked. Nevertheless, alibi witnesses are common in police investigations and there is the potential that the suspect lies about his or her alibi witness, and that the alibi witness in turn lies to protect the suspect who is frequently a loved one or friend. The present experiment applies the verifiability approach and the social phenomenon of memory to the detection of deception in alibi witness situations when pairs were required to complete both individual and collective statements. Truth-telling pairs completed a mission around a park together, whereas lying pairs were separated so that one individual completed the mission around the park alone and the other individual committed a mock crime. All pairs were questioned about their activities and whereabouts at the time the crime took place, first on their own then together as a pair. It was found that compared to lying pairs, truth-telling pairs automatically provided more checkable details that demonstrated they were together. Conversely, in comparison with truth-telling pairs, lying pairs provided more uncheckable details. Additionally, an interaction effect showed that the collective statements allowed truth-telling pairs to provide significantly more checkable details that demonstrated they were together in comparison to the individual statements. No such effect was obtained for lying pairs. When the individual and collective statements were compared for memory consistency and distortion, liars repeated significantly more uncheckable details whereas truth-tellers omitted and committed more checkable details. Implications for using both individual and collective statements when applying the verifiability approach and the social phenomenon of memory to alibi witness situations are discussed.
5.2 Introduction

When a crime is committed it is often the case that suspects provide an alibi witness in the hope that the police will then be able to verify their story (Nahari & Vrij, 2014). An alibi witness (often referred to as a person corroborator) is defined as someone who can provide an account of the whereabouts of a suspect at a location other than the crime scene at the time the crime took place (Burke, Turtle & Olsen, 2007; Dahl & Price, 2012). Alibi witnesses are frequently used by defendants in court. For example, Burke and Turtle (2003) reviewed 175 Canadian and American criminal court cases and found that in 86% of Canadian cases and 68% of American cases, alibi witnesses were provided by the defendant. Of course, one problem with interpreting alibi witness evidence is that it can sometimes be false. Given that 61% of people believe they could find a false alibi witness to corroborate their story (Culhane, Hosch & Kehn, 2008), and that 82% of people report that they would lie for a romantic partner, and 68% report that they would lie for their oldest/best friend (Hosch, Culhane, Jolly, Chavez & Shaw, 2011), false alibis are likely to be common.

A real life example in which a false alibi witness misled a UK police investigation is the case known as the ‘Soham Murders’ whereby Ian Huntley murdered two young girls, Holly Wells and Jessica Chapman. When Huntley was first questioned, his then girlfriend, Maxine Carr, provided him with an alibi claiming that she was with him at the time the two young girls went missing and were murdered. Consequently, due to her statements, the police investigators believed for a while that Huntley was innocent. However, it turned out that Carr was in fact lying and was actually with her parents in Grimsby at the time the crime took place. Huntley was then found guilty of murder and Carr was convicted for perverting the course of justice and providing a false alibi.
Despite investigators often having to determine whether the alibi witness is true or false (a process known as \textit{alibi discrimination}; Culhane et al., 2013), little deception research has explored investigations involving an alibi witness and how one can tell whether the alibi witness is true or false. Therefore, the current study applies the verifiability approach of deception detection to a situation whereby the suspect had an alibi witness. A better understanding of how to recognise false alibi witnesses would significantly benefit police investigations and consequently the Criminal Justice System (CJS) (Burke et al., 2007).

5.2.1 Verifiability approach

Cues to deceit are typically faint and unreliable and as a result the ability to distinguish truths from lies is a difficult task (Bond & DePaulo, 2006; DePaulo et al., 2003). Verbal cues are deemed more diagnostic of deceit than nonverbal cues (Vrij, 2008) and therefore much of the deception literature has focused on developing verbal techniques that enhance the detection of deception, e.g. Criteria-Based Content Analysis (CBCA; Raskin & Esplin, 1991; Steller & Köhnken, 1989) and Reality Monitoring (RM; Johnson & Raye, 1981; Sporer, 1997). The Verifiability Approach, which was developed by Nahari, Vrij and Fisher (2014a) is a new verbal method for facilitating lie detection. This approach is based on two assumptions that result in a dilemma for liars. First, research has frequently demonstrated that more detailed accounts signify truthfulness (see Vrij, 2008 for a review) and as a result liars want to provide numerous details in order to make an honest impression (Nahari, Vrij & Fisher, 2012). Second, whilst liars want to provide many details to appear truthful, they simultaneously are motivated to avoid mentioning details that can be checked and result in the investigator uncovering their lies (Nahari et al., 2012). This therefore leads to liars employing a strategy that minimises their chances of being caught by providing many details, but focusing on details that cannot be checked (e.g. “I could
see the leaves falling off the trees in the strong winds”), and do not include details that can be checked (e.g. “As I entered the park at 9:15am, I bumped into my friend, George, from Rugby”). If this assumption is correct then liars should report fewer verifiable details in their account than truth-tellers, and this has been found to be the case (Nahari, Vrij & Fisher, 2014a, 2014b). However, these studies focused on individual truth-tellers and individual liars, whereas the current study applies the verifiability approach to pairs of truth-tellers and pairs of liars.

Nahari and Vrij (2014) applied the verifiability approach to pairs by considering the case of alibi witnesses. In their study, truth-telling pairs completed activities together, whereas lying pairs were separated so that one liar did the activities alone and the other liar completed a surveillance mission alone. All pairs then had to convince an investigator that they had both completed the activities together. The statements provided by all pairs were then coded for verifiable details and it was found that 88% of the pairs could be correctly classified by the verifiability approach.

Similar to Nahari and Vrij (2014), the current study also applies the verifiability approach to situations that involve alibi witnesses. However, the current study adds to the work of Nahari and Vrij (2014) in several ways: First, in the study by Nahari and Vrij (2014) participants were told that the investigator was going to check their statement for verifiable details, therefore liars would be even less likely to provide verifiable details since this knowledge will make them aware that to provide such details will increase the likelihood that they would get caught in their lies. In the current study, participants were not provided with any information about what the investigator was looking for. Hence, any findings that emerge from the current study in support of the verifiability approach are indicative of truth-tellers instinctively providing more checkable details than liars. Second, unlike Nahari and Vrij (2014) whereby the activities completed by the participants purposefully included those that
could be verified (e.g. participants were required to ask a question to the guard located at the main entrance of the campus), the activities set up in the current study did not include those that could be verified (i.e. participants were not required to speak to someone as one of their tasks). Consequently, checkable details were coded separately to the activities they were instructed to do by the experimenter. Third, the participants in Nahari and Vrij (2014) only had to write collective statements, whereas the participants of the current study were required to write both an individual and a collective statement. This allowed for any differences in the number of verifiable details to be examined between the two types of statement. Fourth, the current study had three categories of verifiable details: (1) Checkable details that demonstrate the pair were together, (2) Checkable details that do not necessarily demonstrate the pair were together, and (3) Uncheckable details. Nahari and Vrij (2014) only measured checkable details that demonstrated the pair were together. This division of verifiable details into three categories is important because; (i) the first category allows for the replication of the findings obtained by Nahari and Vrij (2014); (ii) the second category is more applicable to alibi witness research because it allows the experimenter to take into account the fact that even lying alibi witnesses might provide checkable details that demonstrate they were in the park, but not necessarily that their partner was; and (iii) the third category allows for the examination of whether liars compensate for the lack of reporting verifiable details by reporting more unverifiable details. Finally, the current study also applies the verifiability approach to the social phenomenon of human memory by measuring repetitions, omission errors, commission errors and contradictions from the individual statements to the collective statement in terms of the three categories of verifiable details. This allows for the current study to investigate whether an understanding of the verifiability approach and memory
together could further aid the detection of deception and therefore reveal new cues to deceit.

5.2.2 Memory

Remembering often occurs in the company of others and therefore social contexts are an important component of how the information is remembered and later recalled (Harris, Barnier & Sutton, 2012; Harris, Barnier, Sutton & Keil, 2010). Transactive memory suggests that remembering is shared amongst all members of the group and therefore recalling events with others is beneficial because it is more interactive and communicative (Hollingshead, 1998; Wegner, 1987). When groups recall a truly experienced shared event, recall is greater because the members of the group pose questions to one another, remind one another of further details, correct each other, and add information to each other’s accounts (Driskell, Salas & Driskell, 2012; Vernham, Vrij, Leal, Mann & Hillman, 2014; Vrij et al., 2012). Furthermore, collective memory suggests that group collaboration can aid memory through cross-cueing (where members of the group provide cues to one another that increase recall) and error-pruning (where feedback from other members of the group create discussions that make people realise their recall errors) (Rajaram, 2011; Rajaram & Pereira-Pasarin, 2010; Ross, Blatz & Schryer, 2008). However, human memory is highly susceptible to misinformation from a variety of sources, particularly other people (Loftus, 2005) and as a result group collaboration can also result in ‘memory conformity’ (Gabbert, Memon & Allan, 2003), which can reduce the accuracy of memory recall.

Reconstructive memory theory (Bartlett, 1932) states that memory is subject to distortions, such as omission errors (the leaving out of information) and commission

---

1 This is the study reported in Chapter 4 of this PhD thesis.
errors (the adding in of new information) due to its reconstructive nature. Therefore, when truth-tellers are asked to report previously said information, they do not recall the information word for word (unless instructed to do so; Gauld & Stephenson, 1967), but instead recreate details of the story by changing, adding, and removing information (Baddeley, 1990). This theory of reconstructive memory is supported by the ‘repeat vs. reconstruct hypothesis’ (Granhag & Strömwall, 1999), which proposes that whilst liars will attempt to repeat what they have previously said, truth-tellers will try to reconstruct what they actually experienced. Consequently, liars will appear as consistent, if not more consistent, than truth-tellers (Vrij, Mann, Leal & Granhag, 2010). This contradicts the stereotypical belief that consistency implies truthfulness (see ‘consistency heuristic’ literature; Granhag & Strömwall, 2000), and clarifies that investigators need to be cautious when interpreting consistent statements as truthful and inconsistent statements as deceitful and therefore incriminating. In the current study both individual and collective statements were included in order to determine the consistency and distortion occurring across statements between truth-tellers and liars when the verifiability approach is applied. Although the ‘repeat vs. reconstruct hypothesis’ (Granhag & Strömwall, 1999) was originally developed to measure the consistency between two statements from the same interviewee (within-subjects), there is no reason to believe that it cannot also be used to measure consistency between an individual statement and a collective statement whereby the same individual is still contributing. This is because the same principles of the hypothesis will still apply.

5.2.3 Strategies

Research into the differing strategies employed by truth-tellers and liars gives an insight into the types of cues that may arise when the verifiability approach is applied. Previous research has shown that truth-tellers employ a ‘tell it all’ strategy
believing that the ‘truth shines through’ (‘illusion of transparency’; Gilovich, Savitsky & Medvec, 1998). Consequently, they recall information exactly as they remember it and because they have ‘nothing to hide’ this leads to them automatically providing details that can be checked. However, because they are providing a large amount of details overall, they also provide a significant amount of details that cannot be checked (Nahari et al., 2014a). When truth-tellers are questioned in pairs, they provide even more information because they work as a team, reminding each other of further details, questioning each other, and adding more information to each other’s accounts (Driskell et al., 2012; Vrij et al., 2012).

Liars apply a ‘keep it simple’ strategy to avoid raising suspicion, but because they also want to give the impression that they are telling the truth, they provide as many details as possible, but only details that the investigator cannot use to disprove their story (Nahari et al., 2012). When questioned together liars do not interact or communicate as much as truth-tellers (Vernham et al., 2014) and in all likelihood no more information is recalled than if they had just been questioned individually.

5.2.4 Hypotheses

The overall aim of the current study is to apply the verifiability approach to alibi witness situations whilst also taking memory components into account. In light of previous research that applies the verifiability approach to distinguish between liars and truth-tellers (e.g. Nahari & Vrij, 2014; Nahari et al., 2014a, 2014b), it is hypothesised that truth-telling pairs will provide significantly more checkable details that demonstrate the pair were together in both the individual and collective statements compared with lying pairs (Hypothesis 1). However, although, like lying pairs, truth-telling pairs are expected to provide a large number of uncheckable details, it is predicted that when the overall number of checkable and uncheckable details are taken into account, lying pairs will provide significantly more uncheckable details
than truth-telling pairs (Hypothesis 2). No significant difference is expected between pairs of truth-tellers and pairs of liars in terms of checkable details that do not demonstrate the pair were actually together because both truth-telling pairs and lying pairs will have had at least one member of the pair complete the non-criminal activities.

When considering the individual versus collective statements and the types of verifiable details that pairs of truth-tellers and pairs of liars provide, it is hypothesised that, compared to the individual statements, truth-telling pairs will provide significantly more checkable details that demonstrate they were together in the collective statement because joint recall is occurring, whereas this pattern will emerge significantly less for lying pairs because they are not actually recalling shared memories (Hypothesis 3). It is not anticipated that there will be any significant differences between the individual and collective statements in terms of checkable details that do not demonstrate the pair were together or between the individual and collective statements in terms of uncheckable details for both truth-tellers and liars. This is because when working together the truth-tellers will be thinking in terms of shared memories that reflect information about things they did together and as a result only more checkable details that demonstrate they were together will emerge in the collective statement. Liars, however, will purely be recalling the same details as they previously did in their individual statements.

Finally, when reconstructive memory theory (Bartlett, 1932) and the ‘repeat versus reconstruct’ hypothesis (Granhag & Strömwall, 1999) are applied, it is hypothesised that lying pairs will repeat significantly more uncheckable details between the individual and collective statements compared to truth-telling pairs (Hypothesis 4); whereas truth-telling pairs will exhibit more memory distortions by omitting and committing significantly more checkable details that demonstrate they
were together between the individual and collective statements, compared to lying pairs (Hypothesis 5).

5.3 Method

5.3.1 Participants
A total of 120 participants (30 truth-telling pairs and 30 lying pairs) from a UK University took part in this study. However, one lying pair was excluded as they did not correctly follow the instructions of the study (i.e. the ‘suspect’ wrote about committing the crime in their statement instead of lying and saying they were at the park with their friend when the crime was committed). The mean age of the remaining 118 participants was 24.38 years ($SD = 10.48$), 34 were male and 84 were female.

To ensure that any findings obtained in the current study were the result of Veracity and not the result of participants in one condition knowing the park better than participants in the other condition, a one-way ANOVA was conducted to compare whether there was a significant difference between truth-tellers and liars in regard to their knowledge of the park. No significant difference was found ($p = .638$). Additionally, to ensure that any findings obtained were not confounded by the level of friendship of each pair, a one-way MANOVA was conducted on the participants’ self-report data about how friendly they were with their study partner. The MANOVA indicated that there were no significant differences between truth-telling pairs and lying pairs with regard to how they rated their friendship on four 7-point Likert scales which measured labelling (ranging from [1] strangers to [7] best friends), closeness (ranging from [1] distant to [7] intimate), importance (ranging from [1] unimportant to [7] important), and trustworthiness (ranging from [1] distrusting to [7] trusting) (means for truth-tellers ranged from 5.83 to 6.63; means for liars ranged from 5.55 to 6.40; $p$-values ranged from .086 to .218).
5.3.2 Design

This experiment used a mixed design with Veracity (truth versus lie) as the first between-subjects factor, Status (suspect versus alibi witness) as the second between-subjects factor, and Statement (individual versus collective) as the only within-subjects factor. Checkable details (pair together), checkable details (other), and uncheckable details were the three main dependent variables. Additionally, consistency and memory distortions were measured by comparing each individual statement with the collective statement. Therefore, additional dependent variables included repetitions, contradictions, omission errors and commission errors and each of these variables were broken down into three verifiable categories; (i) checkable details (pair together), (ii) checkable details (other), and (iii) uncheckable details, resulting in 12 dependent variables.

5.3.3 Procedure

Participants were recruited via online advertisements, the university staff and student portals, and word of mouth. All participants were told prior to signing up to the study that it was an experiment investigating the interactions occurring between friends and therefore they were required to sign up in pairs.

Upon arrival at the Psychology department, all pairs of friends were required to read and sign an informed consent form and were randomly assigned to one of the two veracity conditions. They were told by the experimenter that they were going to complete a task together (truth-telling pairs) or complete separate tasks (lying pairs).

Truth-telling pairs were sent on a mission around a nearby park together. The park has many features, such as a children’s play area, an animal enclosure, and several war monuments. Truth-telling pairs were provided with instructions of what to do on their mission around the park, a map with directions of how to get there, a map of the park itself, and a task sheet asking seven questions about different areas of the
park. Their mission was to go around the park and work together as a pair to answer the seven questions on the task sheet in the order in which they were asked. Despite the experimenter requesting participants to answer the questions in a specific order, approximately 17% of participants mentioned that they did not follow the tasks in chronological order because they accidentally came across an answer to a later question first. The maps provided could be used to help them locate the answers they required. Questions on the task sheet included “How many slides are there in the children’s play area?”, “Name five animals that live within the enclosure at the centre of the park”, and “What is the date on which the Chinese bell monument was captured?” Pairs were instructed to stay together at all times, working together to answer each of the questions. The questions could only be answered correctly if the pair actually went to the specific places within the park, providing some ground truth that the truth-telling pairs did do the entire mission. Although it could be that participants searched on the internet for the answers (e.g., using their mobile phone), they would only have been able to find answers to three of the seven questions. When asked, no participants admitted to having used the internet to obtain any of the answers. On completion of the tasks, the pairs returned to the Psychology department. They were told to follow the directions provided to enter the park, but could return back to the Psychology department from the park via any route they wished (the park has five exit points). On returning to the Psychology department, they handed the experimenter the task sheet which enabled the experimenter to check that they had completed each of the tasks. When back at the department, the experimenter informed the pair that a crime had taken place and that one of them matched the description provided of the person who was seen leaving the office in which the crime had occurred (the pair member chosen to match the description was picked at random by
the experimenter). Therefore, this individual became the ‘suspect’ and his or her friend became the ‘true alibi witness’.

Lying pairs were separated and randomly assigned a mission. One individual was instructed to do exactly what the truth-telling pairs were asked to do, but on his or her own rather than with his or her friend. The other individual was instructed to commit a crime on his or her own. S/he was given a key and required to follow directions to a locked office in the Psychology department. S/he was to unlock the office, steal £20 from a purse on the desk within the office, lock the office and return to the experimenter with the £20. The £20 was returned to the experimenter following completion of the study. S/he was to do this as quickly as possible and without being seen. When both individuals had completed their tasks, they were reunited as a pair, and informed that a crime had been reported and that the individual who had actually completed the crime matched the description provided of the person who was seen leaving the office in which the crime occurred. Therefore, this individual became the ‘suspect’ and his or her friend was instructed be a ‘false alibi witness’.

The task of all pairs was to convince an investigator that they were together at all times when the crime was committed. They were instructed to state that they had been completing a mission around the park together at the time the money was stolen. Therefore, truth-telling pairs (both the ‘suspect’ and the ‘true alibi witness’) were required to tell the truth about their whereabouts and activities at the time of the crime. The lying pairs on the other hand were required to lie, with the suspect having to lie entirely about his or her whereabouts and activities, claiming that s/he was with the ‘false alibi witness’, whereas his or her friend (the ‘false alibi witness’) had to tell the truth about his or her whereabouts and activities but lie about being alone when completing the mission – That is, s/he had to say that s/he completed the mission together with his or her friend (the ‘suspect’).
All pairs were given as much time as they wanted to prepare for questioning and ‘get their story straight’. They were told to focus on discussing how they were going to prove their own innocence or the innocence of their partner. All pairs were informed prior to their preparation talks that they would be required to write a statement on their own and then a second statement together as a pair. Therefore, if differences between truth-tellers and liars were to emerge, this would not be because the individual or collective statements took the pairs by surprise.

Once the pairs stated they were ready to be questioned, they were separated and individually completed pre-questioning questionnaires. These were completed to get an understanding of the degree to which pairs had prepared for questioning and whether the preparation discussions differed between truth-telling pairs and lying pairs. The pre-questioning questionnaire asked participants to rate on 7-point Likert scales the thoroughness (ranging from [1] incomplete to [7] thorough), sufficiency (ranging from [1] insufficient to [7] sufficient), quality (ranging from [1] very poor to [7] very good), and usefulness (ranging from [1] pointless to [7] useful) of their preparation discussion. It also asked the participants to rate how much they discussed with their partner about what to say during the interview (ranging from [1] not at all to [7] thoroughly).

Subsequently, each member of the pair separately typed up individual statements on a laptop answering the following question: ‘Describe in as much detail as possible what you were doing at the time the crime took place. Think about your whereabouts, your activities, the people you were with, what you saw, what you heard, how you felt etc.’ The statement system was set up on the laptop to look like the statement was being sent to an investigator. That is, all participants were manipulated to believe that the investigator was receiving their statements once complete. Once both members of the pair had completed their individual statements,
they were put together to write a collective statement answering the same question. The pairs could speak freely to one another and could choose who typed up the statement. They were reminded throughout the writing of their statements that they were to convince an investigator that they were together the whole time around the park at the time the crime occurred. They were led to believe that the investigator was receiving their written statements (both individual and then collective) once they clicked submit.

The participants were not primed with any information the investigator would be looking for in their statements, therefore they were not told that the investigator would be specifically examining their statements for details that could be verified. To motivate participants to perform well during the experiment, they were told that if they were believed by the investigator they would each receive £10. However, if they were not believed they would receive no money and would be required to write a further statement about their whereabouts and activities at the time the crime took place. To ensure that the experiment was ethical and equal for all participants, the experimenter told them at the end of the experiment that the investigator believed they were telling the truth, and so all participants were paid £10.

Following participation, a post-questioning questionnaire was completed individually and at this stage all participants were instructed to be truthful about their experience of writing the statements and the strategies they had employed. In this questionnaire, participants were asked to rate on a 7-point Likert scale from [1] not at all motivated to [7] extremely motivated, the extent to which they felt motivated to appear convincing during questioning. They were also asked to rate their confidence in receiving £10 and their confidence about whether or not they would have to write a further statement (both on 7-point Likert scales from [1] none at all to [7] very likely). Additionally, participants were asked to rate on 7-point Likert scales (ranging from [1]
easy to do to [7] difficult to do) the extent to which they found writing their individual statement and the collective statement easy or difficult to do. Finally, to explore how honest participants were in their statements, they rated on scales from 0% to 100% with 10% intervals the extent to which they had told the truth during the individual statement and then the collective statement.

In the post-questioning questionnaire, all participants were asked to report any strategies they employed when completing both the individual and collective statements. This was to determine whether they reported consciously writing or avoiding details that could be verified. Additionally, in order to make sure there were no significant confounding differences between the truth-telling pairs and lying pairs, all pairs were asked about their knowledge of the park and how they perceived their friendship with their study partner (see Section 5.3.1).

Once the post-questioning questionnaire was completed by both members of the pair, they were each given a debriefing form and the opportunity to ask the experimenter questions. Approximately 50% of participants asked the experimenter further questions, such as “Why are you conducting this study?”, “What do you hope to find out from this study?”, and “Is it possible to obtain a copy of the results of this study?”

**5.3.4 Coding the verifiability of the statements**

The statements were coded by a rater who was blind to the hypotheses and veracity status of the pairs. The three main dependent variables (*checkable details* (pair together), *checkable details* (other), *uncheckable details*) were coded for each of the individual statements and the collective statement separately. The two individual statements of each pair were then compared and duplicates of checkable or uncheckable details were removed allowing for one total score from the two individual statements to be calculated for each variable. This meant that each pair
obtained two total frequency scores for each of the three verifiable variables, one score from the individual statements and one score from the collective statement. Consequently, suspects and alibis were not compared within these analyses (however this comparison was made in other analyses).

*Checkable details (pair together)* was the number of details provided by the participant(s) that could be checked and demonstrated the pair were together at the time of the crime (e.g. “We bumped into our tutor Anne and spoke to her for a bit” or “There was CCTV in Guildhall square that would have picked us up”).

*Checkable details (other)* was the number of details provided by the participant(s) that could be checked but did not necessarily demonstrate that the pair were together at the time of the crime. For example, providing details that support one member of the pair was at the park but not necessarily the other (e.g. “The park warden was feeding the animals whilst I was there…He saw me writing down the animals on my answer sheet” or “I saw a park warden and he asked me what I was doing”).

*Uncheckable details* was the number of details provided by the participant(s) that could not be checked (e.g. “We spent two whole minutes staring at the guinea pigs before moving on” or “There were no children in the play area when we walked past”).

Each type of detail was converted into a percentage by dividing each type of verifiable detail by the total number of all three types of verifiable details. For example: Percentage of checkable details (pair together) = total checkable details (pair together) / {total checkable details (pair together) + total checkable details (other) + total uncheckable details}. A relative measurement was used in the analyses as opposed to the total numbers because practitioners typically prefer such measurements plus the author wanted to take into account the overall number of details being
provided within the statement because truth-telling pairs did provide significantly more details overall in their statements compared to lying pairs ($p = .002$).

A second coder, also blind to the hypotheses and veracity status of the pairs, coded the individual and collective statements collected from 16 pairs for the total number of times each of the three verifiable variables occurred. Intra-class correlation coefficients (ICCs) were then calculated between the two individual raters. The inter-rater reliability between the two coders was very good for both the individual and collective statements with each of the ICCs demonstrating strong agreement between the two raters (checkable details (pair together): ICCs = .82 and .91; checkable details (other): ICCs = .88 and .89; and uncheckable details: ICCs = .90 and .82).

5.3.5 Coding for consistency and memory distortions

The collective statement was compared with each of the individual statements provided by each pair, and coded by a rater who was blind to the hypotheses and veracity status of the pairs. They were compared and coded in terms of two consistency variables (repetitions and contradictions) and two memory distortions (omission errors and commission errors), and each of the four variables were broken down into the three verifiable categories resulting in six consistency variables and six memory distortions in total.

Repetitions were the total number of details provided in both the collective statement and in the individual statement. Contradictions were the total number of details provided in the collective statement that conflicted with details provided in the individual statement. Omission errors were the total number of details provided in the individual statement, but were then not included in the collective statement. Commission errors were the total number of details provided in the collective statement that were not previously included in the individual statement. All four variables were divided into three type of details: Those details that can be checked and
demonstrate the pair were together at the time of the crime (*checkable details (pair together)*); those details that can be checked but do not necessarily demonstrate the pair were together at the time of the crime (*checkable details (other)*); and those details that cannot be checked (*uncheckable details*).

To summarise, this meant that each individual of each pair obtained 12 frequency scores in total: Three for repetitions, three for contradictions, three for omission errors and three for commission errors. Consequently, as well as truth-tellers and liars being compared in the analyses, suspects and alibis were also compared within these analyses.

A second coder, also blind to the hypotheses and veracity status of the pairs, coded 16 of the 46 transcripts for the total number of times each of the 12 dependent variables occurred. Intra-class correlation coefficients (ICCs) were then calculated between the two individual raters. The inter-rater reliability between the two coders was very good with each of the ICCs demonstrating good agreement between the two raters (see Table 5.1). However, the ICCs for the contradiction variables could not be calculated because contradictions did not occur often within the data and therefore there was very little variation (i.e. the majority of the data recorded for contradictions was zero). As a result, agreement between raters for the three contradiction variables was measured using percentages. The percentages showed very good agreement between raters\(^2\) (see Table 5.1).

\(^2\) Initially, contradictions were measured and coded. However, they did not occur often enough to be included in the analyses. Therefore, the three types of verifiable details in terms of contradictions were not analysed in the results section (Section 5.4).
Table 5.1

The intra-class correlation coefficients (or percentage of agreement) for each of the consistency variables and the memory distortion variables.

