

ICC COMMISSION REPORT

The Accuracy of Fact Witness Memory in International Arbitration

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I. Introduction

A. Background

- 1.1 At the October 2015 meeting of the ICC Commission on Arbitration and ADR, Toby Landau, QC delivered a guest speech entitled *Unreliable Recollections, False Memories and Witness Testimony*. In that speech, Toby Landau gave the Commission an insight into the science of human memory, highlighting its fragile and malleable nature and the ease with which memories can become unwittingly corrupted. He then questioned whether the practices that are commonly adopted for the preparation and presentation of fact witness evidence in international arbitration are themselves potentially corrupting the very evidence that arbitral tribunals rely upon for the fair resolution of disputes.
- 1.2 Toby Landau's speech was not just entertaining and thought-provoking. It invited further enquiries to be made. If indeed these risks exist, what practical steps might be taken to improve the probative value of witness evidence in international arbitration?
- 1.3 The Commission decided to take up this invitation and created the Task Force *Maximising the Probative Value of Witness Evidence*. Its mandate was to look at the science (with input from eminent psychologists specialising in human memory), at arbitral practice (with input from Task Force members specialising in international arbitration from around the globe) and to consider whether modifications could be made to current practices, or alternative approaches could be adopted, in order to enhance the probative value of fact witness evidence in international arbitration, particularly as it is affected by memory.

B. Summary of conclusions

- 1.4 This Report describes the work undertaken by the Task Force, including the independent study that it commissioned by Dr Kimberley A. Wade of the Department of Psychology at the University of Warwick in England. It considers the pertinence of memory issues in international arbitration and sets forth some measures that can be taken to protect witnesses' memories.
- 1.5 The Report sets out the Task Force's conclusions and recommendations (in Section VI), which can briefly be summarised as follows:
 - a) Science shows that the memory of an honest witness who gives evidence in international arbitration proceedings can easily become distorted and may therefore be less reliable than the witness, counsel or the tribunal expects. Greater awareness of the circumstances in which memory distortion is likely to occur and the measures that can be taken to avoid such distortion will be a key step forward for all participants in the arbitration process.
 - b) There are many steps (as set out in detail in Section V) that can be taken by witnesses, in-house counsel, outside counsel and arbitral tribunals to reduce the risk of distortions of witness memory and to better assess the weight to be given to witness evidence in the light of any distortions. In some cases, however, those steps will be impractical, or may actually reduce rather than enhance the accuracy of the evidence and the efficiency of its presentation. A case by case (and potentially witness by witness) assessment is therefore required to determine which steps are appropriate.
 - c) Witness evidence is presented in arbitration proceedings for different purposes, many of which do not rely upon the accuracy of witness memory (as discussed in Section IV). Where the accuracy of witness memory is not relevant, neither are concerns regarding memory corruption.

C. Why is this Report relevant to arbitration practitioners?

- 1.6** The Commission considered the work of this Task Force to be a valuable contribution to the international arbitration community because witness evidence is not only a common feature in international arbitration, but it often takes a central role in arbitration proceedings:
- a)** The preparation of witness statements is a significant task that consumes the time and attention of both the witnesses involved and the legal counsel representing the party relying on the evidence.
 - b)** The preparation of witness statements can be costly, particularly where the statements are in narrative form and give an extensive account of the factual background to the dispute.
 - c)** The presentation of oral evidence is one of the main functions of a 'final' hearing. It tends to consume the majority of the time taken at such a hearing, often amounting to several days.
 - d)** The costs associated with the presentation of oral evidence are usually significant. The witnesses must take time away from their usual occupations to attend the hearing and often incur out of pocket travel and accommodation costs. They may also spend time preparing to give their evidence. The lawyers spend time preparing the witnesses called by their client and the cross-examination of the other side's witnesses. The tribunal will read all the witnesses' statements in advance of the hearing so that it can understand the evidence given in cross-examination and ask follow-up and questions to seek clarification as appropriate.
 - e)** The decision of the tribunal on the merits of the case will often turn, in varying degrees, on the witness evidence that has been presented. One of the important judgments that tribunal members will often have to make is to determine the credibility of a witness and the weight to be given to a witness' evidence.
- 1.7** The time, effort and cost that are put into the collation and presentation of witness evidence are considered to be justified on the basis that they assist the tribunal reach a just decision in the case. That justification is called into question if the witness evidence is not as reliable as the participants in the process (and most importantly the tribunal) believe it to be.
- 1.8** Historically, different legal cultures have taken different approaches to the presentation of witness evidence in both litigation and arbitration proceedings. In broad terms, *civil law jurisdictions* have placed less focus on witness evidence and more focus on documentary evidence. Some civil law jurisdictions are so sceptical regarding the value of witnesses who are employed by a party to the proceedings that evidence from such witnesses is not admissible at all. In contrast, *common law jurisdictions* have placed significant focus on witness evidence and it is from those jurisdictions that the traditions of narrative witness statements and the cross-examination of witnesses have emerged.
- 1.9** As with other areas of arbitral procedure, the international arbitration community has sought to harmonise its approach to the presentation of witness evidence so as to provide what some refer to as a 'level playing field'. The IBA Arbitration Committee in particular has done significant work in this regard, most notably in publishing the 'IBA Rules on the Taking of Evidence in International Arbitration' and the 'IBA Guidelines on Party Representation in International Arbitration'. The latter of these two documents states:
- 'Many international arbitration practitioners desire more transparent and predictable standards of conduct with respect to relations with Witnesses and Experts in order to promote the principle of equal treatment among Parties.'¹
- 1.10** This harmonisation has resulted in a well-accepted default approach to the presentation of witness evidence in international arbitration proceedings which includes the preparation and exchange (simultaneous or sequential) of narrative statements from each witness of fact.