<table>
<thead>
<tr>
<th>Type of variable</th>
<th>Verifiable category</th>
<th>ICC</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistency</td>
<td>Repetitions</td>
<td>.92</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Repetitions</td>
<td>.84</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Repetitions</td>
<td>.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contradictions</td>
<td>.969%</td>
<td>.90</td>
</tr>
<tr>
<td></td>
<td>Contradictions</td>
<td>.969%</td>
<td>.91</td>
</tr>
<tr>
<td></td>
<td>Contradictions</td>
<td>.938%</td>
<td>.88</td>
</tr>
<tr>
<td>Memory distortions</td>
<td>Omission errors</td>
<td>.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Omission errors</td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Omission errors</td>
<td>.91</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commission errors</td>
<td>.87</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commission errors</td>
<td>.81</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commission errors</td>
<td>.88</td>
<td></td>
</tr>
</tbody>
</table>

5.3.6 Coding of strategies

The strategies participants reported to have employed during the writing of their statements were coded in terms of whether they mentioned trying to include details that could be verified. Therefore, if participants mentioned providing details that could be checked, e.g. “I purposefully included details in my statements that the investigator would be able to check” or “I focused on including details in my statement that the investigator could use to prove I was telling the truth”, then they were given a score of 1 for the checkable details category. If they did not mention
such a strategy, they were given a score of 0. Similarly, if participants mentioned providing details that could not be checked, e.g. “I provided details, such as my feelings, because then my partner wouldn’t mention these even if they were with me and the investigator cannot prove whether I had those feelings or not” or “I intentionally provided general details about the park that would be true regardless of when I went there”, then they were given a score of 1 for the uncheckable details category. If they did not mention such a strategy, they were given a score of 0.

5.4 Results

5.4.1 Pre-questioning questionnaire

Preparation time was offered to all participants. However, only 12 truth-telling pairs compared to all 29 lying pairs chose to prepare prior to writing their statements.

A 2 (Veracity: truth vs. lie) x 2 (Status: suspect vs. alibi) between-subjects MANOVA was conducted to examine if there were any significant differences between truth-tellers and liars in terms of (i) how they rated their preparation discussion prior to writing their statements and (ii) how much they discussed with their partner what to include in their written statements. The MANOVA revealed a significant multivariate main effect for Veracity, Wilks’ $\lambda = .74$, $F(5, 62) = 4.39$, $p = .002$, $\eta^2_p = .26$, but no significant multivariate main effect was obtained for Status, Wilks’ $\lambda = .97$, $F(5, 62) = .46$, $p = .808$, $\eta^2_p = .04$, or the Veracity X Status interaction, Wilks’ $\lambda = .94$, $F(5, 62) = .73$, $p = .604$, $\eta^2_p = .06$. Significant univariate main effects for Veracity were obtained with liars rating the preparation discussion as significantly more useful and more sufficient than truth-tellers. Liars also reported discussing with their partner about what to write in their statements significantly more thoroughly than truth-tellers. No significant differences were found between truth-tellers and liars in terms of how they rated their preparation discussion for thoroughness or quality (see Table 5.2).
Table 5.2

Veracity main effects obtained from the pre- and post-questioning questionnaires.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Truth-tellers</th>
<th>Liars</th>
<th>F</th>
<th>p</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>95% CI</td>
<td>95% CI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pre-questioning questionnaire</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usefulness</td>
<td>4.92 (2.15)</td>
<td>6.19 (.87)</td>
<td>11.40</td>
<td><strong>.001</strong>*</td>
<td>.77</td>
</tr>
<tr>
<td>Sufficiency</td>
<td>4.75 (2.09)</td>
<td>5.60 (1.06)</td>
<td>4.30</td>
<td>.042*</td>
<td>.51</td>
</tr>
<tr>
<td>Thoroughness</td>
<td>5.33 (2.35)</td>
<td>5.65 (.95)</td>
<td>.61</td>
<td>.437</td>
<td>.18</td>
</tr>
<tr>
<td>Quality</td>
<td>5.25 (2.26)</td>
<td>5.81 (.85)</td>
<td>2.14</td>
<td>.148</td>
<td>.33</td>
</tr>
<tr>
<td>Discussion</td>
<td>4.42 (2.19)</td>
<td>5.53 (1.22)</td>
<td>6.10</td>
<td>*<em>.016</em></td>
<td>.63</td>
</tr>
<tr>
<td><strong>Post-questioning questionnaire</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivation</td>
<td>5.27 (1.70)</td>
<td>6.16 (.87)</td>
<td>12.64</td>
<td><strong>.001</strong>*</td>
<td>.66</td>
</tr>
<tr>
<td>Confidence: £10</td>
<td>6.37 (.74)</td>
<td>4.93 (1.37)</td>
<td>50.04</td>
<td>&lt;.001****</td>
<td>1.31</td>
</tr>
<tr>
<td>Confidence: Writing statement</td>
<td>2.37 (1.38)</td>
<td>3.71 (1.50)</td>
<td>25.75</td>
<td>&lt;.001****</td>
<td>.93</td>
</tr>
<tr>
<td>Difficulty: Individual statement</td>
<td>2.58 (1.71)</td>
<td>3.33 (1.79)</td>
<td>5.30</td>
<td>.023*</td>
<td>.43</td>
</tr>
<tr>
<td>Difficulty: Collective statement</td>
<td>2.38 (1.44)</td>
<td>3.55 (1.79)</td>
<td>15.14</td>
<td>&lt;.001****</td>
<td>.72</td>
</tr>
<tr>
<td>Truthfulness: Individual statement</td>
<td>100% (.00)</td>
<td>38.45% (39.86)</td>
<td>1359.04</td>
<td>&lt;.001****</td>
<td>2.18</td>
</tr>
<tr>
<td>Truthfulness: Collective statement</td>
<td>100% (.00)</td>
<td>34.14% (33.93)</td>
<td>590.03</td>
<td>&lt;.001****</td>
<td>2.75</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01; ***p < .005; ****p < .001
5.4.2 Post-questioning questionnaire: Motivation, manipulation checks, and writing statements

The vast majority of participants indicated that they were motivated to appear convincing during the interview, with 85.6% of the sample scoring 5 or higher on the 7-point Likert scale.

A 2 (Veracity: truth vs. lie) x 2 (Status: suspect vs. alibi) between-subjects MANOVA was conducted to investigate whether there were any significant differences between truth-tellers and liars in terms of motivation, confidence, how difficult they found writing the individual and collective statements, and how much they told the truth on both the individual and collective statements. The MANOVA revealed significant multivariate main effects for Veracity, Wilks’ $\lambda = .07$, $F(7, 108) = 214.09, p < .001$, $\eta_p^2 = .93$, Status, Wilks’ $\lambda = .18$, $F(7, 108) = 72.57, p < .001$, $\eta_p^2 = .83$, and the Veracity X Status interaction, Wilks’ $\lambda = .17$, $F(7, 108) = 76.78, p < .001$, $\eta_p^2 = .83$. As shown in Table 5.2, significant univariate main effects for Veracity were obtained with liars reporting significantly more motivation to appear convincing than truth-tellers. In terms of confidence, truth-tellers reported that they were more confident than liars that they would receive £10 and not have to write a further statement. Furthermore, liars found writing both the individual statement and the collective statement significantly more difficult than truth-tellers. Finally, on both the individual statement and collective statement, truth-tellers reported staying closer to the truth than liars (see Table 5.2).

Significant univariate main effects for Status were also obtained with the alibi witnesses telling the truth significantly more on the individual ($M = 88.14\%, SD = 17.17$, 95% CI [85.59, 90.27]) and collective statements ($M = 80.68\%, SD = 25.11$, 95% CI [76.55, 84.14]) compared to the suspects ($M = 51.36\%, SD = 50.05$, 95% CI [48.18, 52.86], $M = 54.58\%, SD = 48.58$, 95% CI [50.00, 57.59], respectively) ($F$-
values ranged from 95.89 to 502.13; all \( p \)-values = < .001). All other univariate main effects for Status were not significant (\( F \)-values ranged from .53 to 1.15; \( p \)-values ranged from .287 to .469). Additionally, there were only significant univariate effects for the Status X Veracity interaction for the extent to which the pair told the truth on both the individual and collective statements (\( F \)-values ranged from 95.89 to 502.13; all \( p \)-values = < .001). A simple main effects analysis demonstrated that in the individual statements of the lying pairs, the alibi witnesses stayed significantly closer to the truth (\( M = 75.86\% \), \( SD = 17.43 \), 95% CI [72.53, 79.20]) than the suspects (\( M = 1.03\% \), \( SD = 5.57 \), 95% CI [-2.30, 4.37]), \( F(1, 114) = 987.52, p < .001, \eta_p^2 = .90, d = 5.78 \). A similar pattern was obtained for the collective statements with the alibi witnesses of the lying pairs staying significantly closer to the truth (\( M = 60.69\% \), \( SD = 22.19 \), 95% CI [55.27, 66.11]) than the suspects (\( M = 7.59\% \), \( SD = 19.76 \), 95% CI [2.17, 13.00]), \( F(1, 114) = 188.59, p < .001, \eta_p^2 = .62, d = 2.53 \). No significant effect of Status was found with regard to the extent that the truth-tellers stayed close to the truth in the individual and collective statements (all \( p \)-values = 1.00).

### 5.4.3 Hypotheses testing: Percentage of (un)verifiable details

Three two-way mixed ANOVAs were conducted. The first 2 x 2 mixed design ANOVA was conducted with Veracity (truth versus lie) as the between-subjects factor, Statement (individual versus collective) as the within-subjects factor, and percentage of checkable details (pair together) as the dependent variable. The ANOVA revealed that truth-telling pairs provided a significantly higher percentage of checkable details (pair together) (\( M = .32, SD = .14 \), 95% CI [.29, .38]) than lying pairs (\( M = .15, SD = .11 \), 95% CI [.10, .20]), \( F(1, 57) = 28.25, p < .001, \eta_p^2 = .33, d = 1.38 \). Furthermore, a significantly higher percentage of checkable details (pair together) were provided in the collective statement (\( M = .28, SD = .23 \), 95% CI [.23, .33]) compared to the individual statement (\( M = .20, SD = .15 \), 95% CI [.17, .24]),
interaction effect was obtained for checkable details (pair together), $F(1, 57) = 7.20, p = .010, \eta^2_p = .11$. A simple main effects analysis demonstrated that the collective statement led to a significantly higher percentage of checkable details (pair together) ($M = .41, SD = .22, 95\% CI [.34, .48]$) than the individual statements ($M = .27, SD = .16, 95\% CI [.21, .31]$) for pairs of truth-tellers, Wilks’ $\lambda = .76, F(1, 57) = 17.67, p < .001, \eta^2_p = .24, d = .73$, but no difference was found between the individual statements ($M = .14, SD = .11, 95\% CI [.09, .19]$) and the collective statement ($M = .16, SD = .15, 95\% CI [.09, .23]$) for pairs of liars, Wilks’ $\lambda = .99, F(1, 57) = .14, p = .712, \eta^2_p < .01, d = .15$. These findings provide support for Hypotheses 1 and 3.

The second 2 x 2 mixed design ANOVA was conducted with Veracity (truth versus lie) as the between-subjects factor, Statement (individual versus collective) as the within-subjects factor, and percentage of checkable details (other) as the dependent variable. The ANOVA revealed that there was no significant difference between truth-telling pairs ($M = .32, SD = .10, 95\% CI [.25, .37]$) and lying pairs ($M = .26, SD = .22, 95\% CI [.19, .31]$) in terms of the percentage of checkable details (other) provided, $F(1, 57) = 2.44, p = .124, \eta^2_p = .04, d = .42$. There was also no significant difference between the individual and collective statements in terms of percentage of checkable details (other) ($p = .082$) nor was there a significant Statement X Veracity interaction effect ($p = .536$).

The third 2 x 2 mixed design ANOVA was conducted with Veracity (truth versus lie) as the between-subjects factor, Statement (individual versus collective) as the within-subjects factor, and percentage of uncheckable details as the dependent variable. The ANOVA revealed that lying pairs provided a significantly higher percentage of uncheckable details ($M = .59, SD = .20, 95\% CI [.52, .65]$) compared to truth-telling pairs ($M = .36, SD = .10, 95\% CI [.29, .42]$), $F(1, 57) = 26.12, p < .001,$
\( \eta_p^2 = .31, d = 1.29 \). There was no significant difference between the individual and collective statements in terms of percentage of uncheckable details \( (p = .087) \) nor was there a significant Statement X Veracity interaction effect \( (p = .217) \). These findings support Hypothesis 2.

Discriminant analyses were conducted on each of the significant dependent variables separately to investigate the nature of their relationship with Veracity in the individual and collective statements. The individual discriminant analyses revealed that checkable details \( (pair\ together) \) and uncheckable details were individually significant predictors of Veracity in the individual statements and also in the collective statements (see Table 5.3). The cross-validated classification results support the first ANOVA above by demonstrating that checkable details \( (pair\ together) \) was a better predictor of Veracity in the collective statement compared to the individual statements. In fact, the cross-validated classification results obtained from the discriminant analyses reveal that checkable details \( (pair\ together) \) and uncheckable details were better predictors of Veracity in the collective statement compared to the individual statements, with 78% and 86.4% of truth-tellers and liars being classified correctly based on these variables (see Table 5.3).
Table 5.3

Classification results of Veracity for each of the significant dependent variables in the individual and the collective statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Type of verifiable detail (percentages)</th>
<th>Chi-square</th>
<th>Wilks' lambda (p-value)</th>
<th>Total percentage of cases correctly classified</th>
<th>Percentage of truth-tellers correctly classified</th>
<th>Percentage of liars correctly classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Checkable details (pair together)</td>
<td>10.30</td>
<td>.83 (.001)</td>
<td>62.7%</td>
<td>60.0%</td>
<td>65.5%</td>
</tr>
<tr>
<td></td>
<td>Uncheckable details</td>
<td>20.22</td>
<td>.70 (&lt;.001)</td>
<td>79.7%</td>
<td>76.7%</td>
<td>82.8%</td>
</tr>
<tr>
<td>Collective</td>
<td>Checkable details (pair together)</td>
<td>21.37</td>
<td>.69 (&lt;.001)</td>
<td>78.0%</td>
<td>73.3%</td>
<td>82.8%</td>
</tr>
<tr>
<td></td>
<td>Uncheckable details</td>
<td>16.37</td>
<td>.75 (&lt;.001)</td>
<td>86.4%</td>
<td>93.3%</td>
<td>79.3%</td>
</tr>
</tbody>
</table>
5.4.4 Hypotheses testing: Applying the verifiability approach to memory consistency and memory distortions

A 2 x 2 between-subjects MANOVA was conducted with Veracity (truth versus lie) as the first between-subjects factor, Status (suspect versus alibi) as the second between-subjects factor, and total number of repetitions, total number of omission errors and total number of commission errors each divided into checkable details (pair together), checkable details (other) and uncheckable details as the dependent variables. The MANOVA revealed a significant multivariate main effect for Veracity only, Wilks’ $\lambda = .45$, $F(9, 106) = 14.64$, $p < .001$, $\eta^2_p = .55$. Significant univariate main effects for Veracity were obtained for two of the consistency variables and four of the memory distortion variables. Truth-tellers repeated significantly more checkable details (pair together) in comparison to liars, whereas liars repeated significantly more uncheckable details compared to truth-tellers. Additionally, truth-tellers omitted and committed more errors in terms of both checkable details (pair together) and checkable details (other) (see Table 5.4). These findings support Hypotheses 4 and 5.

No significant univariate main effects for Status were found ($F$-values ranged from .07 to 2.80; $p$-values ranged from .097 to .793) nor were there any significant univariate Veracity X Status interaction effects ($F$-values ranged from .05 to 3.87; $p$-values ranged from .052 to .832).
Table 5.4

*Veracity main effects obtained for the consistency and memory distortion variables.*

<table>
<thead>
<tr>
<th>Type of variable</th>
<th>Truth-tellers</th>
<th>Liars</th>
<th>F</th>
<th>p</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD) 95% CI</td>
<td>Mean (SD) 95% CI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Consistency Repetitions:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checkable (pair together)</td>
<td>1.92 (2.27)</td>
<td>.90 (1.15)</td>
<td>9.22</td>
<td>.003**</td>
<td>.57</td>
</tr>
<tr>
<td>Checkable (other)</td>
<td>1.38 (1.68)</td>
<td>1.22 (1.44)</td>
<td>.30</td>
<td>.585</td>
<td>.10</td>
</tr>
<tr>
<td>Uncheckable</td>
<td>1.25 (1.61)</td>
<td>2.50 (2.11)</td>
<td>12.91</td>
<td>&lt;.001***</td>
<td>.67</td>
</tr>
<tr>
<td><strong>Memory Distortion Omission Errors:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checkable (pair together)</td>
<td>1.35 (1.54)</td>
<td>.59 (.80)</td>
<td>11.20</td>
<td>.001**</td>
<td>.62</td>
</tr>
<tr>
<td>Checkable (other)</td>
<td>2.30 (2.62)</td>
<td>1.24 (1.27)</td>
<td>8.01</td>
<td>.005*</td>
<td>.51</td>
</tr>
<tr>
<td>Uncheckable</td>
<td>2.88 (3.25)</td>
<td>3.60 (3.29)</td>
<td>1.46</td>
<td>.299</td>
<td>.22</td>
</tr>
<tr>
<td><strong>Memory Distortion Commission Errors:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checkable (pair together)</td>
<td>3.02 (2.38)</td>
<td>.45 (.71)</td>
<td>61.15</td>
<td>&lt;.001***</td>
<td>1.46</td>
</tr>
<tr>
<td>Checkable (other)</td>
<td>2.25 (2.83)</td>
<td>.71 (.96)</td>
<td>15.27</td>
<td>&lt;.001***</td>
<td>.73</td>
</tr>
<tr>
<td>Uncheckable</td>
<td>2.72 (2.99)</td>
<td>2.19 (1.91)</td>
<td>1.27</td>
<td>.262</td>
<td>.21</td>
</tr>
</tbody>
</table>

*p < .01; **p < .005; ***p < .001
Discriminant analyses were separately conducted on each of the two significant consistency variables and the four significant memory distortion variables to investigate the nature of their relationship with Veracity. The individual discriminant analyses revealed that all six variables were individually significant predictors of Veracity (see Table 5.5). The cross-validated classification results reveal that overall the memory distortion variables were better predictors of Veracity than the consistency variables. *Commission errors: checkable details (pair together)* in particular was a diagnostic cue to deceit with 80.5% of truth-tellers and liars classified correctly based on this variable (see Table 5.5). The findings that *commission errors: checkable details (pair together)* is a particularly significant predictor of Veracity supports the previous discriminant analysis (see Table 5.3), which demonstrated that *checkable details (pair together)* was a better predictor of Veracity in the collective statements compared to the individual statements, because it shows that a significant number of *checkable details (pair together)* were added in-between the individual and collective statements.
Table 5.5

Classification results of Veracity for each of the significant consistency variables and memory distortion variables.

<table>
<thead>
<tr>
<th>Type of variable</th>
<th>Chi-square</th>
<th>Wilks’ lambda (significance)</th>
<th>Total percentage of cases correctly classified</th>
<th>Percentage of truth-tellers correctly classified</th>
<th>Percentage of liars correctly classified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consistency Repetitions:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checkable (pair together)</td>
<td>8.97</td>
<td>.93 (.003)</td>
<td>61.0%</td>
<td>46.7%</td>
<td>75.9%</td>
</tr>
<tr>
<td>Uncheckable</td>
<td>12.37</td>
<td>.90 (&lt;.001)</td>
<td>66.1%</td>
<td>73.3%</td>
<td>58.6%</td>
</tr>
<tr>
<td><strong>Memory Distortion Omission Errors:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checkable (pair together)</td>
<td>10.79</td>
<td>.91 (.001)</td>
<td>57.6%</td>
<td>60.0%</td>
<td>55.2%</td>
</tr>
<tr>
<td>Checkable (other)</td>
<td>7.43</td>
<td>.94 (.006)</td>
<td>58.5%</td>
<td>51.7%</td>
<td>65.5%</td>
</tr>
<tr>
<td><strong>Memory Distortion Commission Errors:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checkable (pair together)</td>
<td>49.53</td>
<td>.65 (&lt;.001)</td>
<td>80.5%</td>
<td>73.3%</td>
<td>87.9%</td>
</tr>
<tr>
<td>Checkable (other)</td>
<td>14.49</td>
<td>.88 (&lt;.001)</td>
<td>63.6%</td>
<td>45.0%</td>
<td>82.8%</td>
</tr>
</tbody>
</table>
5.4.5 Strategies used by truth-tellers and liars

All pairs were questioned about the strategies they used during the writing of their individual and collective statements. Only 8.33% of truth-tellers reported employing a strategy when writing their individual statements, compared to 75.86% of liars, and only 16.67% of truth-tellers reported employing a strategy when writing their collective statements, compared to 68.97% of liars.

To investigate whether truth-tellers were intentionally mentioning checkable details and whether liars were intentionally mentioning uncheckable details, the strategies reported to have been used by each of the groups were explored. None of the truth-tellers or the liars in the current study referred to using checkable details as part of their strategy to prove their innocence. That is, truth-tellers were automatically providing details that could be checked within their statements. However, whilst not explicitly referring to uncheckable details as part of their strategy, 15.52% of liars did refer to including details that their partner would not mention even if they had been present with them in the park, e.g. internal feelings, such as feeling happy, and 24.14% of liars referred to including general details that would apply regardless of when they attended the park, e.g. seeing children in the play area. Truth-tellers never reported such strategies. This suggests that liars were, to some extent, thinking about how to include details that could not be checked.

5.5 Discussion

The overall aim of the current study was to apply the verifiability approach and the social phenomenon of human memory to the detection of deception in alibi witness situations. In support of Hypothesis 1, truth-telling pairs, compared to lying pairs, included a higher percentage of checkable details that demonstrated the pair were together in both the individual and collective statements. The fact that truth-telling pairs provided more checkable details that demonstrated they were together
supports previous studies which applied the verifiability approach to the detection of
deception (e.g. Nahari & Vrij 2014; Nahari et al., 2014a, 2014b). Furthermore, and in support of Hypothesis 2, lying pairs, compared to truth-telling pairs, included a higher percentage of uncheckable details in both their individual and collective statements. This finding adds to the current literature that is emerging around the verifiability approach by identifying that lying pairs provide significantly more uncheckable details than truth-telling pairs. Based on the strategies that liars reported to have employed in the study by Nahari et al. (2012), this finding was expected: Liars do want to give an honest impression by providing a high number of details, but they also want to avoid providing details to the investigator that reveal their lies. Consequently, they provide a lot of details, but focus on those that cannot be verified. As expected, no differences were found between pairs of truth-tellers and pairs of liars in terms of the percentage of checkable details they included that did not necessarily demonstrate the pair were together. This last finding can be explained by the fact that lying pairs did have one person complete the mission around the park meaning that they could provide some checkable details but only those that could demonstrate one member of the pair was in the park, not both. Providing checkable details that demonstrated one member of the pair was in the park was also something that each of the truth-tellers could do.

The only significant difference between the individual and collective statements in terms of checkable or uncheckable details was the percentage of checkable details that demonstrated the pair were together, which increased between the individual and collective statements, but only for truth-telling pairs. Thus, providing support for Hypothesis 3.

Based on the differences in the percentages of checkable details that demonstrate the pair were together and the differences in the percentages of
uncheckable details, the cross-validated classification results revealed that checkable
details (pair together) and uncheckable details were better predictors of veracity in the
collective statement, with 78% and 86.4% of truth-tellers and liars being classified
correctly based on these variables, compared to the individual statement where only
62.7% and 79.7%, of truth-tellers and liars were classified correctly. This suggests that
the collective statement can enhance the differences between truth-tellers and liars by
making it easier for truth-tellers to demonstrate they were together and provide shared
verifiable details. However, given that both checkable details that demonstrate the pair
were together and uncheckable details were significant predictors of veracity,
regardless of statement type, demonstrates the high utility and applicability of the
verifiability approach to both individual and collective statements.

The cross-validated classification result obtained in the current study for total
checkable details that demonstrated the pair were together in the collective statement
(78% overall accuracy) was slightly less than the figure obtained in the study by
Nahari and Vrij (2014) (88% overall accuracy). This difference in the accuracy rates is
likely to be because participants in the current study were not instructed to include
verifiable details in their statements, whereas the participants in the study by Nahari
and Vrij (2014) were. Although the accuracy rates of the current study are still high
and show that just by instructing pairs to prove their own or their friend’s innocence
automatically leads to truth-telling pairs providing checkable details that demonstrate
they were together, it does suggest that the accuracy rates and differences between
truth-tellers and liars could be enhanced by informing them that the investigator will
be reading their statements to look for those details that can be checked. Informing
participants to think about verifiable details will encourage truth-tellers to provide
more, but not liars, making the difference between the two groups more pronounced
(Nahari et al., 2014b). This idea can be empirically tested in future studies by having
an experimental design whereby the experimenter implements ‘informing participants
to include verifiable details’ versus ‘not informing participants to include verifiable
details’ as a factor.

Finally, the cross-validated classification results do conflict with the findings
obtained by Nahari et al. (2014a) because they could not classify truth-tellers and liars
above chance level based on unverifiable details alone; whereas the present study did.
This difference may be due to Nahari et al. (2014a) having a lack of statistical power
(sample size was only 38 participants), or because their study used individual
participants as opposed to the current study which used pairs of participants. Again,
this idea can be empirically tested in the future by implementing individuals versus
pairs as a factor in the experimental design.

In support of Hypothesis 4, liars repeated significantly more uncheckable
details between the individual and collective statements compared to truth-tellers.
Additionally, and in support of Hypothesis 5, truth-tellers, in comparison to liars,
exhibited more memory distortions by omitting and committing significantly more
checkable details demonstrating that they were with their partner between the
individual and collective statements. The findings that liars repeat whereas truth-
tellers reconstruct by exhibiting more omission and commission errors supports
reconstructive memory theory (Bartlett, 1932) and the ‘repeat versus reconstruct’
hypothesis (Granhag & Strömwall, 1999). That is, truth-tellers reconstruct the
information they recall over time, whereas liars repeat information over time. These
findings further demonstrate that although the ‘repeat vs. reconstruct hypothesis’
(Granhag & Strömwall, 1999) was originally developed to measure the consistency
between two statements from the same interviewee (within-subjects), it can also
measure consistency between an individual statement and a collective statement
whereby the same individual is still contributing. Truth-tellers recall information
exactly as they remember it and because they have ‘nothing to hide’ this leads to them automatically providing details that can be checked and demonstrate they were together, but because they are also reconstructing the information, they make more errors in-between the statements and these errors reflect those types of details that can be checked. Collective recall is more challenging for lying pairs than truth-telling pairs because they did not actually share the event they are attempting to recall. Instead, they are merely repeating information they have previously pre-planned together (Strömwall, Granhag & Jonsson, 2003; Vrij et al., 2010). Since they are employing a ‘keep it simple’ strategy and not wanting to provide details that the investigator can use to disprove their story (Nahari et al., 2012), their repetitions reflect details that cannot be checked. The current study demonstrated that the truth-tellers were not consciously employing a strategy to include more checkable details, whereas some of the liars reported, to some extent, intentionally including unverifiable details.

The cross-validated classification results revealed that Commission errors: checkable details (pair together) in particular was very successful in classifying both truth-tellers (73.3%) and liars (87.9%) correctly (80.5% overall accuracy). This demonstrates the benefit of including both an individual and a collective statement within the investigation, as a comparison of the two types of statement enable new cues to deceit to emerge. The findings also support the idea that working together gives the pair the opportunity to provide a more convincing alibi in which they can share their memories and provide even more checkable details that demonstrate they were together than if they were working alone on individual statements.

5.5.1 Limitation of the verifiability approach

The current study demonstrates that applying the verifiability approach to the detection of deception does make the task of lying especially difficult. However, it
must be noted that the approach cannot be used all the time, e.g., for; (i) non-recent cases, such as historical child sexual abuse, whereby there is very rarely any details that can be verified, and (ii) truth-tellers (innocent people) who cannot provide verifiable details. Innocent people may not have an alibi witness (e.g. the “alone at home” alibi), or they may not remember exactly where they were or what they were doing at the time of the crime. Nevertheless, a person’s location can be traced by their mobile phone, social networking accounts, etc. People are increasingly possessing and using such devices and technologies; thus the “alone at home” poor alibi is becoming increasingly rare (Vrij & Nahari, 2014). As a result, even if there is no alibi witness, it is unlikely that someone will go a long period of time without using their phone or social networking sites, and consequently activities using such technologies can be traced. Hence, details can be verified to some extent (just not necessarily in the case of historical crimes).

5.5.2 Practical implications

The verifiability approach can act as an alternative verbal technique to lie detection and has many advantages over CBCA and RM. For example, CBCA and RM state that liars lack the imagination to create details that give an honest impression (Sporer, 2004). The verifiability approach should remain effective even if liars have a rich imagination because, unless the ‘imagined’ details can be verified, they will not sound convincing to an investigator applying such an approach (Nahari et al., 2014a).

Additionally, liars might realise that CBCA and RM investigators are measuring credibility and as a result include details that sound more convincing. For example, liars may learn that including a number of cognitive and motivational factors, such as ‘details of interactions’, ‘unusual details’, ‘admitting lack of memory’, or ‘details involving self-deprecation’ are indicative of genuine experiences according to CBCA and therefore by preparing a statement that includes a high number of such details, the
liars know they are more likely to be believed. However, these types of details will have no merit with the verifiability approach unless they can be proven to be true.

Although the current study was a laboratory study with a mock crime, the verifiability approach is likely to be stronger in real life. First, practitioners prefer relative measures, e.g. percentages or ratios, as they control for individual differences in verbal responses (Nahari et al., 2014a), and when such measures are used for the verifiability approach high classification rates are obtained. Second, the verifiability approach exploits the differing strategies used by truth-tellers and liars (truth-tellers are automatically able and more willing to provide details that can be checked, whereas liars are not) and this can be applied even if the investigator does not have much evidence. Therefore, this approach complements other investigative techniques that exploit the strategies employed by truth-tellers and liars, such as the strategic use of evidence (SUE; Hartwig, Granhag, Strömwall & Kronkvist, 2006).

5.5.3 Conclusion

The current study adds to the validity of the verifiability approach, demonstrating that it can be applied to alibi witness situations. Truth-telling pairs provide significantly more checkable details that demonstrate they were together, whereas lying pairs provide significantly more uncheckable details. This is the case even when the pairs are not informed that the investigator will be applying the verifiability approach to their statements.
5.6 References


Chapter 6:

General Discussion
6.1 General Discussion Outline

This general discussion first summarises the main findings of the thesis, highlighting the social indictors of deceit that emerged when a collective interviewing approach was applied to deception detection (see Section 6.2). A summary table of the variables measured within each chapter is provided (see Table 6.1). Next, the theoretical implications are discussed focusing on deception theory, memory theory and group processes (see Section 6.3), followed by the practical implications which focus on sham marriages, alibi witness situations, and the utility of security equipment (see Section 6.4). The methodological issues are then considered (see Section 6.5). Ideas for further research are suggested throughout, but an overview of future research is also provided (see Section 6.6), before the thesis is concluded (see Section 6.7).

6.2 Overview of Main Findings

Deception detection research has primarily focused on interviewing individuals despite the fact that crimes are frequently committed by pairs of, or groups of, offenders. The deception occurring within groups and the novel cues to deceit that may arise from interviewing groups has been ignored within the deception literature, and therefore the main aim of this thesis was to examine collective interviewing as a technique to improve the detection of deception. Collective interviewing involves interviewing multiple interviewees simultaneously. The studies conducted within this thesis focused on pairs of interviewees and explored: (a) the potential of using a collective interviewing approach to aid the detection of deception and elicit new cues to deceit; (b) whether lie catchers would be able to easily recognise and learn the new cues arising from employing a collective approach; and (c) whether collective interviewing could be applied to real-life contexts and therefore benefit professionals involved in citizen security.
Chapter 2 examines the application of a collective interviewing approach to a police-style interview setting whereby pairs of friends were interviewed together. The interview protocol involved repeated questioning of both general and spatial interview questions. Overall, truth-telling pairs provided significantly more details than lying pairs, which supports previous research that applies an individual interviewing approach (e.g. DePaulo et al., 2003; Vrij, 2008; Vrij, Granhag & Porter, 2010). However, no significant differences were found between pairs of truth-tellers and pairs of liars with regard to repetitions, omission errors, commission errors, contradictions and dominance on both the general and spatial interview questions. This was unexpected because the lack of differences between pairs of truth-tellers and pairs of liars across questioning conflicts with memory theories, such as reconstructive memory (Bartlett, 1932), and previous deception literature, such as the ‘repeat vs. reconstruct’ hypothesis (Granhag & Strömwall, 1999). The lack of findings obtained in this experiment could be a consequence of the interview protocol used not eliciting the necessary differences in veracity between pairs. Therefore, the experiments in the remaining chapters of this thesis introduced different interview styles, measured dependent variables better associated with group recall, and imposed cognitive load (a technique known to magnify the differences between individual truth-tellers and individual liars; Vrij, Fisher, Mann & Leal, 2008).

Chapter 3 constitutes two experiments whereby cognitive load was imposed in a collective interviewing situation by implementing a forced turn-taking technique. The first experiment within this chapter applied collective interviewing to an immigration-style interview whereby couples were interviewed together about their real or fictitious relationship. The experiment demonstrated that the forced turn-taking technique elicited key differences between pairs of truth-tellers and pairs of liars. That is, truth-telling pairs continued on from one another when forced to turn-take
significantly more than lying pairs, whereas lying pairs waited and repeated
previously said information when forced to turn-take significantly more than truth-
telling pairs. The second experiment within this chapter then shows that these three
cues – continuations, repetitions, waiting – were easy for lie catchers to detect and
therefore the accuracy rates obtained for categorising pairs based on veracity were
high, and in fact amongst the highest obtained in verbal lie detection research. This
chapter therefore demonstrates that imposing cognitive load in a collective interview
setting can elicit key differences between pairs of truth-tellers and pairs of liars.

Chapter 4 leads on from the first experiment in Chapter 3, using the same
methodology and collective interviewing context (i.e. an immigration-style interview).
In this chapter, the theory of transactive memory (Hollingshead, 1998; Wegner, 1987)
is applied and it was revealed that truth-telling pairs posed questions to one another,
provided cues to one another, handed over remembering responsibility, and finished
each other’s sentences significantly more than lying pairs. This chapter emphasises the
importance of joint memory recall in the detection of deception.

Chapters 3 and 4 discuss a study whereby the pairs were of equal status (i.e. they were both trying to prove their innocence and had the same task). Therefore,
Chapter 4 applies a collective approach to alibi witness situations whereby the pair
members had differing responsibility and status (i.e. one individual was trying to
prove his or her own innocence whilst the other individual in the pair was trying to
prove the innocence of his or her friend). The experiment in Chapter 4 applies the
verifiability approach (Nahari, Vrij & Fisher, 2014) and the social phenomenon of
memory (e.g. Baddeley, 1990; Bartlett, 1932; Rajaram, 2011) to the detection of
deceit in alibi witness scenarios. It was revealed that truth-telling pairs provided
significantly more details that could be checked compared to lying pairs who provided
significantly more uncheckable details. The collective statement prompted
significantly more checkable details that demonstrated the pair were together, than the individual statement, for truth-telling pairs only. Additionally, truth-tellers repeated, omitted and committed significantly more checkable details between the individual and collective statements, whereas liars only repeated significantly more uncheckable details. This chapter contributes further to the verifiability approach and how it can facilitate lie detection. Additionally, it shows how such an approach can be used as an alternative to other verbal lie detection techniques, such as Criteria-Based Content Analysis (CBCA; Steller & Köhnken, 1989) and Reality Monitoring (RM; Johnson & Raye, 1981; Sporer, 2004).

To summarise, collective interviewing can elicit cues to deceit that are unique to interviewing two or more interviewees together at the same time. In particular, imposing cognitive load, applying memory theories, and using the verifiability approach can all aid the detection of deception in collective interviewing contexts. Table 6.1 provides an overview of the current PhD thesis and the cues measured when a collective interviewing approach was applied to the detection of deception.
Table 6.1
Overview of the deception cues measured in the current PhD thesis when a collective interviewing approach was implemented.

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Deception cue</th>
<th>Truth-tellers Mean (SD)</th>
<th>Liars Mean (SD)</th>
<th>F</th>
<th>p</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 2</td>
<td>General repetitions</td>
<td>16.02 (7.74)</td>
<td>9.00 (5.35)</td>
<td>2.55</td>
<td>.118</td>
<td>1.06</td>
</tr>
<tr>
<td></td>
<td>General omission errors</td>
<td>98.96 (67.13)</td>
<td>51.66 (27.67)</td>
<td>.13</td>
<td>.718</td>
<td>.92</td>
</tr>
<tr>
<td></td>
<td>General commission errors</td>
<td>32.64 (18.83)</td>
<td>25.45 (21.20)</td>
<td>2.42</td>
<td>.128</td>
<td>.36</td>
</tr>
<tr>
<td></td>
<td>General contradictions</td>
<td>1.14 (1.68)</td>
<td>.36 (.66)</td>
<td>1.24</td>
<td>.272</td>
<td>.61</td>
</tr>
<tr>
<td></td>
<td>Spatial repetitions</td>
<td>7.79 (5.96)</td>
<td>5.68 (3.39)</td>
<td>2.99</td>
<td>.091</td>
<td>.44</td>
</tr>
<tr>
<td></td>
<td>Spatial omission errors</td>
<td>28.60 (19.84)</td>
<td>17.59 (13.21)</td>
<td>.03</td>
<td>.872</td>
<td>.65</td>
</tr>
<tr>
<td></td>
<td>Spatial commission errors</td>
<td>16.55 (11.13)</td>
<td>8.77 (5.57)</td>
<td>2.18</td>
<td>.148</td>
<td>.88</td>
</tr>
<tr>
<td></td>
<td>Spatial contradictions</td>
<td>.33 (.58)</td>
<td>.18 (.50)</td>
<td>1.31</td>
<td>.260</td>
<td>.28</td>
</tr>
<tr>
<td>Chapter 3</td>
<td>Number of swaps</td>
<td>8.83 (8.00)</td>
<td>9.05 (5.78)</td>
<td>.01</td>
<td>.919</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td>Continuations per swap</td>
<td>.70 (.35)</td>
<td>.43 (.19)</td>
<td>10.42</td>
<td>.002***</td>
<td>.96</td>
</tr>
<tr>
<td></td>
<td>Repetitions per swap</td>
<td>.13 (.14)</td>
<td>.52 (.21)</td>
<td>56.95</td>
<td>&lt;.001****</td>
<td>2.19</td>
</tr>
<tr>
<td></td>
<td>Waiting per swap</td>
<td>.33 (.27)</td>
<td>.71 (.24)</td>
<td>24.82</td>
<td>&lt;.001****</td>
<td>1.49</td>
</tr>
</tbody>
</table>
### Chapter 4

**Posing questions to one another**

15.83 (10.62)  
9.41 (5.80)  
6.32  
**.016***  .75

**Providing cues to one another**

3.79 (2.87)  
.91 (1.66)  
16.94  
***<.001****  1.23

**Handing over remembering responsibility**

.63 (.97)  
.05 (.21)  
7.51  
**.009**  .83

**Finishing each other’s sentences**

5.92 (2.95)  
1.14 (1.46)  
47.22  
***<.001****  2.05

### Chapter 5

**Percentage of checkable details (pair together)**

.32 (.14)  
.15 (.11)  
28.25  
***<.001****  1.38

**Percentage of checkable details (other)**

.32 (.10)  
.26 (.22)  
2.44  
.124  .42

**Percentage of uncheckable details**

.36 (.10)  
.59 (.20)  
26.12  
***<.001****  1.29

**Repetitions: Checkable details (pair together)**

1.92 (2.27)  
.90 (1.15)  
9.22  
**.003***  .57

**Repetitions: Checkable details (other)**

1.38 (1.68)  
1.22 (1.44)  
.30  
.585  .10

**Repetitions: Uncheckable**

1.25 (1.61)  
2.50 (2.11)  
12.91  
***<.001****  .67

**Omission errors: Checkable details (pair together)**

1.35 (1.54)  
.59 (.80)  
11.20  
**.001***  .62

**Omission errors: Checkable details (other)**

2.30 (2.62)  
1.24 (1.27)  
8.01  
**.005**  .51

**Omission errors: Uncheckable**

2.88 (3.25)  
3.60 (3.29)  
1.46  
.299  .22

**Commission errors: Checkable details (pair together)**

3.02 (2.38)  
.45 (.71)  
61.15  
***<.001****  1.46

**Commission errors: Checkable details (other)**

2.25 (2.83)  
.71 (.96)  
15.27  
***<.001****  .73

**Commission errors: Uncheckable**

2.72 (2.99)  
2.19 (1.91)  
1.27  
.262  .21

* *p < .05; **p < .01; ***p < .005; ****p < .001
6.3 Theoretical Implications

The main theoretical implications of the findings obtained in this thesis are in the areas of deception, memory, and group dynamics.

6.3.1 Deception theory

6.3.1.1 Group deceit. Individuals have very much been the focus of lie detection research. However, with serious threats to security, and with crimes often involving networks or organisations, it is important to develop new techniques that enable a distinction to be made between groups of truth-tellers and groups of liars. This PhD thesis provides support for previous collective interviewing studies into deception (e.g. Driskell, Salas & Driskell, 2012; Jundi, Vrij, Hope, Mann & Hillman, 2013; Jundi, Vrij, Mann, et al., 2013; Vrij et al., 2012) and shows the potential for exploring the social indicators of deceit emerging from groups, as well as the individual indicators. Therefore, group interviewing can elicit novel verbal cues, such as posing questions to one another and finishing each other’s sentences, which cannot emerge during individual interviewing.

6.3.1.2 Cognitive load. Previous deception research with single suspects has shown that ‘imposing cognitive load’ elicits and magnifies the verbal and nonverbal cues to deceit (Vrij et al., 2008) because lying is often more mentally taxing than truth-telling (Zuckerman, DePaulo & Rosenthal, 1981). Chapter 3 supports the cognitive approach theory by showing that implementing a forced turn-taking technique as a means of imposing cognitive load makes the task of giving an honest impression difficult for lying pairs, but not truth-telling pairs, and as a result new cues to deceit emerge that reflect this increased cognitive load. This chapter therefore contributes to the growing body of research into the cognitive load approach of examining deception (Vrij et al., 2008; Zuckerman, et al., 1981): Not only does ‘imposing cognitive load’ elicit and magnify the verbal cues to deceit in individual
interviewees, but it can also be employed when interviewing pairs. Future research should explore alternative techniques for imposing cognitive load when applying a collective interviewing approach. For example, adding instructions to the turn-taking manipulation and stating that the group members are to switch turns as quickly as possible without repeating previous information, or split up sensory details, for example, asking one member of the pair to describe visual details of an event, then ask the other individual to describe the auditory details, etc. Alternatively, one member of the pair could be instructed to recall the story in reverse order whilst the other member of the pair recalls the story in chronological order. This could be completed at the same time to determine whether they can work inwards to meet in the middle, whilst also making their story appear coherent and plausible.

6.3.1.3 Cue-based approach. This PhD thesis is very much based on the cue-based approach towards deception detection (see DePaulo et al., 2003 for an overview of the cues to deception). This approach focuses on identifying behaviours that significantly distinguish between truth-tellers and liars. Examples of such an approach include; the four-factor theory of deception consisting of arousal, affects, cognitions and attempts to control behaviour (Zuckerman, et al., 1981); Interpersonal Deception Theory (Buller & Burgoon, 1996); and cognitive load theory (Vrij et al., 2010). Although the cue-based approach continues to be explored within the deception detection literature and is becoming increasingly popular amongst lie detection researchers as they attempt to develop new techniques that magnify deception cues and exploit the strategies used by liars, this approach has not been unchallenged by critics. Levine and McCormack (2014), for example, believe that the cue-based approach to lie detection should be abandoned because they believe that focusing on such an approach will not ever identify reliable cues to deceit and will also never obtain accuracy rates any better than chance. I believe this not to be true. Instead, I
believe that the cue-based approach is only redundant when referring to the passive observation of cues. As shown by the studies completed throughout this PhD thesis, when cues are actively measured through the use of appropriate questioning and interview techniques, novel and unique cues to deceit, such as communication cues, can emerge and these can result in high accuracy rates.

6.3.2 Importance of memory

It is widely acknowledged that memory plays an important role in deception (Sporer & Schwandt, 2006; Verschuere, Ben-Shakhar & Meijer, 2011; Walczyk, Igou, Dixon & Tcholakian, 2013), and that the act of remembering is, at least in part, influenced by social dynamics (Halbwachs, 1992; Hirst & Rajaram, 2014). Overall, the memory literature tends to focus on individual memory, neglecting the importance of collective memory whereby groups of individuals share, remember, and recall memories together (also referred to as social memory or collaborative remembering). This is despite the fact that the social context of memory has been extensively studied for decades (e.g. Barnier & Sutton, 2008; Bartlett, 1932; Blumen, Rajaram & Henkel, 2013; Edwards & Middleton, 1987; Rajaram, 2011). Nevertheless, recent studies are now emphasising the benefits of collective memory. For example, Pociask and Rajaram (2014) found that participants were more likely to solve assigned problems associated with material they had studied if they were working collaboratively, compared to individually. Additionally, Blumen and Stern (2011) demonstrated that there are two cognitive processes that aid collaborative recall; re-exposure (hearing another group member recall information that they themselves had forgotten) and cross-cuing (hearing another group member recall information that reminds them of additional information). These cognitive processes cannot occur when recall occurs individually. As our understanding of collective memory improves, perhaps a clearer understanding of the deception occurring within groups could be better identified.
That is, if more is known about how group members share and recall information together, more strategies could be employed by investigators to disrupt this collaborative remembering so that more cues to deceit emerge.

This thesis applies three memory theories: Collective memory (see all Chapters); Reconstructive memory (see Chapters 2 and 5); and Transactive memory (see Chapter 4). With the exception of Chapter 2, all experimental chapters (Chapters 3, 4, 5) demonstrate the usefulness of collective memory (i.e. collaborative recall) in magnifying the discrepancies between pairs of truth-tellers and pairs of liars, and generating new cues to deceit. Each study shows the different communicative and interactive behaviours that occur through joint recall when the information being recalled reflects actual shared events, compared to the lack of communicative and interactive behaviours that occur when joint recall is of a fabricated event (see Table 6.1).

In terms of reconstructive memory theory (Bartlett, 1932), Chapter 2 does not provide support for this theory, whereas Chapter 5 does. The truth-telling participants recruited in Chapter 5 did make significantly more omission and commission errors resulting in their statements changing over time, whereas the lying participants purely focused on repeating information. However, it is important to note that the $d$-values obtained in Chapter 2 were substantial for some variables (e.g. $d = 1.06$ for general repetitions), yet the effects not significant. Therefore, there appears to have been a lack of power in Chapter 2. Consequently, if the $d$-values were interpreted and relied upon, as opposed to the $p$-values, then the findings obtained in Chapter 2 would actually support the findings of Chapter 5 as well as the reconstructive memory theory (Bartlett, 1932).

Nevertheless, there are numerous other reasons as to why the findings of Chapter 2 may not have concurred with the findings of Chapter 5. First, the
participants in Chapter 2 were not informed that they were going to be interviewed together, whereas the participants in Chapter 5 were, and therefore the participants’ preparation and strategies are likely to have differed between studies. Individual interviewing is more common and more widely experienced; therefore the participants in Chapter 2 had probably assumed that this was how they were going to be interviewed. Second, the interview protocol used in Chapter 2 did not provide the appropriate manipulations for eliciting cues that differentiated between pairs of truth-tellers and pairs of liars, but instead focused on an interview protocol appropriate for individual truth-tellers and individual liars. Consequently, the interview protocol may have been less applicable to pairs than it has been found to be for individuals. Finally, Chapter 5 applies the verifiability approach to reconstructive memory, whereas Chapter 2 does not, and therefore different categories of repetitions, omission errors, commission errors, and contradictions were used in Chapter 5 compared to Chapter 2. The breakdown of each of the variables may have therefore created new cues that were more predictive of veracity than when they were all examined together and not divided into further categories.

In terms of transactive memory theory (Hollingshead, 1998; Wegner, 1987), Chapter 4 demonstrates that there are good opportunities to differentiate truths from lies if truth-tellers do not remember clearly, because signs of truthfulness emerge from the existence of a transactive memory system (e.g., posing questions to one another, providing cues to one another, handing over of remembering responsibility, and finishing each other’s sentences). Hence, as opposed to truth-tellers sounding like liars due to providing a lack of detail, liars can be classified correctly because they will lack the presence of each of these cues.

Overall, it is clear that an understanding of memory theory and joint recall can aid the detection of deception when a collective interviewing approach is applied,
allowing for new and unique cues to emerge that do not arise during individual recall. Therefore, future studies that apply a collective interviewing approach should always consider memory and the effects of joint recall on social cues to deceit.

6.3.3 Group dynamics

When applying a collective approach it is important to think about the group dynamics and how each of the members bond and work together (referred to as group formation; Arrow, McGrath & Berdahl, 2000). Groups often form a structure with each member having a different role and being of a different status. Roles facilitate group functioning, and when these roles are inflexible or clouded, this can be detrimental to the group (Gersick & Hackman, 1990). This PhD thesis, particularly Chapters 3 and 4, clearly shows the importance of communication cues when detecting deception in groups of interviewees. Group roles influence how group members behave and communicate within that group; thus are likely to influence the communication cues that arise from within that group. Group roles are not equal and therefore those of a higher status (i.e., leaders who are deemed to be more knowledgeable and able to initiate the ideas and activities adopted by the group) will be more valued and respected than those who are of a lower or equal status. For example, individuals are typically reluctant to express disagreement with their group leaders in a group discussion, but are more willing to express disagreement with those group members who are not superior to themselves (Chemers, 2001; Hollander, 1985). In group discussions this could result in a systematic pattern of agreeing and disagreeing. If this is then examined within a collective interviewing context to detect deceit, ‘agreement’ and ‘disagreement’ could be measured as a function of the role or status within the group. It is expected that low status individuals within a truth-telling group and low status individuals within a lying group will not differ from one another because their role within the group will be to agree regardless of whether they are
lying or telling the truth. However, it is expected that high status truth-tellers and high status liars will differ from one another. That is, high status individuals within a truth-telling group will not be scared to disagree with other group members, whereas high status individuals within a lying group will not disagree with other group members through fear that this will look suspicious. Consequently, communication cues in the form of agreements and disagreements should theoretically differ depending on the veracity of the group.

Indeed, aside from group roles and status, the degree of dependence upon a group could potentially influence the outcomes. For example, individualistic cultures, such as people from Australia and the UK, are very much independent with self-reliance being greatly emphasised. Individuals of such cultures focus on identifying more with the self so that their own needs are satisfied before those of the group. Conversely, collectivistic cultures, such as people from Japan and Korea, are very much interdependent so that the wellbeing of each individual is related to the success of the group. Emphasis is put on group loyalty and conformity with the self-identity of each individual developing from the relationships and interconnectedness between all group members (Hofstede, 1980, 2001; Hui, 1988). Participants in the studies within this thesis were primarily from the UK and therefore of an individualistic culture, which as some scholars emphasise is an issue with the vast majority of research in the human psychology and behaviour domain (see Henrich, Heine & Norenzayan, 2010 for a discussion about study samples being primarily from Western, Educated, Industrialised, Rich, and Democratic (WEIRD) societies). Consequently, the findings in this thesis would be likely to differ and in fact be stronger in participants from a collectivistic culture whereby supporting the group and masking any lies is more important. Hence, it is believed that interviewing groups from a collectivistic culture
will result in more social cues to deceit emerging than was found in the studies of this thesis.

Another concept to consider is group cohesiveness which explores the properties of a group that effectively bind them together giving the group a sense of solidarity (Festinger, 1950). The more cohesive a group is, the more they appear like a group. One way of exploring this notion of cohesiveness during collective interviewing is to consider what would happen to the cohesiveness of the group if an investigator behaves more positively towards one specific member of the group or if one group member “slips up” during the interview. One would expect there to be a veracity effect because if the group are concealing information, then the (rest of the) group may perceive this individual as behaving differently to the rest and not satisfying the group goals or standards. The group may see this as a threat to cohesiveness and therefore a threat to their group’s credibility. Subsequently, they may respond in a way that restores the group cohesiveness. The way they communicate with that individual may differ to that of a group whose members are not concealing information, because a non-concealing group’s members are likely to be less concerned about their group cohesiveness during the interview. That is, groups that are concealing information may start to support the individual being favoured or who slipped up, or find a way of explaining the information that this individual has provided. That way the group restores solidarity and motivates all group members, including the favoured individual or individual who slipped up, to act on behalf of the group. As a result, communicative and interactive cues arising from this mutual support may emerge. These will not emerge from a group not concealing information because they will not be focusing on group cohesiveness and will be more willing to correct or disagree with other group members.
Social psychology theories, such as those mentioned above, have not yet been applied to deception detection. Therefore, an understanding of group structure, the culture or beliefs of the group, the roles that each individual has within the group, and the ways in which the group members communicate should be a point of focus for future deception detection research when a collective interviewing approach is applied.

6.4 Practical Implications

The main practical implications for the findings obtained in this thesis are in the areas of detecting deception, intelligence-gathering, and investigative interviewing.

6.4.1 Immigration: Sham marriages

Chapters 3 and 4 demonstrate a study whereby an immigration paradigm was used as the setting to which collective interviewing was applied. This setting is becoming increasing relevant worldwide as ‘immigration’ is high up on the political agenda. The main aim for immigration agencies is to prevent illegal immigration and distinguish between genuine couples and fake couples, especially as sham marriages are frequently associated with organised crime groups and increased criminality. When investigating the genuineness of a relationship, documentary evidence is examined, the couple are interviewed in-depth and/or a home visit will take place, and it is during these investigative stages that techniques need to be implemented in order to detect potential sham marriages and prevent them from occurring. Collective interviewing (see all Chapters), the implementation of forced turn-taking (see Chapter 3) and an understanding of transactive memory theory (see Chapter 4) are ways in which an investigator could increase the detection accuracy of genuine and fake relationships.
6.4.2 Police investigations: Alibi witness scenarios

Alibi witnesses are commonly provided by suspects to corroborate their whereabouts when a crime took place, and the Criminal Justice System (CJS) often accepts alibi witnesses as evidence during criminal investigations (Burke, Turtle & Olsen, 2007). When an alibi witness is advocated there are three key phases: (1) *alibi generation* whereby a suspect provides an alibi witness to back up their whereabouts at the time the crime took place; (2) *alibi discrimination* whereby investigators attempt to distinguish between true and false alibi witnesses; and (3) *alibi evaluation* whereby the claim put forward by the alibi witness is considered (i.e. by a jury) with regard to all other evidence (Culhane et al., 2013). Phase 2 is particularly relevant to the experiment conducted in Chapter 5, which demonstrated that both an individual and collective approach to the detection of deceit within alibi witness situations was beneficial. Therefore, individual and collective questioning, employing the verifiability approach, and having an understanding of the social phenomenon of human memory can aid the detection of deception and allow for investigators to more accurately differentiate true from false alibi witnesses. This could, in turn, assist those evaluating the evidence from alibi witnesses in phase 3. A better understanding of how to recognise false alibi witnesses would significantly benefit criminal investigations, such as the Soham murders case mentioned in Section 5.2.

Another police investigation context whereby collective interviewing could be applied along with group dynamics is the use of an informant. An informant is someone who secretly gathers and provides information to an agency, such as the police, about an individual or group of individuals, usually criminals. Informants are used frequently in criminal investigations and often form a vital part of the investigative process (Brown, 2001). If an informant in a group does not want to be exposed to his or her fellow group members, s/he needs to identify with them (see
Chapter 6

social identity theory; Hogg, 2006; Tajfel & Turner, 1979) as well as learn his or her role within the group. If the group members are then interviewed collectively, the informant needs to ensure that s/he does not communicate or behave in a manner that causes the other group members to become suspicious of him or her. This means s/he has to compare himself or herself socially to the other group members so as to reflect their opinions and behaviours and establish the correct or socially approved way of thinking and behaving (known as the social comparison theory; Festinger, 1954). This is a difficult task. Therefore, an understanding of how groups conceal information together, and most importantly how they communicate when being questioned by an investigator and concealing information, would be beneficial to informants working undercover.