¹ 'IBA Guidelines on Party Representation in International Arbitration', Comments to Guidelines 18-25 ('Witnesses and Experts'), available at https://www.ibanet.org/Publications/publications_IBA_guides_and_free_materials.aspx.

- 1.11** The 'IBA Guidelines on Party Representation in International Arbitration'² provide that a party representative may:
- assist witnesses in the preparation of their witness statements, whilst seeking to ensure that a witness statement reflects the witness' own account of relevant facts, events and circumstances; and
 - meet or interact with witnesses in order to discuss and prepare their prospective testimony.
- 1.12** These practices are already widely used, which was no doubt a factor in the IBA Arbitration Committee's decision to propose them as accepted 'best practice'.
- 1.13** The international arbitration community has therefore developed a well-accepted practice for the presentation of witness evidence which has undoubtedly assisted in levelling the playing field. However, what has not been done – at least in the field of international arbitration – is to consider whether the best practices that we have developed produce witness evidence that has the probative value expected of it and justifies the effort and expense that go into its preparation.

D. Summary and structure of the Report

- 1.14** Scientific studies and human experience show that witness memory is imperfect and is subject to possibly distorting influences as soon as it is formed. Memory is malleable – it is not akin to a fixed image that is 'retrieved' when needed, but rather it is a dynamic process that can be affected by subsequent events.
- 1.15** As the science establishes that witness memory can become altered or contaminated, the Task Force examined ways to reduce the distortions, and in particular, ways in which the participants in the arbitral process (witnesses, in-house and outside counsel, arbitrators) can reduce the distortions in the memory process.
- 1.16** For instance, practices that are not uncommon in modern arbitral practice, such as interviewing witnesses in a group rather than individually, can distort a memory. Also, lawyers arrive 'on the scene' at different points after the memory is formed, and one of the aims of this Report is to reduce the risk of memory distortion as early as possible in the process. The suggestions include steps that can be taken to preserve memory such as the maintenance of contemporaneous documents (even before the lawyers arrive on the scene) as well as practices designed to reduce the distortion-causing effects of lawyer/witness interaction and other practices such as collective witness preparation.
- 1.17** When addressing how to enhance the value of witness evidence, one must be careful to distinguish between inaccuracies or distortions that result from the imperfections of the memory process and deliberate efforts by a witness to distort or shade the truth. This Report identifies measures that can help to reduce or prevent the inaccuracies or distortions that result from the former, namely, unintentional but nevertheless real, distortions and inaccuracies in witnesses' memory that result from the memory process itself.
- 1.18** This Report is comprised of six sections and two Appendices which are integral parts of the Report.
- 1.19** **Section II** 'What existing scientific research tells about memory and eyewitness evidence' refers to the work of Professor Maryanne Garry and summarises the report co-authored by Dr Ula Cartwright-Finch and Dr Kimberley Wade (at Appendix 1) that sets forth the contemporary science with respect to memory, with a particular focus on aspects pertinent to witness evidence.
- 1.20** Because much of the existing scientific research with respect to witness memory centres on criminal cases in which witnesses typically are asked to recall what they saw and heard with respect to a particular incident, the Task Force pondered whether the findings of those studies – that human memory is subject to distortion by post-event information and other factors – also applied to disputes in international arbitration which normally do not centre on one critical event (i.e. the 'commission of the crime') but rather involve a sustained interaction between parties (witnesses) over time,

2 Respectively Guideline 20 and Guideline 24.

including communications in person and via other means. Another feature of international arbitration is that witnesses are only asked to give evidence by a party if their evidence supports the case being advanced by that party. Witnesses who are entirely neutral to the parties are rare.

- 1.21** To address these concerns, the Task Force benefitted from the expertise of Dr Kimberley Wade at the University of Warwick, who undertook a series of field studies designed to determine the vulnerability of memory in the context of a commercial dispute not atypical of the disputes that are routinely resolved in arbitration.
- 1.22** **Section III** ‘Do the same witness memory issues arise in international arbitration?’ summarises the key findings of Dr Wade’s research (at Appendix 2) that reveals that the memory of witnesses in international arbitration is subject to the same distorting effects research has proven exists in other contexts.
- 1.23** **Section IV** ‘Accuracy of witness memory and its significance in international arbitration’ examines the purposes for which witness evidence is used in international arbitration and evaluates the contexts in which accuracy of witness memory is and is not important. It draws in great measure upon the views of the Task Force members based on their experiences.
- 1.24** Witness memory can be affected by a variety of factors, including post-event information and bias (such as pro-employer). Multiple actors in the course of a dispute, including in-house counsel, outside counsel, peers and supervisors, can impact a witness’ memory process, so each of the participants in the arbitral process can help to reduce the distortion effects.
- 1.25** **Section V** ‘Measures that can be taken to improve the accuracy of witness memory’ sets forth specific suggestions about how in-house counsel and outside counsel can carry out the fact-gathering and fact-presenting process so as to reduce the risk of memory distortion. It also describes certain steps that an arbitral tribunal may consider taking in appropriate cases, both to reduce the distortions of witness memory and in evaluating witness evidence in the light of any potential distortions.³
- 1.26** **Section VI** sets out the Task Force’s ‘Conclusions and Recommendations’. As is stressed in several places in this Report, the measures described in Section V are not intended to be one-size-fits-all. In essence, the suitability and utility of each suggestion can be evaluated only in the context of the specific circumstances. The efforts to keep witness memory pristine must be tempered with practical considerations. Sometimes, for example, it is not practical to interview witnesses individually. As well, sometimes post-event