6.4.3 Additional collective interviewing settings

The current PhD thesis has demonstrated that the collective interviewing of pairs could benefit both immigration and police investigations. However, future studies should consider alternative contexts whereby collective interviewing could be of benefit for distinguishing innocent groups from guilty groups. For example, police ‘stop and search’ scenarios (e.g. possession of weapons within gangs), insurance claims (e.g. to detect fraud), road border control (e.g. to detect illegal immigration or trafficking), house-to-house enquiries (e.g. questioning whole households about their knowledge of a local crime), and security checkpoints (e.g. to detect drug mules or terrorists at airports). Additionally, whilst this thesis focuses on pairs, collective interviewing can also be employed when more than two interviewees require questioning. It should be possible to apply the findings obtained from the experiments conducted within this thesis to other environments than those examined, as well as to more than two interviewees, because the theoretical rationale on which the key findings of this thesis are based (e.g. cognitive load, collective memory, reconstructive
memory, transactive memory, and the verifiability approach) will remain the same regardless of the setting or number of people being interviewed together.

A key area in which collective interviewing could be applied is within the area of security equipment, such as closed-circuit television (CCTV). Truth-tellers interact more with each other than liars, and interaction is often associated with mutual eye gaze and body orientation towards each other. Consequently, it would be interesting to discover whether CCTV footage can spot such nonverbal communication cues. If it can, then this would help distinguish between truth-tellers and liars in collective interviews. Future studies should therefore explore whether observing groups and applying a collective approach enables security personnel, using CCTV, to discriminate truth-tellers from liars.

6.5 Methodological Considerations

6.5.1 Knowledge of being interviewed collectively

In the experiment mentioned in Chapter 2 participants were not informed that they would be interviewed collectively whereas they were in the other experiments in this thesis (see Chapters 3, 4, 5). It would be interesting to know whether a lack of knowledge about the fact they were going to be interviewed together had an effect. This idea could be empirically tested in future studies by implementing an experimental design whereby participant in one condition are informed about being interviewed collectively versus another condition whereby participants are not informed about being interviewed collectively. Interviewees often focus on their nonverbal behaviours as they believe it is these that will give their lies away. Therefore, in the informed condition, lying pairs may develop socially shared deceptive strategies that will focus on how they should respond nonverbally to each other in order to appear convincing, e.g. looking at each other or at the interviewer.
Since liars focus so much on their behaviours, they may not discuss how they should communicate and interact together.

6.5.2 Lack of lie detection experiments

Four studies were conducted within this thesis, yet only one was a lie detection study. Lie detection studies enable the overall potential of a collective approach to be explored. Chapter 3 demonstrates that the three turn-taking cues were easy for lie catchers to recognise and therefore they could more accurately categorise pairs based on veracity. Future lie detection studies should examine the other cues identified in this thesis and whether they would be easily recognised and understood to obtain equally high accuracy rates. Additionally, the lie detection study conducted in Chapter 3 used interview transcripts as the materials (as opposed to video clips). Although this demonstrated the pure effect and potential of the turn-taking technique within collective interviewing, future lie detection studies should examine the accuracy rates obtained from real-life interviews to increase the ecological validity of the findings.

6.5.3 No individual interviewing comparison group

With the exception of the experiment conducted in Chapter 5, there was no individual interviewing condition used as a control or comparison group. Hence, an experimental manipulation whereby there are two conditions: (1) groups separated and interviewed individually; and (2) groups kept together and interviewed simultaneously, would emphasise the true benefits of a collective approach and the different ways such an approach can aid with the detection of deception. However, the question is not whether collective interviewing should replace individual interviewing. Instead, the question is whether collective interviewing can be employed as a ‘new’ or ‘additional’ approach to individual interviewing. Therefore, the collective interview could be used in isolation whereby if the group raises suspicion in a collective interview, investigators take the required actions they would normally take after
Chapter 6

interviewing individuals who raise suspicion (e.g., calling for assistance, collecting further evidence). Alternatively, collective interviewing could act as an initial screening process to determine whether suspects then need to be interviewed individually.

6.5.4 Translation of the findings to the field

Throughout this PhD thesis, different collective interviewing settings have been mentioned, e.g. security checkpoints, police stop and search, and house-to-house enquires. However, whilst all these settings can involve collective interviewing, they also share the same characteristic of interest (i.e. deception), and deception in itself is characterised by low base rates. Therefore, although the effect sizes and hit rates reported throughout this PhD thesis are high, they are primarily based on discriminant analyses in which the upper bound estimates of the ‘true’ accuracy are reported. Consequently, it must be acknowledged that there will be a significant number of false accusations made when using this technique. Therefore, future research needs to examine better ways of identifying who needs to be examined so that the number of false accusations reduces. Despite this, the hit rates reported are a massive improvement within the deception detection literature showing the clear potential of using collective interviewing to detect deceit.

6.6 Overview of Future Research

There are various ideas that could be examined in further studies to help contribute to the collective interviewing literature within the detection of deception. Some of these ideas have been provided in the current chapter, but others have been suggested in the discussion sections of Chapters 2, 3, 4 and 5. To summarise, the main ideas for future research put forward throughout this thesis include: (1) alternative contexts or scenarios to which collective interviewing could be applied (e.g., insurance claims, the use of an informant, security equipment, house to house
enquiries); (2) alternative techniques for imposing cognitive load during collective interviewing, as well as different ways in which the turn-taking technique could be implemented (e.g., by giving the pairs instructions to follow); (3) identifying what cues emerge when social psychology theories of group processes and differing cultures are applied to group deception; (4) a novel experimental design whereby there are two comparison conditions (e.g., individual interviewing versus collective interviewing, informing versus not informing pairs of how they will be interviewed, or informing versus not informing participants of what the interviewer/investigator is measuring); (5) additional lie detection studies that can be applied to the real world and identify whether social indicators of deceit can be easily recognised by lie catchers; (6) an examination of the nonverbal behaviours that may arise from collective interviewing; and (7) an investigation of what cues arise when more than two interviewees are interviewed together at the same time, and whether the theories and techniques applied throughout this thesis also apply to the questioning of more than two interviewees.

6.7 Conclusion

Previous research has neglected the social indicators of deception. The aim of this thesis is to apply collective interviewing to deception detection by interviewing pairs of truth-tellers and pairs of liars simultaneously. This thesis demonstrates that a collective interviewing approach can elicit novel cues to deceit that can be easily measured and recognised. It implies that memory and the effects of joint recall need to be understood if the approach is to be applied constructively.
6.8 References


and trials. In M.P. Toglia, J.D. Read, D.F. Ross, & R.C.L. Lindsay (Eds.), The
handbook of eyewitness psychology, Vol. 1: Memory for events (pp. 157-174).
Mahwah, NJ: Lawrence Erlbaum Associates.

Hogg & R.S. Tindale (Eds.), Blackwell handbook of social psychology: Group

(2013). Generation and detection of true and false alibi statements. Psychiatry,

DePaulo, B. M., Lindsay, J. J., Malone, B. E., Muhlenbruck, L., Charlton, K., &
DOI: 10.1037/0033-2909.129.1.74.

Factors: The Journal of the Human Factors and Ergonomics Society, 54, 577-
588. DOI: 10.1177/0018720812446338.

DOI: 10.1002/acp.2350010202.

Festinger, L. (1950). Informal social communication. Psychological Review, 57, 271-
282. DOI: 10.1037/h0056932.

117-140. DOI: 10.1177/001872675400700202.

Organizational Behavior and Human Decision Processes, 47, 65-97. DOI:
10.1016/0749-5978(90)90047-D.


mind. In B. Mullen & G.R. Goethals (Eds.), *Theories of group behaviour* (pp.

communication of deception. In L.Berkowitz (Eds.), *Advances in experimental
Appendices
Appendix 2.1: Averages and Totals Calculations

Pairs of participants were labelled as left participant and right participant. All of the following calculations were conducted first for the general interview questions, then for the spatial interview questions.

Initial details
All details provided in the initial interview questions were first added together for each coder and each member of the pair separately. Therefore, a total number of initial details for each participant and from each coder was obtained.

*Average initial details from left participant* = (Total initial details provided by the left participant: Coder 1 + Total initial details provided by the left participant: Coder 2) / 2.

*Average initial details from right participant* = (Total initial details provided by the right participant: Coder 1 + Total initial details provided by the right participant: Coder 2) / 2.

*Total initial details* = Average initial details provided by the left participant + Average initial details provided by the right participant.

*Average initial details* = Total initial details / 2.

Replicate details
All details provided in the replicate interview questions were first added together for each coder and each member of the pair separately. Therefore, a total number of replicate details for each participant and from each coder was obtained.

*Average replicate details from left participant* = (Total replicate details provided by the left participant: Coder 1 + Total replicate details provided by the left participant: Coder 2) / 2.
Average replicate details from right participant = (Total replicate details provided by the right participant: Coder 1 + Total replicate details provided by the right participant: Coder 2) / 2.

Total replicate details = Average replicate details provided by the left participant + Average replicate details provided by the right participant.

Average replicate details = Total replicate details / 2.

Repetitions

Average repetitions made by left participant of the left participant = (Repetitions of the left participant by the left participant: Coder 1 + Repetitions of the left participant by the left participant: Coder 2) / 2.

Average repetitions made by right participant of the right participant = (Repetitions of the right participant by the right participant: Coder 1 + Repetitions of the right participant by the right participant: Coder 2) / 2.

Total repetitions of themselves = Average repetitions of the left participant by the left participant + Average repetitions of the right participant by the right participant.

Average repetitions of themselves = Total repetitions of themselves / 2.

Average repetitions made by left participant of the right participant = (Repetitions of the right participant by the left participant: Coder 1 + Repetitions of the right participant by the left participant: Coder 2) / 2.

Average repetitions made by right participant of the left participant = (Repetitions of the left participant by the right participant: Coder 1 + Repetitions of the left participant by the right participant: Coder 2) / 2.

Total repetitions of other participant in pair = Average repetitions of the right participant by the left participant + Average repetitions of the left participant by the right participant.
Average repetitions of other participant in pair = Total repetitions of other participant in pair / 2.

Overall number of repetitions from both the left and right participants = Total repetitions of themselves + Total repetitions of other participant in pair.

Contradictions
Total contradictions of themselves = Agreed number of contradictions by the left participant of the left participant + Agreed number of contradictions by the right participant of the right participant.

Total contradictions of other participant in the pair = Agreed number of contradictions by the left participant of the right participant + Agreed number of contradictions by the right participant of the left participant.

Overall number of contradictions from both the left and right participants = Total contradictions of themselves + Total contradictions of other participant in the pair.

Omission Errors
Number of omission errors made by left participant of the left participant = Average initial details from left participant – Average repetitions made by left participant of the left participant.

Number of omission errors made by right participant of the right participant = Average initial details from right participant – Average repetitions made by right participant of the right participant.

Total omission errors of themselves = Average omission errors made by left participant of the left participant + Average omission errors made by right participant of the right participant.

Average omission errors of themselves = Total omission errors of themselves / 2.
Number of omission errors made by left participant of the right participant =
Average initial details from right participant – Average repetitions made by the left participant of the right participant.

Number of omission errors made by right participant of the left participant =
Average initial details from left participant – Average repetitions made by the right participant of the left participant.

Total omission errors of the other participants in their pair = Average omission errors made by left participant of the right participant + Average omission errors made by right participant of the left participant.

Average omission errors of the other participants in their pair = Total omission errors of the other participant in pair / 2.

Overall number of omission errors from both the left and right participants = Total omission errors of themselves + Total omission errors of the other participants in their pair.

Commission Errors
Number of commission errors made by left participant of the left participant =
Average replicate details from left participant – Average repetitions made by left participant of the left participant.

Number of commission errors made by right participant of the right participant =
Average replicate details from right participant – Average repetitions made by right participant of the right participant.

Total commission errors of themselves = Average commission errors made by left participant of the left participant + Average commission errors made by right participant of the right participant.

Average commission errors of themselves = Total commission errors of themselves / 2.
Number of commission errors made by left participant of the right participant =
Average replicate details from left participant – Average repetitions made by the left
participant of the right participant.

Number of commission errors made by right participant of the left participant =
Average replicate details from right participant – Average repetitions made by the
right participant of the left participant.

Total commission errors of the other participants in their pair = Average
commission errors made by left participant of the right participant + Average
commission errors made by right participant of the left participant.

Overall number of commission errors from both the left and right participants =
Total commission errors of themselves + Total commission errors of the other
participants in their pair.
Appendix 2.2: Proportion Calculations

Pairs of participants were labelled as left participant and right participant. All of the following calculations were conducted first for the general interview questions, then for the spatial interview questions.

**Repetitions**

*Percentage of information given by the left participant in the replicate questions that was originally given by the left participant in the initial questions* = (Average repetitions made by left participant of the left participant x 100) / Average Initial details from left participant.

*Percentage of information given by the right participant in the replicate questions that was originally given by the right participant in the initial questions* = (Average repetitions made by right participant of the right participant x 100) / Average initial details from right participant.

*Average percentage of information repeated of themselves* = (Percentage of information given by the left participant in the replicate questions that was originally given by the left participant in the initial questions + Percentage of information given by the right participant in the replicate questions that was originally given by the right participant in the initial questions) / 2.

*Percentage of information given by the left participant in the replicate questions that was originally given by the right participant in the initial questions* = (Average repetitions made by left participant of the right participant x 100) / Average initial details from right participant.

*Percentage of information given by the right participant in the replicate questions that was originally given by the left participant in the initial questions* = (Average repetitions made by right participant of the left participant x 100) / Average initial details from left participant.
**Average percentage of information repeated of the other participant in their pair** =
(Percentage of information given by the left participant in the replicate questions that was originally given by the right participant in the initial questions + Percentage of information given by the right participant in the replicate questions that was originally given by the left participant in the initial questions) / 2.

**Omission errors**

**Percentage of information lost by the left participant in the replicate questions that was originally given by the left participant in the initial questions** = 100 – Percentage of information given by the left participant in the replicate questions that was originally given by the left participant in the initial questions.

**Percentage of information lost by the right participant in the replicate questions that was originally given by the right participant in the initial questions** = 100 – Percentage of information given by the right participant in the replicate questions that was originally given by the right participant in the initial questions.

**Average percentage of information omitted (lost) of themselves** = (Percentage of information lost by the left participant in the replicate questions that was originally given by the left participant in the initial questions + Percentage of information lost by the right participant in the replicate questions that was originally given by the right participant in the initial questions) / 2.

**Percentage of information lost by the left participant in the replicate questions that was originally given by the right participant in the initial questions** = 100 - Percentage of information given by the left participant in the replicate questions that was originally given by the right participant in the initial questions.

**Percentage of information lost by the right participant in the replicate questions that was originally given by the left participant in the initial questions** = 100 - Percentage of information given by the right participant in the replicate questions that was originally given by the left participant in the initial questions.
Average percentage of information omitted (lost) of the other participant in the pair
= (Percentage of information lost by the left participant in the replicate questions that was originally given by the right participant in the initial questions + Percentage of information lost by the right participant in the replicate questions that was originally given by the left participant in the initial questions) / 2.

Commission errors

Percentage of new information given by the left participant in the replicate questions that was not originally given by left participant in the initial questions = 100 – {(Average repetitions made by left participant of the left participant x 100) / Average replicate details from left participant}.

Percentage of new information given by the right participant in the replicate questions that was not originally given by right participant in the initial questions = 100 – {(Average repetitions made by right participant of the right participant x 100) / Average replicate details from right participant}.

Average percentage of information committed (added) of themselves = (Percentage of new information given by the left participant in the replicate questions that was not originally given by left participant in the initial questions + Percentage of new information given by the right participant in the replicate questions that was not originally given by right participant in the initial questions) / 2.

Percentage of new information given by the left participant in the replicate questions that was not originally given by right participant in the initial questions = 100 – {(Average repetitions made by left participant of the right participant x 100) / Average replicate details from left participant}.

Percentage of new information given by the right participant in the replicate questions that was not originally given by left participant in the initial questions = 100 – {(Average repetitions made by right participant of the left participant x 100) / Average replicate details from right participant}.
Average percentage of information committed (added) of the other participant in their pair = (Percentage of new information given by the left participant in the replicate questions that was not originally given by right participant in the initial questions + Percentage of new information given by the right participant in the replicate questions that was not originally given by left participant in the initial questions) / 2.
Appendix 2.3: Dominance Calculations

Initial interview questions
Proportion of information provided by the left participant during the initial interview questions = Average initial details from left participant / Total initial details.

Proportion of information provided by the right participant during the initial interview questions = Average initial details from right participant / Total initial details.

Replicate interview questions
Proportion of information provided by the left participant during the replicate interview questions = Average replicate details from left participant / Total replicate details.

Proportion of information provided by the right participant during the replicate interview questions = Average replicate details from right participant / Total initial details.

Equal dominance
Negative values from the variables computed below signify more than equal dominance, whereas positive values signify less than equal dominance. Zero represents equal dominance.

Dominance of left participant on the initial interview questions = 0.5 – Proportion of information provided by the left participant during the initial interview questions.

Dominance of right participant on the initial interview questions = 0.5 – Proportion of information provided by the right participant during the initial interview questions.

Dominance of left participant on the replicate interview questions = 0.5 – Proportion of information provided by the left participant during the replicate interview questions.
**Dominance of right participant on the replicate interview questions** = 0.5 – Proportion of information provided by the right participant during the replicate interview questions.

**Dominance change**

**Dominance change of left participant** = Proportion of information provided by the left participant during the initial interview questions – Proportion of information provided by the left participant during the replicate interview questions.

**Dominance change of right participant** = Proportion of information provided by the right participant during the initial interview questions – Proportion of information provided by the right participant during the replicate interview questions.

**Overall dominance change** = Dominance change of left participant x Dominance change of right participant.

The sign of the overall dominance change is ignored, with larger numbers for overall dominance representing a greater change in dominance.
Appendix 3.1: Number of Details (Condition 1) Examples

1. Truth-telling pair example (underlined information = details):

Describe a recent memorable day that you spent together hour by hour.

F: Umm... On the 3rd of July just gone we flew to Australia to see my family... Ermm... we left like the hotel at like 6 in the morning I think, coz our flight was at quarter to 9. Ermm so we got like one of those shuttle buses from the Hilton to... to... Heathrow... We flew from Heathrow... it was Heathrow wasn't it?

M: Yeah it was Heathrow, it wasn't Gatwick.

F: Terminal 4.

M: Yep.

F: And then we... I don't remember... I think it was gate 6 we flew from, coz I took a picture of it on my phone.

M: Yeah... but we... I thought we'd have loads of time there, but we really didn't. We had about half an hour in the airport before we had to get on the plane.

F: Which we spent buying stuff for mum (laughs).

M: Yeah! And...

F: Umm...what else? Then we waited there, got on the plane. The food was rubbish... Umm, we had to stop at Brunei... well first Dubai... on the way to Brunei... umm... I think it took 7 and a bit hours to get to Dubai, and then 7 more to get to Brunei, so by that point it was probably…
M: We had to get off the plane, and then go through security again, even though we'd been through security and hadn't left the airport so there didn't really seem like much point... Umm... yeah.

F: I don't really remember...

M: Didn't we have sweet and sour noodles for dinner?

F: Yeah. Sweet and sour noodles and then sweet and sour fried rice on the next flight which was... lovely (laughs). Umm, I can't remember what films we watched though, didn't we watch... that one that we really wanted to see with...

M: Friends...

F: Friends with kids or Friends with children?

M: Something like that.

F: Yeah. Not friends with benefits, it was a rubbish version of that with kids. Umm... I don't remember now... I don't remember what gate we were in Dubai or Brunei.

M: There was a crab, I remember that, like a little...

F: Oh yeah, yeah in Dubai (laughs).

M: In Dubai like a crab that came and...

F: An alarm clock... (laughs) oh yeah... Umm... what else? We should probably give some more information...

M: Yeah (laughs). Umm...
F: We were at the back of the plane, umm in 2 seats on their own coz we didn't want anyone smelly sitting next to us.

M: (Laughs).

F: But there weren't any toilets near us so we had to like go all the way to the front for the toilet.

M: Yeah... we were in seats 59H and 59K.

F: Yeah, in one row... Umm... oh and we had that bag of Doritos that nearly exploded.

M: Yeah because of the pressure it just kind of...

F: Yeah, we took a picture of it. And you were laughing for like 10 minutes... Umm... we didn't sleep on that flight either because it was our time.

2. Lying pair example (underlined information = details):

Describe a recent memorable day that you spent together hour by hour.

F: Okay... Last Thursday there was this charity thing going on and he got picked as well as Tara to do this um... Bush Tucker trial.

M: Yeah so eating creatures...

F: Yeah, it was hilarious (laughs).

M: ...and weird things and she came down to support me, or so I thought...

F: (Laughs).

M: Instead she was just sitting there, drinking, laughing at me, and yeah...
F: Yeah, so, um... He got drunk from 4 in order to prepare for this…

M: Well I had to drink, I couldn’t…

F: So well erm, that was quite funny... I wasn’t entirely sure whether he was going to get in. He ate a load of bugs and all those disgusting things, I decided I was not like, going to get … Was not going to let him kiss me for the rest of that day. Definitely. And err... after that we were both a little bit drunk so we decided to go to Pure. Was it Pure?

M: Yeah Pure.

F: Yeah we went to Pure. But there was only a couple of other friends… Was there a couple of other friends? I’m sure…

M: Yeah, Hope and Leanna came down as well…

F: Yeah, Hope and Leanna came down as well. And Hope and Leanna were together, so they were spending most of their time together, so it was nice coz we got to like dance a lot and everything… Together and it was quite crowded which was nice because I prefer crowded places (laughs).

M: To be honest I really enjoy going clubbing quite a lot. But she’s not really a clubbing kind of person…

F: Not too much.
Appendix 3.2: Number of Details (Condition 2) Examples

1. Truth-Telling Pair Example (underlined information = details):

*(TT) Can you describe in as much detail as possible your first date.*

M: Err... we were in the Winney and Henry in Weymouth where we're from. Umm...

F: Table at the top by the stairs (laughs).

M: Yeah. Umm... Err...

F: Both sat on the outside bit as well.

M: Yeah.

F: They had really tall chairs coz I couldn't sit on it properly coz I'm so short.

M: You had Pepsi...

F: Yeah coz I was driving.

M: Yeah you were driving. And I had Jack Daniels and coke.

*If you could carry on for me.*

F: Umm... I think he bought me a drink. Umm... which was nice, coz all of my friends were going ‘ooh he really likes you’. Umm…so I was like texting them while he was getting drinks and stuff, saying ‘oh he's buying me a drink’ and they were all going ‘ah yeah I told you so!’

*Okay and if you could carry on.*
M: Umm... yeah... And then we just... sat there talking... umm... I... did Jade come along eventually... or not? Or was that a different time?

F: Umm...

*And again if you could carry on.*

F: I think she might have done... oh we bumped into someone I think... like someone else that saw us and then... we only stayed there for like, a couple of hours, and then I felt a bit awkward so I was like ‘I'm gonna go home’, and he expected a lift and I didn't give him one, which I still feel guilty about now (laughs)... Coz that was a bit nasty.

2. **Lying Pair Example** (underlined information = details):

**(TT) Can you describe in as much detail as possible how you first met.**

M: Uhhhh...

F: (Laughs).

M: I don't really remember the first time we properly met... umm... we were at college umm... we were in the common room I remember that much... umm... I think I was messing around with my best friend... umm...

*Okay, can I stop you there and can you carry on?*

F: Umm... I thought he was a bit of a dick at first soo... I didn't really spend much time with him, I think it was because he was messing around. Umm... I just obviously kind of didn't wanna get too close to him because he was my best friend's boyfriend and not mine…

*Okay I'm going to stop you there, and if you could carry on.*
M: Ermm... (laughs) Ermm... I don't think we really had much to say to each other... ermm...coz she was my girlfriend's best friend and I didn't really know what to say to her... ermm...I think I was rather more interested in spending time with my girlfriend at the time...rather than talking to other people.

*Okay, and again if you can now carry on.*

F: Umm... I don't think it was very long when we first met, I think it was just like, it was in like a break between lessons so it was kind of like... just go and see all your friends and then you have to go... I think it used to be like 15 minutes so... probably didn't say much to him and... just kind of thought ‘what a dick’, and left (laughs).

*And if you can now carry on.*

M: Umm... yeah... I think that's pretty much it.
Appendix 3.3: Turn-Taking Cues (Condition 3) Examples

1. Truth-telling pair example (italicized = continuation; underlined = repetition; bold = waiting):

   (TT) Can you describe in as much detail as possible your last holiday or trip away together?

   F: Ermm... we went to Australia for 10 weeks to see my family, Buck, my mum, dad, brother, sister and like my uncle and his family. Um... we stayed with them the whole time in Mornington which is near Melbourne. Umm... we didn't really do much coz we didn't have much money, umm so we just helped....

   And if you could carry on.

   M: Umm... yeah, err we helped out around the house and umm, looked after her little sister, umm, we... I walked the dogs quite a lot as well umm... and...

   If you can carry on for me please.

   F: And the first Sunday we were there it was my little sisters first birthday party that they waited... coz they waited to have the party for us to get there. Umm... and we went... that was like in a little... just a little play barn place. Umm... and then we also went to Melbourne on the train on the Sunday.

   I'm gonna interrupt you there... and if you can carry on.
Yeah, we went to Melbourne which was really good... we got concession tickets on like the public transport coz there wasn't enough room in the car for us and Mia to go... and it was only 6 dollars 50 for like zone 1 and 2 which was like the bus and the train to the city all day so I thought that was pretty good. Umm... and while we were there we ended up walking to this weird museum of like film and games.

Sorry if I can stop you there and if you can carry on.

Umm... that was called like... ACMI I think and it was in Federation Square just opposite the train station and it had loads of weird exhibitions of old tellies and all of that... and then a... an Asian woman gave my little sister a balloon coz she was trying to grab it off her... (laughs)

Swap again please.

Yeah, and then we went down toward the train station where we got off and there was a dulux dog there, like a really big fluffy dulux dog... umm and Mia just went mental, like flapping her arms up and down and umm I managed to get quite a few paint samples, not that we needed them...

2. Lying Pair Example (italicised = continuation; underlined = repetition; bold = waiting):

(TT) Can you describe in as much detail as possible your last holiday or trip away together?

Well it wasn’t just us two it was like a group of our friends from erm... the same halls that we’re going to and it was just like a last minute thing, we just decided the night before that we were going to go to Southsea for a barbeque coz the weather was alright and things like that so erm... We woke up quite early and erm me and her ended up going to Tesco’s, we just bought a load of meat, different types of meat and a lot of alcohol, and then...
Okay can I swap you now?

F: Yeah err... yeah loads of meat and alcohol (laughs)... and it was... we it was erm... we went off with the others then even though we ended up leaving quite late despite the fact that we got to Tescos quite early because everyone else hadn’t got prepared so we had to wait quite a while but when we did go erm, was that the day? Yeah, that was the time we also went to the fair afterwards but anyway first of all when we were at the park, that was really nice we played a bit of football, even though I’m awful at that.

I’m sorry can I swap you again now please?

M: Yeah so... we played football and we just like chilling, we were eating, drinking, socialising, laughing, it was just, it was like a really good time coz erm we... we... all of us as a group we don’t really go out as much, like obviously me and her we see each other all the time but the rest we don’t really get to see that much so err...

Can I swap you again?

F: So it was really nice, we could play more team things and... And erm we played rounders... Was it rounders? Which was also quite embarrassing on my part, and erm, and then after that, was it? I’m sure it was you who was also lobbing around bits of meat from the barbeque and hitting them with the rackets which was disgusting...

M: That weren’t me...That was Callum.

F: That was Callum? Oh okay fine that’s alright then, you’re off the hook with that (laughs) coz that was gross and it landed on my top. And erm...then we went to the fair...

Okay can you swap now please?
M: **Err...** Yeah *so after that we just went to the, to the fair,* like to the... like where the arcades are and things like that *err* we spent a bit of time there and then really from there we kind of, we just came back here and we all decided to go out in the evening as well like to, like one of the places in Guildhall, we started off at, I think at Yates and then we made our way to Babylon.
Appendix A: Favourable Ethical Opinion (Chapters 3 and 4)

Part C  Information for Submissions to the Ethics Committee for Full Review

Title of proposed research
DETECTING...RECEPTION...IN...COUPLES...WORKING...COLLECTIVE INTERVIEWING...

Name of research ethics board: ZEBRA VETERINARY

This Ethics submission is for (please tick one of the following two options):

☑ 1) Full review for the first time

☐ 2) Expedited review (please tick one box)

   ☐ A revision in response to Ethics Committee feedback. Please attach an additional sheet that details your responses to the concerns listed previously, along with the original submission.
   ☐ Modification of already approved project – attach full previously approved proposal with a list of modifications or changes on a separate sheet
   ☐ Departmentally-funded master bursaries (or equivalent)
   ☐ Practicals (i.e. 1st or 2nd year undergraduate)
   ☐ M.Sc. unit with short deadlines (N.B. This does not include the dissertation)

Checklist for expedited and full reviews: Check that each of the following documents is enclosed with this form:
(a) Written responses to the items 1-19,
(b) Recruitment information (e.g. letters to parents, information sheet, Participant Pool poster, if applicable),
(c) Informed Consent Form (required),
(d) Debriefing Form (required),
(e) All questionnaires / Interview schedule – (if applicable).

Decision of Ethics Committee: Date: 10/11/17

☑ Favourable opinion

☑ Favourable opinion with provision [make the changes indicated on the proposal – no need to re-submit]. Please state in the posters that the interviews will be video- and sound-recorded. Please highlight this statement also in the informed consent form.

☐ Unfavourable opinion - consult with your supervisor, tutor and/or mentor to rectify or address the concerns noted on the proposal, then resubmit following the instructions below:

☐ No opinion possible [see proposal for details]

N.B. Revised proposals should be submitted in the Coursework box, Floor 1 King Henry Building. Remember to tick the first box under 2 above, tick the front sheet (Expedited review) and include (i) the original submission, (ii) the revised proposal (including a new cover sheet), and (iii) a list of your responses to the feedback.
Appendix B: Favourable Ethical Opinion (Chapter 5)

FAVOURABLE OPINION WITH MINOR AMENDMENTS

Proposal Title: Detecting Deception in Suspect’s and Alibi’s using a Collective Interviewing Approach

Dear Zarah,

Thank you for submitting your protocol for ethical review. The proposal has been on SFEC Moodle for two weeks for light touch review.

Your responses have been reviewed and I am pleased to inform you that your application has been given a favourable opinion subject to minor amendments by the Science Faculty Ethics Committee. Alongside the comments made by Maggie and myself on the attached proposal, please address the following comments from the external reviewers (many of which are similar).

1. More information is required on the nature of theft (locked office etc) and perhaps any future security issues this staging may cause

2. From where is the retention of raw data for 5 years after the study has concluded drawn?

3. There is reference to a pilot study (June) and then full study - more info on the pilot would be useful.

4. The debriefing form for those who did the activity is fine those who sought to deceive may need an opportunity to discuss what they were asked to do etc - this may give some useful insights for the researcher

Please send me AND psychologycourseadmin@port.ac.uk a final electronic version of your SFEC proposal and associated documents (Informed consent, debrief etc) with your responses to the comments listed at the top of the proposal and amendments highlighted within the text and you may go ahead with the research with no further action. We will place the final version on SFEC Moodle.

Good luck with the study,

Best wishes,

Dr Claire Nee
Psychology rep, Science Faculty Ethics Committee

CC -
Dr Chris Markham – Chair of SFEC
Sci.fil@port.ac.uk
psychologycourseadmin@port.ac.uk
Appendix C: Journal article published from Chapter 3

Collective Interviewing: Eliciting Cues to Deceive Using a Turn-Taking Approach

Zarah Vervenham, Aldert Vrij, Samantha Mann, Sharon Leal, and Jackie Hillman
University of Portsmouth

Group interviewing provides useful insight into the social indicators of deception. The present study investigated turn-taking as a technique for enhancing novel cues to deceit. “Turn-taking” is a technique whereby the interviewer states which of the 2 interviewees is to answer the question, and then intervenes every 20 s by stopping whichever of the interviewees is responding and asking the other interviewee in the pair to continue from the point to which their partner was stopped. In the present experiment, truth-tellers were real couples who had been in relationship for at least 1 year and cohabiting. Lying pairs were friends who pretended to be in a relationship for at least 1 year and cohabiting. All “couples” were interviewed together in their pairs about their real or fictitious relationship. It was found that when forced to turn-take, truth-telling pairs were significantly more able to continue on from one another, whereas lying pairs were significantly more likely to repeat what their partner last said before continuing. Additionally, lying pairs waited before speaking after being told to turn-take significantly more than truth-telling pairs. A subsequent lie detection study revealed that these 3 turn-taking cues improved people’s ability to accurately detect deceit considerably. Implications for simultaneous interviewing are discussed.

Keywords: deception, turn-taking, collective interviewing, cognitive load, lie detection

Deception research has primarily focused on interviewing single suspects, despite the fact that crimes are frequently committed by pairs or multiple offenders (McClain & Piquero, 2009; van Manen & Farrington, 2009). One reason for interviewing suspects individually is that police detectives traditionally separate suspects as soon as possible prior to interrogation to reduce opportunity for planning of responses (Kassin & Goffronsson, 2004). Consequently, several studies that have considered pairs of truth-tellers and pairs of liars have involved interviewing group members individually (e.g., Granberg, Stromwall, & Jonsson, 2003; Stromwall, Granberg, & Jonsson, 2005; Vrij, Leal, et al., 2009). Despite individual interviewing reflecting many real-life police interviewing contexts, there are several field settings in which collective interviewing (interviewing of two or more individuals together at the same time) would be more suited, for example, when there are multiple suspects but only one interviewer available, such as during police stop and searches, at road border controls where cars containing several people are checked, or at security checkpoints (e.g., airports). In such settings, it would make logical sense to interview people together about joint activities, because it would be a more timely and convenient means of gathering intelligence.

Each year, more than 200 million people cross the U.K. border, and each year, the U.K. Border Agency checks over 100 million people arriving at U.K. airports, and consider that there are around 3.5 million applicants to visit, live, work, and study in the U.K. (Home Office UK Border Agency, 2011–2015). Securing border control and controlling migration is important not only in the U.K. but also worldwide, for identifying threats from organized crime, terrorism, smuggling, trafficking, and illegal immigration, each of which frequently involves groups of individuals (Home Office UK Border Agency, 2010). Sometimes collective interviewing is part of an existing procedure for security reasons. For example, in Canada, customs officers carry out collective interviews at airports because groups are deemed to have “similar issues,” and thus if only one person in the group is examined, this could result in a wasted effort or a missed opportunity (A. Leach, Canadian former customs officer, personal communication, November 12, 2013).

In addition, in the United Kingdom, the situation occurs when one member of a couple is British and the other needs to seek British citizenship in order to be with their partner. In order to marry and achieve citizenship, couples are expected, at one potential stage, to be interviewed simultaneously. It is estimated that around 35,000 marriages in the United Kingdom every year involve a non-European Economic Area (EEA) national. The Home Office estimates that between 4,000 and 10,000 applications to stay in the United Kingdom are made on the basis of sham marriages (marriages of convenience, whereby the couple is not genuine; Home Office, 2013). Sham marriages are on the increase, and they frequently involve individual facilitators or organized crime groups that increase the profits for criminal activity (Home Office, 2013). If a sham marriage is uncovered, it often leads to imprisonment, with the non-EEA national being arrested and removed from the United Kingdom (Home Office, 2013). Because of the increasing problems and risks associated with immigration, the present study explored the application of collective interview-
Collective Interviewing

Collective interviewing is different from individual interviewing. Collective interviewing will determine deception at a social level rather than just at an individual level, and will enable the identification of cues to deceit that are present in groups, but cannot be explored in individuals, for example, cues stemming from suspects communicating and interacting with one another.

Recently, four studies have illustrated the clear potential for using collective interviewing to elicit cues to deceit. Vrij et al. (2012) found that pairs of truth tellers interrupted and corrected each other more than pairs of liars, as well as adding more information to each other’s accounts in comparison with pairs of liars. Vrij, Mann, et al. (2013) found that pairs of liars made more eye contact with the interviewer than pairs of truth tellers, whereas pairs of truth tellers looked more at each other than other pairs of liars. Driskell, Salas, and Driskell (2012) found that pairs of truth tellers illustrated more synchrony in behavior and exhibited more interactions (e.g., mutual eye gaze and verbal transitions) than pairs of liars, and Vrij, Hope, Mann, and Hillman (2013b) found that, compared with lying pairs, truth-telling pairs posed more questions to one another during a timeline task.

These four studies show that a collective approach can generate discrepancies between pairs of truth tellers and pairs of liars that can aid in the detection of deception, with communication cues and interaction cues (e.g., corrections, interruptions, eye contact, verbal transitions) being particularly indicative of deceit. Corrections, interruptions, and verbal transitions are unique to collective interviewing and cannot be measured when individuals are interviewed. Eye contact with the interviewer, of course, can be measured in individuals. However, whereas eye contact is not a diagnostic cue to deceit in individuals (DePaulo et al., 2003), it is a diagnostic cue to deceit when pairs of interviewees are interviewed (Sand, Vrij, Mann, et al., 2013). A possible reason why, in collective interviewing, truth tellers display less eye contact with interviewers than liars is that in collective interviews, truth tellers communicate more with each other than liars, and when people communicate with one another, they tend to look at each other (Sand, Vrij, Mann, et al., 2013). In sum, collective interviewing is different from interviewing individuals; thus, cues that are not diagnostic of deceit when individuals are interviewed may become diagnostic of deceit when dyads or groups are interviewed.

Memory: Collaborative and Transactive

A collective interview approach coincides with the upcoming trend in memory research that is starting to focus on collaborative learning and remembering. Collaborative memory refers to how people collectively recall information alongside others (Bargh & Pietra-Passini, 2010), and can be applied to deception research, particularly the strategies that truth tellers and liars employ. When pairs of truth tellers are asked to recall a shared event, they exhibit interactions that cannot be unrolled when interviewed individually, and these interactions tend to occur more frequently for the truth-telling pairs than for the lying pairs. Truth tellers prefer a "tell it all" strategy that aims to provide a detailed description of what actually occurred (Granberg, 2003; Vrij, Mann, Leal, & Granberg, 2010). Pairs of truth tellers will collectively recall information by sharing their experiences and communicating with one another (e.g., by posing questions to one another or correcting each other’s accounts; Sand, Vrij, Hope, et al., 2013; Vrij et al., 2012).

Liars’ dominant strategy is to prepare answers to possible questions and to keep their stories simple (Granberg, 2003; Strimwall et al., 2003; Vrij, Granberg, & Porter, 2010). Therefore, lying pairs tend to exhibit fewer interactions as they merely recall their fabricated story (Driskell et al., 2012; Vrij et al., 2012). In addition, when answering unexpected questions to which they have not prepared an answer for, lying pairs need to rely on their individual cognitive ability to create a story that makes sense and matches with what their partner is saying (Wegner, 1987). This latter activity can be mentally taxing and this cognitive load can be further increased by forced turn-taking.

Imposing Cognitive Load Through Turn-Taking

Previous deception research with individual liars and individual truth tellers has attempted to introduce new interview strategies that focus on the different psychological states experienced by liars and truth tellers. One of the strategies identified is “imposing cognitive load,” which has been found to elicit and magnify verbal and nonverbal cues to deception, making the differences between liars and truth tellers more pronounced (Vrij, Fisher, Mann, & Leal, 2006). Lying is often more mentally taxing than truth telling (Zuckerman, DePaulo, & Rosenthal, 1981), and perhaps particularly in interview settings, in part because lying includes more tasks than truth telling. Liars focus on their storytelling, but also on making a convincing impression and scrutinizing the interviewer to check whether they believe them (Buhrer & Borgoos, 1996). Truth tellers merely focus on their storytelling (Buhrer & Borgoos, 1996). Consequently, liars have fewer cognitive resources left over to cope when mentally taxing interventions are implemented into the interview schedules (Vrij et al., 2009).

When recalling information as a pair or group, the group members interact with each other, resulting in a naturally occurring turn-taking pattern (Sacks, Schegloff, & Jefferson, 1974). This pattern preserves who speaks next, and when another person continues, then stops, and the sequence is repeated with the other person then taking over again. This cyclical sequence back and forth between members of the group only finishes once all members have nothing else left to say. Turn-taking automatically shapes the communication and reporting of information among the group members, and consists of two essential characteristics: (a) frequency, which refers to the amount of times turn-taking occurs; and (b) control of contribution, which refers to the amount of control each individual has over what to say and how much to say (Woodburn, Arnett, Newell, & Proctor, 1991). The present experiment exploited this naturally occurring turn-taking speech pattern by introducing a mentally taxing intervention in which the interviewer forced turn-taking between the pairs within the collective interview. Forced turn-taking meant that the inter-
viewer stopped whichever member of the pair was recollecting, and asked the other member in the pair to continue from the point in which their partner was stopped. They did this repeatedly between the members until the pair had finished answering the interview question.

Forced turn-taking inhibits social interactions between pairs of interviewees and should be more cognitively demanding for lying pairs than for truth-telling pairs for several reasons. First, pair members are required to concentrate on what they are saying as well as what their partner is saying; the latter may be mentally difficult when the partner is telling a fabricated story. Second, forced turn-taking takes away pair members’ ability to choose who answers each of the questions, removing the effects of any dominant characters who tend to speak more frequently (Hing et al., 2007), an effect that is often present within close relationships (Dutch & Bugman, 2003). In lying pairs, it means that the pair member who is most eloquent or most comfortable with lying loses the ability to control the interview. Third, interrupting somebody’s turn has been found to violate the natural flow of recall and inhibit the ability of the individual to continue with their turn (Costa, 2004). Finally, forced turn-taking removes any retrieval strategy adopted by the pairs (Baidan, Baidan, Bryner, & Thomas, 1987). If the question is unanticipated and one person in the pair is forced to fabricate, the other individual in the pair is then forced to continue with that fabrication; hence, it requires the members of the pair to have rapid thinking and good improvisation skills (Vrij, Granhag, & Mann, 2009). If the pair lacks such skills, they will have difficulty continuing on from one another, requiring them to create more time to think before providing new information. Therefore, cues reflecting increased cognitive demand, such as repetitions and waiting, will be valuable in deception detection.

Lying pairs are already using more cognitive resources than truth-telling pairs, and the forced turn-taking technique will place a higher level of cognitive load onto each member of the pair. Consequently, forced turn-taking will be more demanding for lying pairs than truth-telling pairs, which will result in cues to deci et emerging, some of which have not yet been identified in deception research: continuations and repetitions. Speech-onset delays (waiting) are also likely to emerge when forced turn-taking is implemented.

**Deception Cue: Number of Details**

Deception research with individuals has found that individual truth tellers provide significantly more details when recalling events than individual liars (DePaulo et al., 2003; Vrij, 2008; Vrij, Granhag, et al., 2010). As a result, it is worthwhile to consider whether number of details remains a significant cue to deceit when more than one individual is interviewed together at the same time, and also when the turn-taking technique is implemented. We cannot think of any theoretical reasons as to why number of details will not be a cue to deceit in collective interviews. As is the case in individual interviews, in collective interviews, truth tellers should find it easier to provide details and should not fear that the extra detail will incriminate them. Overall, we believe turn-taking will act as a stimulant to say more, and so all pairs (truth tellers and liars) will feel they need to provide extra information when the interviewer asks them to swap and continue with the story. This is a similar notion to that postulated in Leal, Vrij, Warmink, Vernham, and Fisher (2013), who found that when a very detailed model statement was played to participants prior to them giving their own statements, number of details within the statements from both truth tellers and liars increased. We believe that differences between truth tellers and liars in the amount of details that are likely to arise in the non-turn-taking questions should also theoretically arise in the forced turn-taking questions.

**Experiment I**

**Hypotheses**

The overall aim of the present experiment was to investigate whether we could identify important cues to deceit and enhance the detection of deception in ‘couples’ (i.e., pairs) by forcing turn-taking (in a way of increasing cognitive load) into the interview schedule. It is hypothesized that forced turn-taking will impose cognitive load and thus be more difficult for lying pairs compared with truth-telling pairs. Consequently, truth-telling pairs will be significantly more able than lying pairs to instantly continue on from one another when forced to turn take; whereas lying pairs, perhaps to buy time on what to say, will be significantly more likely than truth-telling pairs to repeat what their partner last said before continuing when forced to turn take (Hypothesis 1).

Additionally, as a result of cognitive load, it is hypothesized that lying pairs will be significantly more likely than truth-telling pairs to wait (i.e., pause) when forced to turn take by the interviewer (Hypothesis 2). It is also hypothesized that the turn-taking interview questions will elicit more details than the non-turn-taking interview questions from the truth-telling and lying pairs together (Hypothesis 3). Based on the frequent research that shows that individual truth tellers provide significantly more details when recalling information than individual liars (Vrij, Mann, et al., 2010), it is also predicted that the total number of details provided will remain significantly greater for pairs of truth tellers than pairs of liars, regardless of whether the interview question involves the forced turn-taking technique (Hypothesis 4).

**Method**

Participants. A total of 92 participants (45 males and 47 females) from the University of Portsmouth took part in this study. The mean age was 23.64 years ($SD = 5.98$). A t test revealed that age significantly differed between truth-telling ($M = 24.77$ years, $SD = 7.02$) and lying pairs ($M = 20.32$ years, $SD = 3.04$), $t(65.23) = 4.005, p < .001$; however, when age was used as a covariate in all the preceding analyses, it did not change any of the experimental findings reported in the Results section. Truth-telling pairs ($N = 24$) were real couples who had been in a relationship for at least one year and cohabiting. Lying pairs ($N = 22$) were friends who were told only to take part as a pretend couple if they had never been intimate with one another and did not live together. The lying pairs had to be of the same sexual orientation, that is, of the opposite sex to one another if they were both heterosexual, and of the same sex if they were both homosexual. Of all 46 pairs who participated in this study, 45 were heterosexual and one was homosexual. The one homosexual pair was a lying couple.
Design. This study used a mixed design with Veracity (truth vs. lie) as the between-subjects factor and Turn-Taking (absent vs. present) as the within-subjects factor. Which three of the six questions were used as turn-taking questions differed for each pair and was controlled for so that the truth-telling group and the lying group were matched on turn-taking combinations. This counterbalancing technique removed any effects of question order from influencing the findings; thus, any significant differences found between pairs of truth tellers and pairs of liars would be a result of the forced turn-taking manipulation itself, not the order in which the turn-taking questions occurred.

Procedure. Upon arrival to the Psychology Department, all pairs were asked to go for coffee (paid for by the researchers) for approximately 30 min. They were instructed to prepare, during coffee, for the interview and talk about their “real” or “pretend” relationship, discussing (a) how they met, (b) how they spend time together, and (c) where they live (the interview then focused on these issues). They were also informed that they would be interviewed together at the same time. Therefore, if differences between truth tellers and liars were to emerge, this would not be because the collective interview setting took the pairs by surprise. Once the pairs returned to the department and stated they were ready to be interviewed, they individually completed pre-interview questionnaires. The pre-interview questionnaire asked participants to rate, on 7-point Likert scales, the sufficiency (ranging from [1] insufficient to [7] sufficient), quality (ranging from [1] very poor to [7] very good), and usefulness (ranging from [1] pointless to [7] useful) of their preparation discussion. It also asked the participants to rate how much they discussed with their partner what to say during the interview (ranging from [1] not at all to [7] thoroughly).

A collective interview in which pairs were interviewed together then took place. The interview was audio and video recorded. All interviews involved one interviewer who was blind to the veracity of the couple. The interview schedule comprised six interview questions (see Table 1) and included the turn-taking manipulation, which took place in three questions.

Forced turn-taking worked as follows: The interviewer stated which of the two participants was to answer the question (each participant was asked to start answering on one of the questions, and on the third occasion, the pair could choose who started answering), and then intervened every 20 s by stopping whichever of the participants was responding and asking the other participant in the pair to continue from the point in which their partner was stopped. This continued until the pair had finished answering the question. Therefore, although each participant only had 20 s (time frame decided based upon two previous pilot studies) on each turn to provide details, they could have as many turns as they wanted, and could continue providing detail until they indicated they no longer could take a turn and had no more information to give in response to the interview question. Each of the questions in Table 1 were possible forced turn-taking questions, and which three questions were used for forced turn-taking and which three were not was counterbalanced for each pair (hence turn-taking was a within-subjects manipulation). The three questions that did not involve the forced turn-taking manipulation instead promoted spontaneous speech and natural turn-taking. The task for all couples was to convince the interviewer that they were a bona fide couple who had been in a relationship for at least one year and were now living together. Thus, real couples just had to tell the truth, whereas pretend couples had to describe a fabricated relationship.

To motivate participants to perform well during the experiment, they were told that if they were believed by the interviewer, they would receive £S. However, if they were not believed, they would receive no money and would be required to write a statement about their relationship with the other individual in their pair.

Following participation, a post-interview questionnaire was completed individually, and at this stage, all participants were instructed to be truthful about their experience of the interview and the strategies they used. In this questionnaire, participants were asked to rate, on a 7-point Likert scale from [1] not at all likely to [7] very likely, the extent to which they felt motivated to appear convincing during the interview. They were also asked to rate their confidence in receiving £S and their confidence about whether or not they would have to write a statement (both on 7-point Likert scale from [1] not at all likely to [7] very likely).

Truth tellers were asked an additional open question about how long, in number of months, they had been in a romantic relationship with their interview partner. This relationship length variable was used in correlation analyses along with each of the turn-taking dependent variables as a means of examining whether or not relationship length was associated with any of the dependent variables and therefore confounding the effect of veracity.

Table 1
A List of Each of the Six Interview Questions Used in This Experiment

<table>
<thead>
<tr>
<th>Interview question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. &quot;Can you describe in as much detail as possible how and when you first met? Please give as much information as you can about your first interaction, the location you were at, and so on.&quot;</td>
</tr>
<tr>
<td>2. &quot;Can you describe in as much detail as possible your first date and when this was? Think about the location and the sights and sounds you experienced.&quot;</td>
</tr>
<tr>
<td>3. &quot;Describe your home.&quot;</td>
</tr>
<tr>
<td>4. &quot;Please draw the exterior of your bedroom on this piece of A3 paper . . . Now describe in as much detail as you can your bedroom starting from the left-hand wall and moving all the way around the outline. Please describe everything including furnishings, décor, etc.&quot;</td>
</tr>
<tr>
<td>5. &quot;Describe a recent memorable day that you spent together hour by hour (this must not be your wedding day if you are married).&quot;</td>
</tr>
<tr>
<td>6. &quot;Can you describe in as much detail as possible your last holiday or trip away together? Please give as much information as you can about the location, what you did, the sights you experienced, and so on.&quot;</td>
</tr>
</tbody>
</table>
Conversely, liars were given an additional postinterview questionnaire to explore whether they actually met the inclusion criteria and had not been in a previous intimate relationship with their interview partner. The first part of this questionnaire asked an open question about how long, in number of months, the liars had been friends with one another. It then measured, on four different 7-point Likert scales, how they rated their friendship with their interview partner. This included questions about friendliness (ranging from [1] strangers to [7] best friends), intimacy (ranging from [1] not at all to [7] intimate), importance (ranging from [1] unimportant to [7] important), and trustworthiness (ranging from [1] distrustful to [7] trusting). Each individual that made up the lying pair gave their own rating for each of the four questions. The ratings from the four questions were then added together to give a total friendship-closeness rating for each individual within each pair. The average rating for each pair was obtained providing an overall friendship-closeness score for each lying pair. The friendship length and the friendship-closeness variables were inputted into correlation analyses along with each of the turn-taking dependent variables to determine whether friendship length or friendship closeness were associated with any of the dependent variables and therefore confounding the effect of veracity.

To ensure that all participants were actually paid $5, the experimenter told them at the end of the experiment (following the postinterview questionnaire) that the interviewer believed they were telling the truth.

Coding. The interviews were each transcribed, and the interview transcripts coded by a rater who was blind to the hypotheses and veracity status of the pairs. Each of the six questions was coded separately.

The dependent variables—(a) number of swaps instigated by interviewer; (b) continuations when swapping; (c) repetitions when swapping; and (d) waiting before continuing or repeating after swapping—were coded only for the three interview questions in which the turn-taking manipulation was implemented. Number of swaps instigated by interviewer was the number of times the interviewer forced turn-taking between the members of the pair. Continuations when swapping and repetitions when swapping continue on from one another when the interviewer forced swapping, then this was counted as a continuation when swapping and the pair was given a score of 1 (the absence of a continuation was giving score of 0). If, when forced to turn-take, the member of the pair taking over first repeated any of the information that their partner last said before continuing with the story, then this was counted in a repetition when swapping and the pair was given a score of 1 (the absence of a repetition was given a score of 0).

Waiting before continuing or repeating after swapping was an objective measure based on whether each member of the pair immediately continued or repeated after swapping, or paused (e.g., “um,” “umm,” “err,” or a gap of nonspeech for 3 s or longer) before continuing or repeating after swapping. This was a dichotomous variable, that is, if the participant paused or stuttered when forced to take over from their partner, then this was counted as waiting and a score of 1 was given (if there was no waiting, a score of 0 was given). The frequency of each of these turn-taking variables was computed for each pair.

To take into account the number of swaps instigated by the interviewer, the turn-taking dependent variables—(a) total number of continuations when swapping, (b) total number of repetitions when swapping, and (c) total number of times members of the pair waited before continuing or repeating after swapping—were divided by the total number of swaps for each pair during the forced turn-taking questions. This created three new dependent variables that were inputted into the analyses: (a) average number of continuations per swap; (b) average number of repetitions per swap; and (c) average number of times participants waited before continuing or repeating per swap.

Verbal cues were coded using the total number of details provided for both the turn-taking and non-turn-taking interview questions. This meant that these three different frequencies could be computed: (a) total number of details for all six interview questions; (b) total number of details for the three turn-taking questions only; and (c) total number of details for the three non-turn-taking questions only. A detail was coded only if it was new information that had never been said previously by either member of the pair.

A second coder, also blind to the hypotheses and veracity status of the pairs, coded 16 of the 46 transcripts for each of the dependent variables: (a) total number of swaps instigated by interviewer; (b) total number of continuations when swapping; (c) total number of repetitions when swapping; (d) total waiting before continuing or repeating after swapping, and (e) total number of details. Interrater correlation coefficients (ICCs) were then calculated between the two individual raters for each of the five dependent variables. The interrater reliability between the two coders was very good with each of the ICCs, demonstrating a good agreement between the two raters (swaps instigated by interviewers, ICC = 1.00; continuations when swapping, ICC = 94; repetitions when swapping, ICC = 83; waiting before continuing or repeating after swapping, ICC = .86; number of details, ICC = .85).

Results

Prereview questionnaire. Four one-way ANOVAs were conducted to examine if there was a significant difference between truth tellers and liars in terms of how they rated their preparation discussion prior to being interviewed. There was no significant difference between truth tellers and liars in terms of how they rated their preparation discussion in terms of sufficiency, F(1, 90) = 0.11, p = .918, η² = .000, and being good, F(1, 90) = 0.959, p = .330, η² = .011. However, liars rated the preparation discussion as more meaningful (M = 4.89, SD = .96, 95% CI [.43, 6.36]) than truth tellers (M = 4.15, SD = 1.39, 95% CI [3.69, 4.60]), F(1, 90) = 27.645, p < .001, η² = .235. Liars also stated that they discussed with their partner about what to say during the interview significantly more thoroughly (M = 5.45, SD = .90, 95% CI [5.06, 5.88]) than truth tellers (M = 3.86, SD = 1.62, 95% CI [3.47, 4.24]), F(1, 90) = 33.304, p < .001, η² = .270.

Postinterview questionnaire: Motivation, manipulation checks, collective interviewing, and forced turn-taking. The vast majority of participants indicated that they were motivated to appear convincing during the interview, with 80.3% of the sample scoring 5 or higher on the 7-point Likert scale. Liars were significantly more motivated (M = 6.09, SD = .86, 95% CI [5.60, 6.58]) than truth tellers (M = 4.85, SD = 2.10, 95% CI [4.29, 5.32]) to appear convincing, F(1, 90) = 13.188, p < .001, η² = .128. In
terms of confidence, truth tellers reported that they were more confident ($M = 6.64, SD = 1.37, 95\% CI [5.61, 7.64]) than liars ($M = 4.48, SD = 1.68, 95\% CI [4.02, 4.93]) that they would receive 15, $F(1, 90) = 24.206, p < .001, \eta^2 = .212$. Truth tellers also believed they were less likely ($M = 2.71, SD = 1.73, 95\% CI [2.26, 3.16]) than liars ($M = 4.36, SD = 1.40, 95\% CI [3.89, 4.84]) to have to write a statement ($F(1, 90) = 25.282, p < .001, \eta^2 = .219$).

Hypotheses testing.

**Turn-taking variables.** A one-way ANOVA was conducted examining the difference between truth tellers and liars in terms of the total number of swaps instigated by the interviewer during the turn-taking questions. There was no significant difference between truth tellers ($M = 8.83, SD = 8.00, 95\% CI [5.94, 11.73]) and liars ($M = 9.05, SD = 5.78, 95\% CI [6.03, 12.07]) with regard to the total number of swaps, $F(1, 44) = .010, p = .919, \eta^2 = .000$. A one-factor between-subjects MANOVA was conducted with Veracity (truth vs. lie) as the only factor and average number of continuations per swap, average number of repetitions per swap, and average number of times participants waited before continuing or repeating per swap as the dependent variables. The MANOVA revealed a significant multivariate main effect for Veracity, Wilks’ $\lambda = .297, F(3, 45) = 34.207, p < .001, \eta^2 = .710$. Additionally, significant univariate main effects for Veracity were obtained for the average number of continuations per swap, $F(1, 44) = 10.419, p = .002, \eta^2 = .181$, average number of repetitions per swap, $F(1, 44) = 56.945, p < .001, \eta^2 = .564$; and average number of times participants waited before continuing or repeating per swap, $F(1, 44) = 24.818, p < .001, \eta^2 = .361$. Truth tellers were able to continue their story significantly more often than liars when instructed to swap by the interviewer ($M = .70, SD = .30, 95\% CI [.56, .82]$) and $M = .44, SD = .19, 95\% CI [.31, .55]$, respectively), whereas liars were significantly more likely to repeat what their partner last said then continue when instructed to swap by the interviewer ($M = .52, SD = .21, 95\% CI [.45, .60]$, in comparison with truth tellers ($M = .33, SD = .14, 95\% CI [.06, .21]$). This supports Hypothesis 1. Furthermore, when asked to swap by the interviewer, liars waited before speaking significantly more often than truth tellers ($M = .71, SD = .24, 95\% CI [.60, .82]$; and $M = .33, SD = .27, 95\% CI [.22, .43]$, respectively), supporting Hypothesis 2.

Three discriminant analyses were conducted on each of the three significant turn-taking variables separately to investigate the nature of their relationship with Veracity. The discriminant analyses revealed that all three turn-taking variables were individually significant predictors of Veracity when number of swaps was once again taken into consideration (see Table 2). The cross-validated classification results revealed high accuracy rates (around the 80% mark) for all three variables.

**Verbal cues: Total number of details.** A mixed-design ANOVA was conducted with the turn-taking manipulation as the within-subjects factor, comprising two levels: total number of details within the three turn-taking questions for each pair and total number of details within the three non-turn-taking questions for each pair. Veracity was the between-subjects factor. Turn-taking had a significant effect on the total number of details provided by each pair, $F(1, 44) = 7.982, p = .007, \eta^2 = .154$, with all pairs together providing significantly more details on the turn-taking questions ($M = 209.54, SD = 103.73, 95\% CI [178.74, 240.35]$) compared with the non-turn-taking questions ($M = 168.02, SD = 94.31, 95\% CI [140.01, 196.03]$). This supports Hypothesis 3. Veracity also had a significant effect on the total number of details provided by each pair, $F(1, 44) = 4.052, p = .050, \eta^2 = .084$, with pairs of truth tellers ($M = 242.75, SD = 183.02, 95\% CI [255.44, 493.06]$) providing significantly more details overall than pairs of liars ($M = 338.09, SD = 145.29, 95\% CI [234.74, 437.44]$). The Turn-Taking × Veracity interaction effect was not significant, $F(1, 44) = 2.07, p = .151, \eta^2 = .051$.

**Truth-telling pair’s relationship status.** Pearson’s correlation analyses were conducted to test the association between relationship length and each of the turn-taking dependent variables. The correlation revealed that there were no significant associations between relationship length ($M = 41.92, SD = 44.74$, and total number of swaps, $r(22) = -.191, p = .328$; average number of repetitions per swap, $r(22) = -.190, p = .328$; and average number of times participants waited before continuing or repeating per swap, $r(22) = .243, p = .252$. Hence, no links were found between relationship length and turn-taking.

**Lying pair’s relationship status.** Analyses from the liars’ self-reports about how friendly they actually were as a pair indicated that the lying pairs reported being friendlier than was desired for the inclusion criteria of this study. That is, they were recruited as a pair only if they stated they were friends who were of the same sexual orientation, who had never been intimate, never been in a romantic relationship, and never lived together. However, liars obtained a mean of 5.73 ($SD = .95, 95\% CI [5.44, 6.02]$) for friendliness on a Likert scale of 1 (unfriendly) to 7 (best friends); a mean of 4.31 ($SD = 1.23, 95\% CI [4.03, 4.60]$) for intimacy on a Likert scale of 1 (unimportant) to 7 (important); and a mean of 6.07 ($SD = 1.21, 95\% CI [5.70, 6.44]$) for how trusting they were of their partner on a Likert scale of 1 (untrusting) to 7 (trusting). Despite this, the results were still significant, demonstrating that even when good friends lie together, cues to deceit still emerge in a collective interview situation. This strengthens the effect that veracity had on each of the dependent variables. Furthermore, Pearson’s correlation analyses were conducted to test the association between friend closeness and each of the turn-taking dependent variables. The correlations revealed that there were no significant associations between friendship closeness ($M = 22.61, SD = 3.27$) and total number of swaps, $r(20) = -.094, p = .199$; average number of continuations per swap, $r(20) = -.174, p = .438$; average number of repetitions per swap, $r(20) = .208, p = .332$; and average number of times participants waited before continuing or repeating per swap, $r(20) = -.240, p = .489$. Pearson’s correlation analyses were also conducted to test the association between relationship length and each of the turn-taking dependent variables. The correlations revealed that there were no

---

**1** Despite the interaction effect not being significant, a significant difference was found between pairs of truth tellers and pairs of liars in terms of how many details they provided in the non-turn-taking questions, $F(1, 44) = 4.335, p = .042, \eta^2 = .090$, but not in terms of how many details they provided in the turn-taking questions, $F(1, 44) = 1.978, p = .167, \eta^2 = .043$. Hypothesis 4 cannot be supported.
Table 2
Classification Results for Each of the Turn-Taking Variables When Taking Total Number of Swaps Into Account

<table>
<thead>
<tr>
<th>Turn-taking variable</th>
<th>Chi square</th>
<th>Wilks’ lambda (significance)</th>
<th>Percentage of total cases correctly classified</th>
<th>Percentage of truth tellers correctly classified</th>
<th>Percentage of liars correctly classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuations per swap</td>
<td>9.245</td>
<td>.099 (.002)</td>
<td>76.1%</td>
<td>79.2%</td>
<td>72.7%</td>
</tr>
<tr>
<td>Repetitions per swap</td>
<td>16.122</td>
<td>.246 (.001)</td>
<td>84.4%</td>
<td>91.2%</td>
<td>77.9%</td>
</tr>
<tr>
<td>Waiting per swap</td>
<td>19.437</td>
<td>.039 (.001)</td>
<td>82.6%</td>
<td>79.2%</td>
<td>86.6%</td>
</tr>
</tbody>
</table>

significant associations between friendship length ($M = 14.39$, $SD = 14.30$) and total number of swaps, $r(20) = - .051$, $p = .754$; average number of continuations per swap, $r(20) = .017$, $p = .841$; average number of repetitions per swap, $r(20) = .043$, $p = .851$; and average number of times participants waited before continuing or repeating per swap, $r(20) = .053$, $p = .813$. These analyses suggest that neither friendship closeness nor friendship length were related to turn-taking.

Discussion

Hypotheses 1 and 2: Turn-taking variables. Truth-telling pairs were able to continue their story significantly more often than lying pairs when forced to swap by the interviewer (Hypothesis 1). Additionally, lying pairs were significantly more likely than truth-telling pairs to repeat what their partner last said when forced to swap by the interviewer (Hypothesis 2). Forced turn-taking eliminates the interviewer’s control, removes any retrival strategies the pair are using (Bulman et al., 1997), and disrupts the natural flow of recall, inhibiting the individuals’ ability to spontaneously continue when forced to swap (Coates, 2004). The ability to continue on from one another when forced to turn-take is easier for truth tellers because they both actually experienced the event and know what one another are reporting. They are using their memory to collectively recall a shared event (Bajram & Pevara-Pasato, 2019). Conversely, liars face difficulty in this forced turn-taking and buy themselves time by waiting before speaking and by repeating what their interview partner last said.

The combination of waiting and repetition, displayed by liars, further demonstrates how difficult the forced turn-taking task was for them. It provides insight into liars’ metacognition about making a credible impression. Liars are probably aware that waiting too long before answering makes a suspicious impression on observers (Global Deception Team, 2006; Sittenfeld, Granhag, & Hare, 2004; Vrij, Aleckurth, & Knight, 2008), and they therefore decide not to wait too long. However, because they still do not know what to say, they buy further time by repeating what the other person had said.

Hypotheses 3 and 4: Number of details and turn-taking. The pairs of participants provided significantly more details on the turn-taking questions than the non-turn-taking questions (Hypothesis 3). The increased number of details from the turn-taking interview questions is likely to be because the pairs felt they needed to provide extra information when the interviewer forced them to swap and continue with the story. This turn-taking technique thus acted as a hidden stimulation to say more. This is similar to Leal et al. (2012), who found that presenting a very detailed model statement increased the amount of detail reported by both truth tellers and liars. Truth tellers used the model statement to get an idea of the types of information they needed to provide, which increased their recall. Apparently, liars also felt they needed to talk more as a response to the detailed model statement. This is, for investigative interviewing, an important finding because the main aim of such interviews is to gather information (Bull, 2010; Fisher, 2010; Metzner, Redlich, Bhatt, & Brandon, 2012). If a technique can be implemented into the interview schedule that results in more details being provided by truth tellers, it gives investigators more opportunity to check that their statement is correct. In the case of liars, it will increase the chances of them “slipping up” and saying information that is inconsistent.

Pairs of truth tellers did provide significantly more details than pairs of liars on the non-turn-taking questions. This is consistent with previous research that has frequently found number of details to be a significant cue when distinguishing individual truth tellers from individual liars (DePaulo et al., 2003). This is not surprising because, like individual truth tellers, pairs of truth tellers actually experienced the event, so the recall of information is less difficult and the truth tellers do not fear that any extra detail will incriminate them (Vrij, 2008). Lying pairs, on the other hand, are fabricating their story, making it more difficult to recall. They are also fearful of saying something that will incriminate them.

Pairs of truth tellers and pairs of liars provided a similar number of details when answering the turn-taking interview questions (rejecting Hypothesis 4). Because number of details successfully discriminated between pairs of truth tellers and pairs of liars in the non-turn-taking questions, but not in the turn-taking questions, this suggests that forced turn-taking makes the cue “more turn-taking” less reliable. We do not think this is problematic. First, because number of details remained a cue to deceit in the non-turn-taking questions, investigators can introduce forced turn-taking in conjunction with non-turn-taking, so that in the non-turn-taking questions, the investigators focus on detail, and in the forced turn-taking questions, they focus on the turn-taking dependent variables. In addition, it could be argued that there will be a cognitive overload for an investigator to focus on the three turn-taking dependent variables as well as on the total number of details in the forced turn-taking questions, making examination of the number of details perhaps redundant when turn-taking is implemented.

Experiment 2: Discriminating Between Truths and Lies

The fact that collective interviewing reveals new cues to deceit that have not yet been identified does not automatically mean that
observers will be able to discriminate better between pairs of truth tellers and pairs of liars when they are informed about the turn-taking cues. This second experiment therefore investigated whether the turn-taking cues developed during the first experiment could be accurately identified so that hypothesis could correctly classify pairs based upon their veracity. This is a relevant addition to the research, as someone could argue that the cues obtained in the first experiment are only relevant if observers are able to spot these cues. We believe that the cues—continuations, repetitions, and waiting—can be easily recognized, allowing for observers to accurately discriminate between the pairs and detect deceit. Therefore, it is hypothesized that observers being informed about continuations, repetitions, and waiting during the turn-taking interview questions will be better able to discriminate between pairs of truth tellers and pairs of liars compared with observers who only have access to the non-turn-taking interview questions or who have access to the turn-taking interview questions but are not informed about the turn-taking cues (Hypothesis 5).

Method

Participants. A total of 80 observers with a mean age of 35.33 years (SD = 13.41) took part in this study: 40 were male and 50 were female. Of the 80 observers, 29 were single, 25 were in a relationship, 3 were engaged, and 31 were married. An analysis of covariance demonstrated that the relationship status of the observers had no effect on the results obtained in this second experiment. All observers who took part in this lie-detection experiment were volunteers who were not compensated for participating. Additionally, they had not partaken as part of any couple in the first experiment.

Design. This study used a 2 × 2 between-subjects design with Condition (non-turn-taking vs. turn-taking control vs. turn-taking cues) as the first between-subjects factor and Veracity (truth vs. lie) as the second between-subjects factor. A total of 80 observers were randomly allocated to one of three conditions (30 observers in each condition). Observers read only one interview transcript consisting of three interview questions with responses from either one real (truth-telling) or one pretend (lying) couple. Hence, within each condition, 15 observers judged a lying couple and 15 different observers judged a truth-telling couple. Of the 48 transcripts obtained in Experiment 1, one truth-telling pair and one lying pair were used as examples, leaving 44 transcripts to be judged in Experiment 2, consisting of 21 lying pairs and 23 truth-telling pairs. Each transcript was divided into two parts: A non-turn-taking part and a turn-taking part. This resulted in 21 lying non-turn-taking parts, 23 truth-telling non-turn-taking parts, 21 lying turn-taking parts, and 23 truth-telling turn-taking parts. In Condition 1 (non-turn-taking), observers were required to judge veracity when the turn-taking technique was not implemented, whereas in Condition 2 (turn-taking control) and Condition 3 (turn-taking cues) the turn-taking manipulation was implemented. For Condition 1 (non-turn-taking), 15 of the 21 lying transcripts and 15 of the 23 truth-telling transcripts were randomly used. For Condition 2 (turn-taking control) and Condition 3 (turn-taking cues) the turn-taking manipulation was implemented. For Condition 2 (turn-taking control), 15 of the 21 lying transcripts and 15 of the 23 truth-telling transcripts were randomly used. For Condition 3 (turn-taking cues), 20 lying transcripts and 30 truth-telling transcripts were used (60 in total) from the 21 lying and 23 truth-telling transcripts available (44 in total). This means that a random sample of 16 turn-taking transcripts was used twice in Conditions 2 and 3, but no transcript was used twice in the same condition.

That is, the same transcript could be used in Conditions 2 and 3, but never twice in Condition 2 or twice in Condition 3.

Procedure. Observers were recruited using an opportunity sample, and were asked to read and sign an informed consent form. They first completed a few demographic details and were then allocated to one of the three conditions and given instructions to read, depending on what condition they were allocated. All instructions told the observers about the first experiment, stating that truth-telling couples and lying couples had been interviewed in pairs about their "real" or "pretend" relationship, and that their task was to now read a transcript and judge the veracity of the pair being questioned in their transcript. The instructions then described specific cues the observers were to look for, depending on their condition.

In Condition 1 (non-turn-taking), observers were told that number of details often distinguishes truth tellers from liars (an accurate fact; DiPaulo et al., 2003), with truth tellers providing more details than liars. They were informed of the different types of details that may be present and shown an example response from both a truth-telling pair and a lying pair in which different types of details were highlighted (see Appendix A). They were then required to read one transcript that did not include the turn-taking manipulation and asked to judge, based on number of details, whether they thought the pair being interviewed was a truth-telling couple or a lying pair.

In Condition 2 (turn-taking control), observers were again told that number of details often distinguishes truth tellers from liars, with truth tellers providing more details than liars. They were informed about the turn-taking manipulation and of the different types of details that may be present. They were then shown an example response from both a truth-telling pair and a lying pair when turn-taking was implemented into the interview schedule, and the different types of details were again highlighted (see Appendix B). They were then required to read one transcript with the turn-taking manipulation present. Observers were once again asked to judge, based on number of details, whether they thought the pair being interviewed was a truth-telling couple or a lying pair. This instruction meant that the observers in Conditions 1 and 2 were asked to judge detail globally and subjectively, rather than objectively through counting every single detail. Research has demonstrated that observers can make accurate subjective judgments of the number of details that appear in a statement (Vu), Evans, Akrhurst, & Mann, 2004).

In Condition 3 (turn-taking cues), observers were informed about turn-taking and instructed to look out for three turn-taking cues: continuations, repetitions, and waiting. Each of the cues were defined and the observers were informed that these cues tend to occur more often among truth-telling pairs, whereas repetitions and waiting tend to occur more often among lying pairs. They were provided with an example response from both a truth-telling couple and a lying pair and asked to judge, based on number of turn-taking manipulations, whether they thought the pair being interviewed was a truth-telling couple or a lying pair. Each of the turn-taking cues were not explicitly stated within the transcripts that the observers were asked to read; instead, observers merely used the defini-
tions of the cues they were provided with to identify whether the cues were present in their transcript. Waiting was illustrated on the transcripts by utterances such as "erm" and "umm" or by "..." (which was indicative of a pause of 3 s or longer).

In all conditions, observers were asked to report what cues they had used to make their veracity judgment. This was an open-ended question recorded qualitatively. Participation took approximately 15 min.

Interview transcripts were chosen as the materials of this lie detection study (as opposed to video clips) because we wanted to be sure the observers focused only on the verbal content of what the pairs were saying as opposed to the nonverbal content and how the pair behaved. By focusing on the text and speech only, the pure effect and the potential of the turn-taking manipulation could be observed without the observers being influenced by other factors.

The cues reported to have been used by the 96 observers were coded and computed per condition. A total of 13 different cues were mentioned by the observers: number of details, unnecessary details, continuations, repetitions, waiting, consistency, plausibility, feelings, equality, lack of memory, cross-checking of information, own relationship beliefs, and natural interactions. Each cue could only be mentioned once by each observer. To measure the reliability of the coding, a second coder coded the cues reported by 24 observers (eight observers from each condition). An interrater reliability analysis, using the Kappa statistic, revealed high agreement between the two raters in allocating the cues to the 13 categories (κ = .683, p < .001). Manipulation checks were conducted to explore what cues observers were using in each of the three conditions. Additionally, both truth accuracy (truth transcripts) and lie accuracy (deceptive transcripts) were measured for all 96 observers by giving the observer a score of 1 if their veracity judgment was correct and a score of 0 if their veracity judgment was incorrect.

Results

Manipulation check: What cues do observers use to make their veracity judgment? To explore what cues the observers were using to make their veracity judgment, a MANOVA was conducted with Condition (non-turn-taking vs. turn-taking control vs. turn-taking cues) as the only factor and each of the 13 cues as the dependent variables. The MANOVA revealed a significant multivariate main effect for Condition, Wilks’ Λ = .276, F(26, 150) = 5.205, p < .001, η² = .474. Additionally, significant univariate main effects for Condition were obtained for six of the 13 cues (see Table 3).

Table 3: Cues Used by Observers That Significantly Differed Across the Three Conditions

<table>
<thead>
<tr>
<th></th>
<th>Condition 1 (non-turn-taking)</th>
<th>Condition 2 (turn-taking control)</th>
<th>Condition 3 (turn-taking cues)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Details</td>
<td>40°n</td>
<td>.18</td>
<td>80°n</td>
</tr>
<tr>
<td>Unnecessary details</td>
<td>63°n</td>
<td>.18</td>
<td>50°n</td>
</tr>
<tr>
<td>Continuations</td>
<td>90°n</td>
<td>.00</td>
<td>25°n</td>
</tr>
<tr>
<td>Repetitions</td>
<td>80°n</td>
<td>.00</td>
<td>50°n</td>
</tr>
<tr>
<td>Waiting</td>
<td>17°n</td>
<td>.38</td>
<td>10°n</td>
</tr>
<tr>
<td>Consistency</td>
<td>13°n</td>
<td>.35</td>
<td>10°n</td>
</tr>
</tbody>
</table>

Note: Only means (in rows) with different superscripts differ significantly from each other (p < .05).
Discussion

Experiment 2 demonstrated that asking participants to use the turn-taking cues to detect deception facilitated their ability to discriminate between pairs of truth tellers and pairs of liars. Participants who were given a transcript involving the turn-taking manipulation and instructed to look for the three turn-taking cues (continuations, repetitions, waiting) were better at distinguishing between truth-telling pairs and lying pairs than those participants who were not given the turn-taking manipulation or were given the turn-taking manipulation but not informed of the three turn-taking cues (Hypothesis 5). In fact, the accuracy rate for both truths (73.3%) and lies (80%) were very high for the observers who were informed about the turn-taking cues and among the highest accuracy rates ever found in verbal lie detection research (see Vrij, 2008 for overviews of such research).

These high accuracy rates reflect the clear potential of forced turn-taking in the ability to distinguish between pairs of truth tellers and pairs of liars. Demonstrating this true potential is necessary, but this is only a first step. The next logical step would be to examine what accuracy rates would be achieved in real-life interviews. Until then, caution should be made when interpreting the high accuracy levels, because we cannot say for certain whether similar accuracy rates will be obtained in such real-life interviews. Perhaps real-life interviews will enable investigators to discriminate between liars and truths even better than when interview transcripts are used, because a strong, yet unidentified, diagnostic cue to deceit could emerge in such settings in addition to the cues examined in the present experiment. Alternatively, the real-time interviews will create noise and will lead to lower accuracy rates, either through the interpretation of nondiagnostic nonverbal cues or because the observers will use their own first impression of the pair to judge whether the pair was a real or pretend couple (Ambady & Rosenthal, 1990; Barney, Carlson, & Hall, 2007).

General Discussion

We examined the use of a collective interviewing approach in the detection of deception, with a turn-taking manipulation being implemented within the interview to increase cognitive load. It was found that a turn-taking elicited novel and detectable cues to deceit that significantly discriminated between pairs of truth tellers and pairs of liars. These cues were continuations, repetitions, and waiting, and each achieved impressive accuracy levels.

Additional Forced Turn-Taking Manipulations

The forced turn-taking technique used in the present study clearly elicited new cues that were indicative of deceit in pairs of interviewees. However, there are implications for further manipulations using the forced turn-taking technique. First, more than two interviewees could be interviewed at the same time and the turn-taking implemented among all group members. We expect the same findings as we found here, because such a situation will not change the underlying principle of forced turn-taking. Second, interviewees could be informed that forced turn-taking is going to take place, and it could be examined how this affects the variables identified in the present study and/or the strategies employed by truth tellers and liars. In terms of strategy, the problem liars have in that they do not know which questions will be asked. However, to "beat" the forced turn-taking manipulation, they should come up with a strategy that also works when questions are asked that they have not expected. We think this will be a challenging task. Third, instructions could be implemented into the turn-taking manipulation, for example, by telling the pairs or groups that they must not repeat information when asked to stop and/or that they must swap as quickly as possible. This should further enhance the cognitive load that liars experience when confronted with forced turn-taking.

Additional Collective Interview Settings and Manipulations

Future studies should consider alternative settings in which collective interviewing could be implemented. For example, police stop-and-search scenarios, insurance claims, road border control, and security checkpoints. We think that the findings of the present study could be applied to other environments because the theoretical rationales on which the findings are based (i.e., cognitive load) will remain the same regardless of the setting in which two or more people are being interviewed together. Additionally, it would be interesting to explore the effect that the turn-taking manipulation has when multiple witnesses are interviewed together at the same time, as opposed to multiple suspects.

To emphasize, we are not suggesting collective interviewing should replace individual interviewing; instead, we suggest that it be employed as a new or additional approach to individual interviewing. Therefore, the collective interview could be used in isolation, whereby if the group raises suspicion in a collective interview, investigators take the required actions they would normally take after interviewing individuals who raise suspicion (e.g., calling for assistance, collecting further evidence). Alternatively, collective interviewing could act as an initial screening process to determine whether suspects then need to be interviewed individually. Collective interviewing is not just limited to pairs—it can also be applied when interviewing more than two suspects.

The present study assumed equal status between the pairs. In real life, situations occur in which one member has a higher status with a greater degree of responsibility and esteem than the other member. Future studies should consider pairs or groups with varying degrees of status to explore how this influences collective interview situations. In addition, in real life, it could be that an adult backs up the story of a suspect, by pretending to be with the suspect at a given time when this was not the case. In this example, the adult can be truthful about their activities, while the suspect has to completely lie about their activities. Importantly, although suspect-adult situations may have an effect on natural turn-taking, we do not think that it will influence forced turn-taking, as in the latter situation, the pair members can no longer control which pair member provides which piece of information.

Methodological Considerations

Two methodological issues deserve further discussion. First, with hindsight, it is perhaps unfortunate that the status of the truth teller's relationship was not documented. That is, the degree to which the truth tellers were intimate, friendly, trusting, and important to one another was not recorded as it was with the lying pairs in the study. Truth-telling couples are likely to differ on these
four closeness variables depending on how they feel within their relationship and on the stage they are at within their relationship (e.g., engagement vs. marriage; children vs. no children); therefore, it could be that intimacy, friendliness, trustfulness, and importance influence truth tellers’ ability to continue each other’s train of thought when forced to turn-taking. Had the truth tellers been asked more about their relationship at the time of the experiment, then the degree of intimacy, friendliness, trustfulness, and importance could have been used as control variables strengthening the findings obtained. Nevertheless, the length of the relationship (which is perhaps an indicator of relationship stage) was recorded, and analyses of relationship length demonstrated that this was not associated with the truth-telling pair’s ability to take turns. In addition, although relationship closeness was not measured in truth tellers, it was measured in liars but did not correlate with any of the turn-taking dependent variables, implying that relationship closeness is not associated with a pair’s ability to take turns.

Second, the truth-telling pairs always told a story about their real romantic relationship, whereas the lying pairs always told a false story about a fictitious romantic relationship. This means that not only did veracity differ between the two conditions, but so did relationship status. Therefore, it may well be that the findings obtained were related to truth-telling pairs having more experience of communicating shared events with one another. Despite this, the lying pairs were friends who were closer to one another and more familiar with one another than required to meet the study criteria (as discussed in the Results section). This strengthens the findings obtained. Furthermore, neither the friendship closeness nor the friendship length of the lying pairs was associated with turn-taking. Hence, it would seem that it is veracity that influences turn-taking ability, not relationship status. Using pairs of individual liars who were friends and familiar with one another makes the study more applicable to real life, whereby pairs pretending to be in a relationship, for example, during immigration interviews, are likely to be known to each other and not complete strangers.

Policy Implication

The main aim for immigration agencies is to distinguish between genuine couples and fake couples. Given the high number of marriages that involve a non-EAA national believed to be a sham (4,000 to 10,000 in the United Kingdom; Home Office, 2013), and the connection that sham marriages have with organized crime groups and increased criminality, it is important to reduce the chances of these occurring. In 2013, the Home Office identified the need for increased interviewing of immigration applicants to help “root out abuse of British visas and improve the integrity of our immigration system” (Home Office, 2013, p. 48). When the genuineness of a relationship is being investigated, documentary evidence is examined, the couple is interviewed in depth, and/or a home visit will occur. It is during the investigative stages that techniques need to be implemented in order to detect potential sham relationships and prevent them from occurring. Collective interviewing and the implementation of forced turn-taking is one method that could increase the detection accuracy of genuine and fake relationships, and this is important because it will help with the identification of sham relationships and with the possible prosecution of those who may be involved in criminal activity (including organized crime, trafficking, perjury, and facilitating or conspiring to illegal immigration).

Theoretical Implications

The present study fills a gap within the deception literature in which group deceit has been ignored. Specifically, this research provides support for previous collective interviewing studies of deception (e.g., Drikski et al., 2012; Jundt, Vrij, Hope, et al., 2012; Jundt, Vrij, Mann, et al., 2013; Vrij et al., 2012) and shows the potential for exploring the social indicators, as well as the individual indicators, of deception. Additionally, a collective approach fits well with the forthcoming research in the memory literature that focuses on collective memory and collaborative recall (e.g., Barnett & Sutton, 2008; Blumen, Rajaram, & Henkel, 2013; Harris, Parson, & Kemp, 2008). Of particular relevance to the current study is that of transactive memory theory, which postulates that people who are actually in a close relationship (truth tellers) share remembering (Nogoe, 1987), thus knowing one another’s memory expertise, that is, each person in the pair knows what they are to remember as well as what the other person in their pair is to remember (Hollingshead & Brandon, 2003). Consequently, encoding, storing, and recalling information is more interactive and communicative between members of a pair that is recalling an actual shared event compared with a pair that is recalling a fabricated event. These interactive and communicative behaviors during joint recall have been associated with the development of other cues indicative of truthfulness, including posing questions to one another, providing cues to one another, handing over remembering responsibility, and finishing each other’s sentences (Vernum, Vrij, Lead, Mann, & Hillman, 2014).

Conclusions

The present study demonstrated that forced turn-taking can be an efficient method for eliciting cues to deceit, and that these cues can only be detected within a collective interview setting in which two or more individuals are interviewed together at the same time. Continuations when turn-taking, repetitions when turn-taking, and waiting when turn-taking can be used as cues to deceit that are easy and quick for investigators (and laypersons) to notice.

References


Ball, R. (2010). The investigative interviewing of children and other vulnerable witnesses: Psychological research and working/professional
Appendix A

Examples: Number of Details (Condition 1)

1. Truth-Telling Pair Example (Italicized Information = Details)

Describe a recent memorable day that you spent together hour by hour.

F: Um... On the 3rd of July just gone we flew to Australia to see my family... Um... we left the house at like 6 in the morning I think, out our flight was at quarter to 8. Um... so we get like one of those short flights from the Hilton to... to Heathrow... We flew from Heathrow... It was Heathrow wasn’t it?

M: Yeah it was Heathrow, wasn’t Gatwick.

F: Terminal 4.

M: Yep.

F: And then we... I don’t remember... I think we got down we flew from, oh I took a picture of it on my phone.

M: Yeah... but we... I thought we’d have loads of time there but we really didn’t. We had about half an hour in the airport before we had to get on the plane.

F: Which we spent buying stuff for Mum (laughs).

M: Yeah! And... 

F: Um... what else? Then we waited there, got on the plane. The food was rubbish... Um... we had to stop at Brussels... well first Dubai... on the way to Brussel... umm... I think it took 7 and a bit hours to get to Dubai, and then 7 more to get to Brussels, so by that point it was probably... 

M: We had to get off the plane, and then go through security again, even though we’d been through security and I think I’ve left the airport so there didn’t really seem like much point... Um... yeah...

F: I don’t really remember...

M: Didn’t we have sweet and sour noodles for dinner?

F: Yeah. Sweet and sour noodles and then sweet and sour fried rice on the next flight which was... lovely (laughs). Um, I can’t remember what films we watched though, didn’t we watch... that one that we really wanted to see with... 

M: Friends... 

F: Friends with kids or friends with children?

M: Something like that.

F: Yeah. Not friends with benefits, it was a rubbish version of that with kids. Um... I don’t remember now.... I don’t remember what gate we were in Dubai or Brussel.

M: There was a crab, I remember that, like a little... 

F: Oh yeah, yeah in Dubai (laughs).

M: In Dubai like a crab that cause and... 

F: An alarm clock... (laughs) oh yeah... umm... What else? We should probably give some more information... 

M: Yeah (laughs). Um... 

F: We were at the back of the plane, umm in 2 seats on their own coz we didn’t want anyone smelly sitting next to us.

M: (Laughs).

F: But there weren’t any seats near us so we had to like go all the way to the front for the toilets.

M: Yeah... We were in seats 56F and 56E.

F: Yeah, in one row... Umm... oh and we had that bag of Doritos that nearly exploded.

M: Yeah because of the pressure it just kind of... 

F: Yeah, we took a picture of it. And you were laughing for like 10 minutes... Umm... we didn’t sleep on that flight either because it was our time.

(Appendices continue)
2. Lying Pair Example (Italicized Information = Details)

Describe a recent memorable day that you spent together hour by hour.

F: Okay . . . Last Thursday there was this charity thing going on and he got picked as well as Tara to do this um . . . Bush Tucker trial.

M: Yeah so existing creatures . . .

F: Yeah, it was hilarious (laughs).

M: . . . and weird things and she came down to support me, or so I thought . . .

F: (laughs).

M: Instead she was just sitting there, drinking, laughing at me, and yeah . . .

F: Yeah, so um . . . He got drank from it in order to prepare for this . . .

M: Well I had to drink, I couldn’t . . .

F: So well um, that was quite funny . . . I wasn’t entirely sure whether he was going to get in. He ate a load of bugs and all these disgusting things. I decided I was not like going to get. . . . Was not going to be this kiss me for the rest of that day. Definitely. And err . . . after that we were both a little bit drunk so we decided to go to Pure. Was it Pure?

M: Yeah Pure.

F: Yeah we went to Pure. But there was only a couple of other friends . . . Was there a couple of other friends? I’m sure . . .

M: Yeah, Hope and Leanna came down as well . . .

F: Yeah, Hope and Leanna came down as well. And Hope and Leanna were together, so they were spending most of their time together, so it was nice cuz we got to like dance a lot and everything . . . Together and it was quite crowded which was nice because I prefer crowded places (laughs).

M: To be honest I really enjoy going clubbing quite a lot. But she’s not really a clubbing kind of person . . .

F: Not too much.

Appendix B

Examples: Number of Details (Condition 2)

1. Truth-Telling Pair Example (Italicized Information = Details)

(TT) Can you describe in as much detail as possible your first date?

M: Err . . . We were in the Winnebago and Henley in Weymouth where we’re from. Umm . . .

F: Table at the top by the stairs (laughs).

M: Yeah, Umm . . . Err . . .

F: Both sat on the outside-bit as well.

M: Yeah.

F: They had really tall chairs cuz I couldn’t sit on it properly cuz I’m so short.

M: You had Pepsi . . .

F: Yeah cuz I was driving.

M: Yeah you were driving. And I had Jack Daniels and coke.

If you could carry on for me.

F: Umm . . . I think he bought me a drink. Umm . . . which was nice. cuz all of my friends were going “oh he really likes me”. Um . . .

M: I . . . I was just sort of like, yeah I don’t know . . .

F: Okay and if you could carry on.

M: Umm . . .

F: And then we just . . . sat there talking . . . umm . . . I . . . did Jude come along eventually . . . or not? Or was that a different time?

F: Umm . . .

And again if you could carry on.

F: I think she might have done . . . oh we bumped into someone I think . . . like someone else that knew us and then . . . we only stayed there for like a couple of hours, and then I felt a bit awkward so I was like “I’m gonna go home,” and he expected a lift and I didn’t give him one. Which I still feel guilty about now (laughs) . . . Cut that was a bit nasty.

(Appendices continue)
COLLECTIVE INTERVIEWING

2. Lying Pair Example
(Italics = Details)

(TT) Can you describe in as much detail as possible how you first met?

M: Uh huh...

F: (laughs).

M: I don’t really remember the first time we spoke... umm... we were at college umm... we were in the common room I remember that much... umm... I think I was messing around with my best friend... umm...

Okay, can I stop you there and can you carry on?

F: Umm... I thought he was a bit of a dick at first, too. I didn’t spend much time with him, I think it was because he was messing around. Umm... I just obviously kind of didn’t wanna get too close to him because he was my best friend’s boyfriend and our nuns...

Okay I’m going to stop you there, and if you could carry on.

M: Errr... (laughs) Errr... I don’t think we really had much to say to each other... umm... cuz she was my girlfriend’s best friend and I didn’t really know what to say to her... errr... I think I was rather more interested in spending time with my girlfriend at the time... rather than talking to other people.

Okay, and again if you can now carry on.

F: Umm... I don’t think it was very long when we first met, I think it was just like, it was in like a break between lessons so it was kind of like, just go and see all your friends and then you have to go... I think it used to be like it’s minutes so... probably didn’t say much to him and... just kind of thought “what a dick,” and left (laughs).

And if you can now carry on.

M: Umm... Yeah... I think that’s pretty much it.

Appendix C
Examples: Turn-Taking Cues (Condition 3)

1. Truth-Telling Pair Example
(All Caps = Continuation; Italicized = Repetition; Bold = Waiting)

(TT) Can you describe in as much detail as possible your last holiday or trip away together?

F: Errrr... we went to Australia for 10 weeks to see my family. Back, my mum, dad, brother, sister and like my uncle and his family. Umm... we stayed with them the whole time in Melbourne. Umm... we didn’t really do much cuz we didn’t have much money, umm so we just helped...

And if you could carry on.

M: Umm.. yeh, err WE HELPED OUT AROUND THE HOUSE and umm, looked after her little sister, umm, we... I walked the dogs quite a lot as well umm... and...

If you can carry on for me please.

F: AND THE FIRST SUNDAY WE WERE THERE IT WAS MY LITTLE SISTERS FIRST BIRTHDAY PARTY that they wanted... cuz they wanted to have the party for us to go there. Umm... and we went... that was like in a little... just a little play barn place. Umm... and then we also went to Melbourne on the train on the Sunday.

I’m gonna interrupt you there... and if you can carry on.

M: Yeah, we went to Melbourne which was really good... we got concession tickets on like the public transport cuz there wasn’t enough room in the car for us and Mia to go... and it was only 6 dollars 50 for like zone 1 and 2 which was like the bus and the train to the city all day so I thought that was pretty good. Umm... and while we were there we ended up walking to this weird museum of like film and games.

Sorry, if I can stop you there and if you can carry on.

F: Umm... THAT WAS CALLED LIKE... ACMI I think and it was in Federation Square just opposite the train station and it had loads of weird exhibitions of old films and all of that... and then a... an Asian woman gave me little sister a balloon cuz she was trying to grab it off her... (laughs)

Swap again please.

M: Yeah, AND THEN WE WENT DOWN TOWARD THE TRAIN STATION where we got off and there was a dog there, like a really big fluffy dog... and umm and Mia just went mental, like flapping her arms up and down and umm I managed to get quite a few print samples, not that we needed them...

2. Lying Pair Example (All Caps = Continuation; Italicized = Repetition; Bold = Waiting)

(TT) Can you describe in as much detail as possible your last holiday or trip away together?
M: Well it wasn’t just us two it was like a group of our friends from er.. the same halls that we’re going to and it was just like a last minute thing, we just decided the night before that we were going to go to Southsea for a barbeque cuz the weather was alright and things like that so er.. We woke up quite early and em we had er and her ended up going to Tesco’s, we just bought a load of meat, different types of meat and a lot of alcohol, and then...

Okay can I swap you now?

F: Yeah err... yeah loads of meat and alcohol (laugh) and it was. .. we it was er.. we went off with the others then even though we ended up leaving quite late despite the fact that we got to Tesco quite early because everyone else hadn’t got prepared so we had to wait quite a while but when we did go er, was that the day? Yeah, that was the time we also went to the fair afterwards but anyway first of all when we were at the park, that was really nice we played a bit of football, even though I’m awful at that.

I’m sorry, can I swap you again now please?

M: Yeah so... we played football and we just like chilling, we were eating, drinking, socialising, laughing. It was just, it was like a really good time you know we... we... all of us as a group we don’t really go out as much, like obviously me and her we see each other all the time but the rest we don’t really get to see that much so err... Can I swap you again?

F: SO IT WAS REALLY NICE, we could play more team things and. .. And em we played rounders... Was it muddy? Which was also quite embarrassing on my part, and em, and then after that, was it? I mean it was you who was also hiding around bits of meat from the barbeque and hitting them with the rockets which was disgusting. ..

M: That weren’t me... that was Callum.

F: That was Callum? Oh okay fine that’s alright then, you’re off the book with that (laugh) coz that was gross and it landed on my top. And em... then we went to the fair... Okay can you swap now please?

M: Err... Yeah so after that we just went to the the... fair. Like to the... like where the arcades are and things like that er we spent a bit of time there and then really from there we kind of, we just came back here and we all decided to go out in the evening as well like to, like one of the places in Guildhall, we started off ar, I think at Yarres and then we made our way to Italyline.

Received November 12, 2013
Revision received April 2, 2014
Accepted April 3, 2014
Appendix D: Journal article published from Chapter 4

Collective interviewing: A transactive memory approach towards identifying signs of truthfulness

Zarah Vernham*, Aldert Vrij, Sharon Leal, Samantha Mann, Jackie Hillman

(University of Portsmouth, UK)

ARTICLE INFO

Article history:
Received 27 August 2013
Received in revised form 1 January 2014
Accepted 2 January 2014
Available online 8 January 2014

Keywords:
Deception
Truthfulness
Group interviewing
Transactive memory
Collaborative recall

ABSTRACT

Group interviewing has been neglected in the deception literature, yet it coincides with recent collective memory research. The present experiment applied the transactive memory theory to a collective interviewing setting and explored whether signs of truthfulness emerged through measuring joint memory recall. Truth-tellers were real couples who had been in a relationship for at least one year and cohabiting. Lying pairs were friends who pretended to be in a relationship for at least one year and cohabiting. All couples were interviewed in their pairs about their ‘real’ or ‘fictional’ relationships. It was found that truth-telling pairs posed questions to one another, provided cues to one another, handed over remembering responsibility, and finished each other’s sentences significantly more than lying pairs, supporting the idea that real couples have a transactive memory system, unlike pretending couples. Implications for a collective interview approach that considers memory within deception detection are discussed.

© 2014 Society for Applied Research in Memory and Cognition. Published by Elsevier Inc. All rights reserved.

Cognitive psychology, specifically memory research, has developed over recent years through the exploration of not only individual memory, but also collaborative learning, collaborative remembering, and joint recall (e.g., Barnier & Sutton, 2008; Blumen, Rajaram, & Henkel, 2013; Harris, Paterson, & Kemp, 2008). Collective memory examines the social nature of memory by treating past experiences and events as memories shared with others (Barnier & Sutton, 2008; Hirst & Manier, 2008; Rajaram, 2011). It explores how individuals collectively recall information together (Rajaram & Perea-Pazarin, 2010). The research suggests that group collaboration can aid memory through cross-cuing (where members of the group provide cues to one another that increase recall) and error-pruning (where feedback from other members of the group create discussions that make people realise their recall errors) (Rajaram, 2011; Nosé, Blatz, & Schryer, 2008).

Deception research has primarily focused on interviewing single suspects despite the fact that crimes are frequently committed by pairs or multiple offenders (Van Mastrigt & Farrington, 2009; M’Closk & Plaure, 2009). Therefore, it seems relevant to explore how group members lie or tell the truth together. Collective interviewing is a new approach to lie detection that coincides with the current trend in collective memory research by focusing on the joint recall of events when two or more individuals are interviewed together at the same time. Although suspects are typically interviewed individually and immediately separated from their group members within police interview settings (Kassin & Goddijonsson, 2004), there are alternative situations whereby it would be more suitable, timely and convenient to interview group members simultaneously, for example, at road border controls where cars containing several people are checked, or at security checkpoints (e.g., airports). Importantly, collective interviewing is already part of some existing procedures. For example, in Canada immigration officers at airports carry out collective interviews, and in the United Kingdom couples are expected, at one potential stage, to be interviewed simultaneously in order to marry and achieve British Citizenship.

Four recent studies have illustrated the clear potential for using collective interviewing to elicit social cues to deceit, specifically communication and interaction cues. Vrij et al. (2012) examined verbal communication cues and found that pairs of truth-tellers interrupted and corrected each other more than pairs of liars, as well as adding more information to each other’s accounts. Jundi, Vrij, Mann, et al. (2013) examined nonverbal communication cues and found that pairs of liars made more eye contact with the interviewer than pairs of truth-tellers, whereas pairs of truth-tellers looked more at each other than pairs of liars. Driskell, Salas, and Driskell (2012) investigated the social indicators of deception within a transactive memory framework and found that pairs of truth-tellers illustrated more synchrony in behaviour and exhibited more interactions (e.g., mutual gaze and verbal transitions) than pairs of liars. Finally, Jundi, Vrij, Hope, Mann, and Hillman (2013) applied the theory of transactive memory to a timeline task.
in which pairs had to work together to illustrate on paper the length of time each pair of their experimental task had taken. The authors found that truth-telling pairs, in comparison to lying pairs, posed more questions to one another during the timeline task. These four studies show that a collective approach can generate discrepancies between pairs of truth-tellers and pairs of liars in the way they communicate.

The aim of the present experiment was to apply a collective interviewing approach to the setting of being interviewed simultaneously to achieve British Citizenship. Similar to the studies by Driskell et al. (2012) and Junidi, Vijl, Hope, et al. (2013), the present experiment explored differences between truth-telling and lying couples within the context of transactive memory. However, the present experiment differed from the previous studies in some important ways. First, Driskell et al. (2012) focused on generic verbal transitions defining them broadly in terms of back-and-fourth verbal exchange (i.e., the number of times an individual elaborated or responded immediately after their partner). Conversely, the present experiment explored the specific types of verbal transitions used by the pairs, focusing on the fundamental memory cues that emerge through collaborative recall and remembering and that may be an indication of truthfulness. Second, whilst Driskell et al. (2012) and Junidi, Vijl, Hope, et al. (2013) both measured posing questions to one another, we thought it to be relevant to replicate this measurement within a different context in the present experiment. That is, whereas Driskell et al. (2012) used a brief investigative interview (similar to that which might occur during initial screenings at security checkpoints) and Junidi, Vijl, Hope, et al. (2013) measured the number of questions posed to one another whilst the pair completed a timeline task, the present experiment measured the frequency of questions posed to one another during a lengthy immigration-type interview. Third, an extra factor was added to the present experiment to explore the influence of question type, an area that has been investigated in previous deception research and been shown to be important. For example, Vijl et al. (2008) found that asking unanticipated questions about central topics increased the discrepancies between pairs of liars’ statements because they had not been able to prepare answers to these questions. These discrepancies were not found between pairs of truth-tellers’ statements because they were relying purely on memory. To take the unexpectedness of the interview questions into consideration, the present experiment split the interview into anticipated questions (which pairs may have planned for) and unanticipated interview questions (which negate the benefit of planning for the interview).

1. Transactive memory

The theory of Transactive Memory is concerned with how groups (and individuals) process and structure information with regard to past events. The theory was developed to describe how people in close intimate relationships share cognition and ‘think together’ (Wegner, 1987). It proposes that people in close relationships have a specialised memory system or ‘division of labour’ for encoding, storing and retrieving information (Hollingshead, 1998; Wegner, 1987). This is particularly relevant to the present experiment whereby ‘real’ (truth-telling) or ‘licentious’ (lying) couples were the focus.

Transactive memory theory postulates that people who are actually in a close relationship (truth-tellers) share remembering, also knowing each other’s memory expertise (i.e., each person knows what they are to remember as well as what the other person in the relationship is to remember) (Hollingshead & Brandes, 2003). This results in a transactive memory system that is greater than the total of all of the individual memories (Wegner, Erber, & Raymond, 1991; Wegner, Giuliani, & Hertel, 1985). Over time, the individuals within the pair (couple) update their transactive memory systems, improving the system and making it more efficient. This transactive memory system is active at all three stages of memory formation and recall: Encoding, storing, and retrieving. First, when information is encoded regarding a shared experience responsibility for information is divided and shared between the members of the pair (Hollingshead & Brandon, 2003). Second, when information is stored, each individual within the pair has remembering responsibilities, knowing what their role is, what they are to remember, and what information their partner has access to (Wegner et al., 1991). Third, retrieval of information is social and interactive as the individuals within the pair communicate considerably with one another to retrieve as much information as possible. The communication with one another and the discussion of incoming information enhances their individual recollections. Hollingshead (1998) orders to the transaction memory search whereby group members who have experienced a past shared event make instinctive use of their transactive memory system to increase recall by posing questions to one another to check information or find out information, cueing one another to remind one another of further information, and handing over remembering responsibility to whoever best remembers that part of the event. These interactive and communicative behaviours between the group members help one another tap into their different memory domains and trigger further information, increasing recall. Consequently, it should be the truth-telling couples in the present experiment that demonstrate the use of a transactive memory system, and therefore display these fundamental interactive and communicative behaviours during their joint recall.

Conversely, pairs of individuals who are fabricating their relationship and inventing (or at least partially inventing) shared events will need to misled or deceive investigators, and in order for these lying pairs to be able to do this, they will need to illustrate the same level of responsiveness as truth-telling pairs. This could be difficult for them to do without the shared memory system for encoding, storing and retrieving information that truth-telling pairs have. In addition, transactive interaction is likely subject to interference by the presence of social and interactive behaviours and that this is likely to be due to the fact that at the time of recall deceptive pairs do not retrieve information from a transactive memory system, unlike truth-telling pairs (Driskell et al., 2012). Instead, lying pairs will rely on a combination of individual processes, which means that each member needs to rely on their individual cognitive ability to create a story that makes sense and matches with what the other individual in their pair is saying (Nisbett, 1990). Retrieval of information in lying pairs is therefore an individual cognitive task which will result in lying pairs exhibiting fewer interactions as they recall their fabricated story (Driskell et al., 2012; Vijl et al., 2012), and only providing prepared answers to expected questions (Granberg, Stolmlén, & Jonsson, 2003; Stolmlén, Granberg, & Jonsson, 2003; Vijl, Mann, Leal, & Granberg, 2010). Additionally, lying pairs will focus on appearing credible when investigated (DePaulo, LeMay, & Epstein, 1991; DePaulo et al., 2003), and due to the misconceptions held by people with regards to the cues that imply deceit (Vijl, 2008a), the lying pairs in particular will avoid certain behaviours, e.g., correcting and interrupting one another (Vijl et al., 2012), posing questions to one another (Driskell et al., 2012), and admitting a lack of memory (Porter & Yulle, 1996).

This again will make the memory cues arising from transactive memory more apparent in truth-telling pairs who believe the truth will shine through (‘Illusion of transparency’; Cilowach, Savitsky, & Medvec, 1998) and are not as concerned with appearing credible, and hence do not avoid particular communications and interactions.
To summarise, truth-telling pairs will encode, store, and recall information through a transactive memory system, whereas lying pairs will encode, store and recall information at an individual level. Consequently, two people recalling an actual jointly experienced event will do so in a different manner than two people who are attempting to recall a fabricated event. Thus, collective interviewing should elicit differences between pairs of truth-tellers and pairs of liars in the transactional information search (Hollingshead, 1998) and that signs of truthfulness as a result of memory differences between pairs of truth-tellers and pairs of liars can be detected. The focus of the present experiment was verbal transitions, but more specifically, it considered four different types of verbal transitions that pairs illustrate when retrieving information through their transactive memory systems. These four verbal transitions were: Posing questions to one another, providing cues to one another, handing over of remembering responsibility, and finishing each other’s sentences.

2. Hypotheses

Overall, truth-telling pairs are expected to exhibit more of each type of verbal transition than the lying pairs when interviewed together about their ‘relationship’. Hence, the present experiment focuses on signs of truthfulness as opposed to signs of deceit. Based on the frequency of each type of verbal transition during the interview, it was hypothesised that truth-telling couples will pose questions to one another to check information or find out information more than lying pairs (Hypothesis 1), provide cues to one another more than lying pairs (Hypothesis 2), hand over remembering responsibility more than lying pairs (Hypothesis 3), and finish each other’s sentences more than lying pairs (Hypothesis 4). We suggest that this last measure, finishing each other’s sentences, will reveal truth because according to transactive memory, truth-telling couples will know what the other person is saying, and will say (e.g. Hollingshead, 1998; Hollingshead & Brandon, 2003; Wegner et al., 1991). Consequently, truth-telling pairs will interrupt one another and automatically complete each other’s sentences, which lying pairs will not do through fear that these interruptions will raise suspicions and imply deceit (Vij et al., 2001). Additional, the present experiment will explore the effect that the expectedness of the interview question has on the frequency of each of the verbal transitions. Previous research has found that asking unexpected interview questions surprises liars and negates the benefit of planning for the interview, requiring the liars to ‘think on the spot’ (Vij et al., 2010). Consequently, more cues to deceit will emerge from liars’ responses to unanticipated questions compared to anticipated questions, which they are able to prepare for (DePaulo et al., 2003). Furthermore, pairs of liars interviewed individually show less overlap in their responses to unanticipated questions compared to anticipated questions (Vij et al., 2009). In contrast, truth-tellers respond similarly to both anticipated and unanticipated questions, and when pairs of truth-tellers are interviewed individually they show similar amounts of overlap when responding to both anticipated and unanticipated questions. The findings above indicate the relevance of measuring the effect of expectedness of the interview question. However, no hypothesis will be formulated because we are unsure how expectedness will affect each of the verbal transitions when pairs of participants are interviewed collectively.

3. Method

3.1. Participants

Participants were recruited via online advertisements, the University of Portsmouth staff and student portals, and word of mouth. All participants were told prior to signing up to the study that it was an experiment investigating whether they could convince an interviewer that they were in a romantic relationship with their selected interview partner.

A total of 92 participants (45 males and 47 females) from the University of Portsmouth took part in this study. The mean age was 22.64 years (SD = 5.90). Truth-telling pairs (N = 24) were real couples who had been in a relationship for at least one year and cohabiting. Lying pairs (N = 22) were friends who were told only to take part as a pretend couple if they had never been intimate with one another and did not live together. The lying pairs had to be of the same sexual orientation; thus, of the opposite sex to one another if they were both heterosexual and of the same sex if they were both homosexual. Of all 46 pairs who participated in this study, 45 were heterosexual and one was homosexual. The one homosexual pair was a lying pair.

3.2. Design

This experiment used a mixed design with Veracity (truth versus lie) as the between-subjects factor and Expectedness (anticipated interview questions versus unanticipated interview questions) as the within-subjects factor. Posing questions to one another, providing cues to one another, handing over of remembering responsibility, and finishing each other’s sentences were the dependent variables (the four verbal transitions measured).

3.3. Procedure

Upon arrival to the Psychology Department, all pairs were asked to go for coffee (paid for by the researchers) for approximately 30 minutes. They were instructed to prepare during coffee for the interview and talk about their ‘real’ or ‘pretend’ relationship, discussing (i) how they met, (ii) how they spend time together, and (iii) where they live (the interview then focused on these issues). They were also informed that they would be interviewed together at the same time. Therefore, if differences between truth-tellers and liars were to emerge, this would not be because the collective interview situation and imply deceit (Vij et al., 2010). Additionally, the present experiment will explore the effect that the expectedness of the interview question has on the frequency of each of the verbal transitions. Previous research has found that asking unexpected interview questions surprises liars and negates the benefit of planning for the interview, requiring the liars to ‘think on the spot’ (Vij et al., 2010). Consequently, more cues to deceit will emerge from liars’ responses to unanticipated questions compared to anticipated questions, which they are able to prepare for (DePaulo et al., 2003). Furthermore, pairs of liars interviewed individually show less overlap in their responses to unanticipated questions compared to anticipated questions (Vij et al., 2009). In contrast, truth-tellers respond similarly to both anticipated and unanticipated questions, and when pairs of truth-tellers are interviewed individually they show similar amounts of overlap when responding to both anticipated and unanticipated questions. The findings above indicate the relevance of measuring the effect of expectedness of the interview question. However, no hypothesis will be formulated because we are unsure how expectedness will affect each of the verbal transitions when pairs of participants are interviewed collectively.

3. Method

3.1. Participants

Participants were recruited via online advertisements, the University of Portsmouth staff and student portals, and word of mouth.
Table 1

<table>
<thead>
<tr>
<th>Interview question</th>
<th>Expectedness score</th>
<th>Expectedness category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Can you describe in as much detail as possible how and when you first met. Please give as much information as you can about your first interaction, the location you were at, and so on.</td>
<td>1.20</td>
<td>Anticipated question</td>
</tr>
<tr>
<td>2. Can you describe in as much detail as possible your first date and when this was. Think about the location and the sights and sounds you experienced.</td>
<td>1.50</td>
<td>Anticipated question</td>
</tr>
<tr>
<td>3. Describe your home.</td>
<td>4.30</td>
<td>Unanticipated question</td>
</tr>
<tr>
<td>4. Please draw the exterior of your bedroom on this piece of A3 paper. Now describe in as much detail as you can your bedroom starting from the left-hand wall and moving all the way around the outside. Please describe everything including furnishings, decor, etc.</td>
<td>6.05</td>
<td>Unanticipated question</td>
</tr>
<tr>
<td>5. Describe a recent memorable day that you spent together (how to use (this should not be your wedding day if you are married)).</td>
<td>3.95</td>
<td>Unanticipated question</td>
</tr>
<tr>
<td>6. Can you describe in as much detail as possible your last holiday or trip away together? Please give as much information as you can about the location, what you did, the sights you experienced, and so on.</td>
<td>2.20</td>
<td>Anticipated question</td>
</tr>
</tbody>
</table>

Total expectedness score: 19.80

that all participants were actually paid £5, the experimenter told them at the end of the experiment that the interviewer believed they were telling the truth.

Following participation, a post-interview questionnaire was completed individually and at this stage all participants were instructed to be truthful about their experience of the interview and the strategies they used. In this questionnaire, participants were asked to rate on a 7-point Likert scale from [1] not at all motivated to [7] extremely motivated, the extent to which they felt motivated to appear convincing during the interview. They were also asked to rate their confidence in receiving £5 and their confidence about whether or not they would have to write a statement (both on 7-point Likert scales from [1] none at all to [7] very likely). Additionally, participants were asked to rate on 7-point Likert scales (ranging from [1] easy to do to [7] difficult to do) the extent to which they found being interviewed collectively easy or difficult to do. Finally, to explore how honest participants reported to have been in the interview, they rated on scales from 0% to 100% with 0% indicating the extent to which they told the truth during the interview and the extent to which they lied during the interview.

Truth-tellers were asked an additional open question about how long it had been in number of months, they had been in a romantic relationship with their interview partner. This relationship length variable was used in correlational analyses along with each of the dependent variables in a means of examining whether or not relationship length was associated with any of the four verbal transitions, and therefore confounding the effect of veracity.

Conversely, liars were given an additional post-interview questionnaire to explore whether they actually met the inclusion criteria and had not been in a previous intimate relationship with their interview partner. The first part of this questionnaire asked an open question about how long, in number of months, the liars had been friends with one another. It then measured on four different 7-point Likert scales how they rated their friendship with their interviewer partner. This included questions about friendliness (ranging from [1] strangers to [7] best friends), intimacy (ranging from [1] distant to [7] intimate), importance (ranging from [1] unimportant to [7] important) and trustfulness (ranging from [1] distrusting to [7] trusting). Each individual that made up the lying pair gave their own rating for each of the four questions. The ratings from the four questions were then added together to give a total friendship-closeness rating for each individual within each pair. The average rating for each pair was obtained providing an overall friendship-closeness score for each lying pair. The friendship length and the friendship-closeness variables were inputted into correlational analyses along with each of the dependent variables to determine whether friendship length or friendship-closeness were associated with any of the four verbal transitions, and therefore confounding the effect of veracity.

3.4. Coding

The interview transcripts were coded by a rater who was blind to the hypotheses and veracity status of the pairs. All four dependent variables (verbal transitions) were coded for all six interview questions separately and the total frequency that each variable occurred within the interview across the six questions was calculated for each pair. Posing questions to one another was the number of times a member of the pair asked their interview partner a question, usually to check information or find out information (e.g., “Did we watch two movies that night or just one?” or “Was I working that day?”). Providing cues to one another was the number of times members of the pair cross-posed—that is when one member of the pair stated something that reminded their interview partner of additional information (e.g., one member of the pair might say “We watched something but I can’t remember the name of it now,” and the other member of the pair might say “The thing we were watching was a soap called Chilled and Live,” which results in the first member of the pair then responding with a phrase, such as “Oh yeah, I remember now”). An exchange such as the previous example would be counted as one cross-cue. The number of times the interview was read over the conversation depending on who best remembers what. Participants would state that they do not remember the information as thoroughly as their partner so will automatically ask their partner to tell that part of the event (using phrases, such as “You remember this better than me, why don’t you explain it to me” “Do you want to explain this? I know you like telling this story”). Each other’s sentences was the number of times one member of the pair started saying something and then the other member of the pair interrupted and spontaneously finished off their sentence (e.g., one member of the pair might start saying “We went on the banana boat and...” then the second member of the pair will complete the sentence and say “...and we fell off into the cold water”). All four of these dependent variables were deemed appropriate for measuring transactive memory based on existing memory literature (e.g., Dijkstra et al., 2012; Hollingshead, 1998; Wegner, 1987).

A second coder, also blind to the hypotheses and veracity status of the pairs, coded 16 of the 46 transcripts for the total number of times each of the four dependent variables occurred. Intraclass correlation coefficients (ICCs) were then calculated between the two individual raters. The inter-rater reliability between the two coders was very good with each of the ICCs demonstrating a good agreement between the two raters (posing questions to one another: ICC = .95; providing cues to one another: ICC = .87; handling over remembering responsibility: ICC = .92; finishing each other’s sentences: ICC = .92). The ICC for the handling over of remembering responsibility variable was not as high as the other three variables.
because this verbal transition did not occur often within the data set.

3.5. Anticipated questions: pilot study

A pilot study was conducted to investigate the expectedness of each of the six interview questions when participants were informed that they were going to be interviewed alongside their partner about their relationship. The expectedness of the interview questions was measured because participants had expected to be asked a specific question, they may have developed a pre-planned answer when given the opportunity to prepare for the interview, which may have then affected participants’ responses and interactions whilst answering the questions. Twenty participants were recruited with a mean age of 34.00 years (SD = 12.61); 11 were male and nine were female. No participants from the main study took part in this pilot study. Each participant was given a brief summary of the present experiment. After reading the summary, participants were given a short questionnaire in which they were asked to rate on a Likert scale of 1 (anticipated) to 7 (not anticipated) the extent to which they would expect that each of the six interview ques-
tions, used in the present experiment, would be asked during an interview with their partner regarding their relationship. Thus the higher the score, the less the question was expected. Table 1 shows the expectedness of each of the six interview questions used during the experiment. The three interview questions with the lowest expectedness scores were then categorised as the anticipated inter-
view questions, and the three interview questions with the highest expectedness scores were then categorised as the unanticipated interview questions. Eight new variables were then computed for each pair: Total frequency for each of the four dependent variables across the three anticipated questions only, and total frequency for each of the four dependent variables across the three unanticipated questions only.

4. Results

4.1. Pre-interview questionnaire

Five one-way ANOVAs were conducted to examine if there was a significant difference between truth-tellers and liars in terms of how they rated their preparation discussion prior to being inter-
viewed. There was no significant difference between truth-tellers and liars in terms of how they rated their preparation discussion in terms of thoroughness (F(1, 96) = 0.926, p = .339, η² = .010, d = 0.20), sufficiency (F(1, 90) = 0.011, p = .918, η² = .000, d = 0.03), and how good they found it (F(1, 90) = 0.959, p = .330, η² = .011, d = 0.20). Howver, liars rated the preparation discussion as more useful (F(1, 89) = 5.97, 95% CI [5.41, 6.36]) than truth-tellers (M = 4.15, SD = 1.99, 95% CI [3.89, 4.60]), F(1, 90) = 27.645, p < .001, η² = .335, d = 1.11. Liars also stated that they discussed with their partner about what to say during the interview significantly more thoroughly (M = 5.45, SD = 2.90, 95% CI [5.06, 5.89]) than truth-tellers (M = 3.86, SD = 1.62, 95% CI [3.47, 4.24]), F(1, 90) = 33.304, p < .001, η² = .307, d = 1.21.

4.2. Post-interview questionnaire: motivation, manipulation checks, and collective interviewing

The vast majority of participants indicated that they were motivated to appear convincing during the interview, with 80.3% of the sample scoring 5 or higher on the 7-point Likert scale. Liars were significantly more motivated (M = 6.69, SD = 0.86, 95% CI [6.60, 6.88]) than truth-tellers (M = 4.85, SD = 2.10, 95% CI [4.39, 5.32]) to appear convincing, (F(1, 90) = 13.188, p < .001, η² = .128, d = .77. In terms of confidence, truth-tellers reported that they were more con-
def (M = 6.04, SD = 1.37, 95% C (5.61, 6.48)) than liars (M = 4.48, SD = 1.68, 95% CI [4.02, 4.93]) that they would receive ES, F(1, 90) = 24.206, p < .001, η² = .212, d = 1.02. Truth-tellers were also more confident (M = 2.71, SD = 1.73, 95% CI [2.26, 3.16]) than liars (M = 4.36, SD = 1.40, 95% CI [3.89, 4.84]) that they would not have to write a statement, F(1, 90) = 25.262, p < .001, η² = .219, d = 1.05. A one-way ANOVA further showed that liars found being interviewed together significantly more difficult than truth-tellers (M = 3.09, SD = 1.80, 95% CI [2.57, 3.62] and M = 2.10, SD = 1.70, 95% CI [1.60, 2.61], respectively), F(1, 90) = 7.286, p = .008, η² = .075, d = 0.57.

Finally, two one-way ANOVAs showed that truth-tellers (M = 98.965, SD = 3.71, 95% CI [94.11, 103.80]) reported to stay closer to the truth than liars (M = 51.825, SD = 24.14, 95% CI [46.76, 56.88]), F(1, 90) = 200.269, p = .001, η² = .690, d = 2.73, and liars (M = 51.145, SD = 25.26, 95% CI [45.83, 56.42]) reported to lie signif-
ificantly more than other-truth-tellers (M = 0.837, SD = 3.47, 95% CI [4.23, 5.89]), F(1, 90) = 186.649, p < .001, η² = .675, d = 2.79.

4.3. Occurrence of cues

Someone could argue that for a cue to become a useful indica-
tor of truthfulness it should occur frequently amongst truth-tellers. That is, it could be that a cue is more frequently used by truth-
tellers than liars, but if only a small minority of truth-tellers use that particular cue then it is of limited value in lieu of the absence of the cue does not provide meaningful information. Therefore we measured the occurrence of each of the transactive memory cues: All 46 pairs (100% of lying pairs and 100% of truth-
telling pairs) posed questions to one another at least twice during the interview; 32 out of 46 pairs (36.6% of lying pairs and 100% of truth-telling pairs) provided cues to one another at least once during the interview; 10 out of 46 pairs (4.55% of lying pairs and 37.5% of truth-telling pairs) demonstrated the handling of over remem-
bering responsibility at least once during the interview; and 38 out of 46 pairs (63.64% of lying pairs and 100% of truth-telling pairs) finished each other’s sentence at least once during the interview. These percentages indicate that, perhaps with the exception of handling over of remembering responsibility, the transactive mem-
ory cues, thought to be used by truth-telling pairs, were indeed used by the truth-tellers in our sample.

4.4. Hypothesis testing: transactive memory

A 2 x 2 mixed-design MANOVA was conducted with Veracity (truth versus lie) as the between-subjects factor, Expectedness (anticipated interview questions versus unanticipated interview questions) as the within-subjects factor, and (1) posing questions to one another, (2) providing cues to one another, (3) handing over of remembering responsibility, and (4) finishing each other’s sentences as the dependent variables. The MANOVA revealed a sig-
nificant multivariate main effect for Veracity, Wilks’ λ = .420, F(4, 41) = 14.181, p < .001, η² = .580. Significant univariate main effects for Veracity were obtained for all four dependent variables: Pos-
ing questions to one another, F(1, 44) = 6.319, p = .016, η² = .126, d = .75; providing cues to one another, F(1, 44) = 16.937, p < .001, η² = .327, d = 1.22; handing over of remembering responsibility, F(1, 44) = 7.713, p = .009, η² = .146, d = .83; and finishing each other’s sentences, F(1, 44) = 47.217, p < .001, η² = .518, d = 2.05. In support of Hypotheses 1-4, truth-telling pairs, more than lying pairs, posed questions to one another (M = 15.83, SD = 10.62, 95% CI [12.27, 19.40]); M = 9.41, SD = 5.80, 95% CI [5.69, 13.13]), pro-
vided cues to one another (M = 3.79, SD = 2.87, 95% CI [2.82, 4.77]; M = 0.01, SD = 1.66, 95% CI [−0.11, 1.93]), handed over remember-
ing responsibility (M = 0.63, SD = 0.97, 95% CI [0.33, 0.92]; M = 0.05,
SD = .11, 95% CI [.026, .339], and finished each other's sentences (M = 5.92, SD = 2.95, 95% CI [4.95, 6.98]; M = 1.14, SD = 1.66, 95% CI [0.61, 2.35]). The MANOVA also revealed a significant multivariate main effect for Expectedness, Wilks' Λ = .798, F(4, 41) = 2.747, p = .041, etasq = .211, but at a univariate level no significant effects for Expectedness were obtained for any of the dependent variables (F-values ranged from .010 to 2.765; p-values ranged from .103 to .919). The multivariate Expectedness × Veracity interaction effect was not significant, Wilks' Λ = .836, F(4, 41) = 2.014, p = .110, etasq = .164, nor were any of the four univariate effects for the Expectedness × Veracity interaction (F-values ranged from .051 to 3.270; p-values ranged from .077 to .862).

Discriminant analyses were conducted on each of the significant dependent variables separately to investigate the nature of their relationship with Veracity. The individual discriminant analyses revealed that all four dependent variables were individually significant predictors of Veracity (see Table 2). The cross-validated classification results reveal that finishing each other's sentences in particular was a diagnostic cue to deceit with 87% of truth-tellers and liars classified correctly based on this cue.

4.5. Truth-telling pairs' relationship status

Pearson's correlational analyses were conducted to test the association between relationship length and each of the four dependent variables. The correlations revealed that there were no significant associations between relationship length (M = 41.92, SD = 41.74), and posing questions to one another, r(22) = −.192, p = .369; providing cues to one another, r(22) = −.239, p = .105; handing over remembering responsibility, r(22) = −.191, p = .371; and finishing each other's sentences, r(22) = −.218, p = .307.

4.6. Lying pairs' friendship status

Analyses from the liars' self-reports about how friendly they actually were as a pair indicated that the lying pairs reported being friendlier than was desired for the inclusion criteria of this study. Only 3 out of 22, they were recruited as a pair only if they stated they were friends who were of the same sexual orientation, who had never been intimate, never been in a romantic relationship, and never lived together. However, liars obtained a mean of 5.73 (SD = .95, 95% CI [.54, 6.01]) for friendliness on a Likert scale of 1 (strangers) to 7 (best friends); a mean of 4.91 (SD = 1.25, 95% CI [.43, 5.29]) for intimacy on a Likert scale of 1 (distant) to 7 (intimate); a mean of 5.91 (SD = 1.07, 95% CI [.52, 6.42]) for the importance of their friendship; an average of their interview partner on a Likert scale of 1 (unimportant) to 7 (important); and a mean of 6.07 (SD = 1.21, 95% CI [.57, 6.44]) for how trusting they were of their partner on a Likert scale of 1 (distrusting) to 7 (trusting). Despite this, Veracity still had a significant effect on the frequency of each of the four verbal transitions, demonstrating that even when good friends lie together, signs of truthfulness still emerge in a collective interview situation. Furthermore, Pearson's correlational analyses were conducted to test the association between friendship-closeness and each of the four dependent variables. The correlations revealed that there were no significant associations between friendship-closeness (M = 23.61, SD = 3.27), and posing questions to one another, r(20) = −.155, p = .492; providing cues to one another, r(20) = −.300, p = .174; and finishing each other's sentences, r(20) = −.182, p = .415. However, the correlations did reveal a significant association between friendship-closeness and the handing over remembering responsibility, r(20) = −.554, p = .007. This significant finding needs to be interpreted with caution because the chances of making a Type I Error are increased due to multiple correlations being conducted at the same time.

Pearson's correlational analyses were also conducted to test the association between friendship length and each of the four dependent variables. The correlations revealed that there were no significant associations between friendship length (M = 14.30, SD = 14.30), and posing questions to one another, r(20) = −.197, p = .379; providing cues to one another, r(20) = .345, p = .116; handing over remembering responsibility, r(20) = −.31, p = .561; and finishing each other's sentences, r(20) = −.152, p = .499. The absence of significant correlations in both truth-tellers and liars suggest that it is Veracity and real shared events that influenced the emergence of interactive memory cues rather than the relationship status of the pairs.

5. Discussion

5.1. Transactive memory variables differentiate truth-tellers from liars

Truth-telling pairs posed questions to one another to check information or find out information, provided cues to one another, handed over remembering responsibility, and finished each others' sentences significantly more than lying pairs, supporting Hypotheses 1–4. The effect sizes were large (ranging from d = .75 to d = 2.05) suggesting that each of the verbal transitions should be easily identified and taught to investigators (e.g., police interviewers, fraud investigators, and immigration officers). Additionally, the findings were not dependent upon the expectedness of the interview questions. Hence, the four verbal transitions were elicited by truth-telling pairs and not elicited by lying pairs regardless of whether the interview question was anticipated or unanticipated. This is a positive finding because it suggests that the signs of truthfulness measured in the present experiment will not be dependent upon the expectedness of the interview question suggesting that the four verbal transitions are robust indicators of truthfulness.

The truth-telling pairs did illustrate more interactive and communicative behaviours in comparison to lying pairs who worked more on an individual basis in alignment with previous collective interviewing studies (Driskell et al., 2012; Jundi, Vrij, Mann, et al., 2013; Jundi, Vrij, Hope, et al., 2013; Vrij et al., 2012). Although previous research suggests that liars plan what to say to expected questions (Vrij et al., 2010), this study implies lying pairs do not plan how to interact or communicate with one another during a collective interview, which makes it more difficult for them to behave like truth-telling couples when answering both expected and unexpected interview questions. Additionally, the natural recall of shared events from the truth-telling couples' transactive memory system means that they unconsciously interact and increase their retrieval of information together (Hollingshead, 1998) which occurs regardless of whether the interview question is anticipated or unanticipated. Overall, the present experiment focused on the differences between truth-tellers and liars based upon memory research, and demonstrated that memory, particularly transactive memory, can be used as a process for eliciting signs of truthfulness that are not influenced by interview question type.

5.2. Importance of memory in detecting deception

It is widely acknowledged that memory plays an important role in deception (Sporer & Schwindt, 2006; Verschure, Ben-Shahar, & Meijer, 2011; Walczyk, Igos, Darn, & Tchakalian, 2013). Verbal memory assessment tools, such as Reality Monitoring, are very much based on memory and postulate that memories of actual events differ from fabrications in predictable ways, including in terms of sensory or affective information (Johnson & Raye, 1998). However, in deception research memory is often also viewed as
Table 2
Classification results for each of the four significant dependent variables.

<table>
<thead>
<tr>
<th>Transaction memory variable</th>
<th>Chi-square</th>
<th>Wilks’ Lambda</th>
<th>Percentage of cases correctly classified</th>
<th>Percentage of truth-tellers correctly classified</th>
<th>Percentage of liars correctly classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posing questions to one another</td>
<td>5.837</td>
<td>.074 (.016)</td>
<td>65.2%</td>
<td>54.2%</td>
<td>77.3%</td>
</tr>
<tr>
<td>Providing cues to one another</td>
<td>14.596</td>
<td>.722 (.000)</td>
<td>71.7%</td>
<td>54.2%</td>
<td>90.8%</td>
</tr>
<tr>
<td>HANDING OVER REMEMBERING RESPONSIBILITY</td>
<td>6.057</td>
<td>.054 (.000)</td>
<td>65.2%</td>
<td>37.9%</td>
<td>95.5%</td>
</tr>
<tr>
<td>Finishing each other’s sentences</td>
<td>3.171</td>
<td>.019 (.000)</td>
<td>87.0%</td>
<td>63.2%</td>
<td>90.8%</td>
</tr>
</tbody>
</table>

A ‘problem’. If truth-tellers do not remember accurately or efficiently then their answers may sound like liars’ answers because their answers will be vague and less detailed (Sperer & Schwandt, 2006; Walczyk et al., 2013). If liars do not remember accurately and efficiently then their physiological responses may look similar to those of truth-tellers because they will not recognise the relevant items in a Concealed Information Polygraph Test (Vrsanschauer et al., 2011). The present experiment demonstrated that there is a good opportunity to differentiate truths from lies if truth-tellers do not remember clearly, because the cues identified in the present experiment will then arise.

Hence, as opposed to truth-tellers sounding like liars due to providing a lack of detail, liars can be classified correctly because they will lack the presence of each of the verbal transitions. Thus, they will rarely pose questions to one another, provide cues to one another, hand over remembering responsibility, and finish each other’s sentences — memory cues that will emerge from truth-tellers. Whilst liars were classified with relatively high accuracy rates for all four verbal transitions, truth-tellers were classified with low accuracy rates for three of the four verbal transitions. These low accuracy rates for truth-tellers are a concern due to the risk of false-positives (i.e., classifying a pair as deceptive when they are in fact truthful). However, the overall classification accuracy rates for these three verbal transitions were high and still significant. Additionally, the results revealed that finishing each other’s sentences in particular was very successful in classifying correctly both truth-tellers (83.33%) and liars (90.9%).

We realise that the memory cues we examined arise in collective interviews and may not be suitable to individual interviews. In the latter interview settings cues such as spontaneous corrections, admitting lack of memory, and raising doubt about one’s own testimony are sometimes examined. They are part of Criteria-Based Content Analysis (CBCA; Kühnlenz & Steller, 1988) and truth-tellers include such cues more often than liars do (DePaulo et al., 2003; Vrij, 2005). However, we believe that these cues are less diagnostic than the collective cues we measured in the present experiment. For example, Vrij (2005) reviewed CBCA field studies and noted that spontaneous corrections, admitting lack of memory, and raising doubt about someone’s own testimony appeared only in a minority of the statements that were analysed (in 40%, 40% and 40% of the statements, respectively). The benefit of the transactive memory cues is that truth-tellers use them frequently.

5.3. Practical applications

The immigration paradigm setting used in this experiment, in which couples were interviewed to judge whether their relationship was real or pretend, was particularly good for applying transactive memory theory because transactive memory was developed around intimate couples. This setting is becoming increasingly relevant as ‘immigration’ is high up the political agenda, with many Western countries trying to prevent illegal immigration. Detecting lies in the type of citizenship interviews examined in the present experiment can serve this purpose.

The four verbal transitions identified from this experiment should work under conditions in which pairs know each other well and are being interviewed collectively about actual shared experiences. Other collective interview situations where these verbal transitions are likely to occur include couples being interviewed with the aim of adopting a child, interviews at road and airport border controls, and interviews where both members of a couple are suspects (which happens frequently in suspected fraudulent insurance claims such as car insurance, tax claims, damage to property, theft, etc.). Institutions that deal with immigration, adoption, security or fraud would benefit from understanding social interactions and how pairs, specifically couples, behave together and recall information when questioned collectively. If the correct questions are asked and the collective interviewing technique applied then the transactive memory variables are likely to emerge and these will help investigators determine whether the individuals that form the pair (or group) require further questioning, either individually or again collectively.

It could be argued that the immigration paradigm will not reveal the verbal transitions identified in this study if one member of the pair is more dominant than the other, or if pair members notice ‘errors’ during the interview from what their partner is saying, but refrain from correcting them through fear that they will then not be believed. Recent collective interviewing studies have considered these two issues. First, a study by Vrij, Mann, Leal, and Hillman (submitted for publication) used a forced turn-taking technique that took away the control from the pair of who responded to the interview question. This technique involved the interviewer stating which of the two participants was to answer the question, and then intervening every 20 seconds by stopping whichever of the participants was responding and asking the other participant in the pair to continue from the point in which their partner was stopped. This continued until the pair had finished answering the question. This turn-taking technique could be applied to the current immigration scenario as a way of preventing dominant characters from influencing the findings. Second, a study by Vrij et al. (2012) demonstrated that truth-telling pairs are not afraid to correct one another, add information to each other’s accounts or interrupt each other, and they do actually do this significantly more than lying pairs. Therefore, the fact that truth-telling pairs will not correct ‘errors’ is not warranted.

Future research should consider whether the verbal transitions identified during this experiment will emerge when close, but not intimate, friends are being interviewed together about past shared events, e.g., close friends who claim to have been to a restaurant, shopping mall, or sport venue together at the time a crime took place. Additionally, it would be interesting to explore whether the verbal transitions emerge in ‘suspect-alibi’ situations to help law enforcement with the identification of false alibis. The verbal transitions should emerge more distinctly if two individuals are actually describing a shared event that took place at the time the crime was...
257




Appendix E: UPR16 Form

---

### FORM UPR16

**Research Ethics Review Checklist**

Please complete and return the form to Research Section, Quality Management Division, Academic Registry, University House, with your thesis, prior to examination.

**Postgraduate Research Student (PGRS) Information**

- **Candidate Name:** ZARAH VERNHAM
- **Department:** PSYCHOLOGY
- **First Supervisor:** PROF. ALBERT URIS
- **Student ID:** 337733
- **Start Date:** 1st October 2011

**Study Mode and Route:**

- Part-time
- Full-time
- MPhil
- MD
- PhD
- Integrated Doctorate (New Route)
- Prof Doc (PD)

**Title of Thesis:**

"NO SAFETY IN NUMBERS": DETECTING DECEPTION USING A COLLECTIVE INTERVIEWING APPROACH

**Thesis Word Count:** (excluding ancillary data) 44,530

---

If you are unsure about any of the following, please contact the local representative on your Faculty Ethics Committee for advice. Please note that it is your responsibility to follow the University’s Ethics Policy and any relevant University, academic or professional guidelines in the conduct of your study.

Although the Ethics Committee may have given your study a favourable opinion, the final responsibility for the ethical conduct of this work lies with the researcher(s).

---

### UKRIQ Finished Research Checklist:

If you would like to know more about the checklist please see your Faculty or Departmental Ethics Committee or refer to the online version of the full checklist at http://www.ukri.org.uk/downloads/academic-handbook-for-ethical-research.

**a)** Have all of your research and findings been reported accurately, honestly and within a reasonable time frame? **YES/NO**

**b)** Have all contributions to knowledge been acknowledged? **YES/NO**

**c)** Have you complied with all agreements relating to intellectual property, publication and authorship? **YES/NO**

**d)** Has your research data been retained in a secure and accessible form and will it remain so for the required duration? **YES/NO**

**e)** Does your research comply with all legal, ethical, and contractual requirements? **YES/NO**

---

UPR 16 (2013) – November 2013
Candidate Statement:

I have considered the ethical dimensions of the above named research project, and have successfully obtained the necessary ethical approval(s).

Ethical review number(s) from Faculty Ethics Committee (or from NRES/SCREC):

<table>
<thead>
<tr>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>10th Jan 2012</td>
</tr>
<tr>
<td>15th May 2013</td>
</tr>
</tbody>
</table>

Signed:  
(Student)  
Date: 27/01/15

If you have not submitted your work for ethical review, and/or you have answered 'No' to one or more of questions a) to e), please explain why this is so:

Signed:  
(Student)  
Date: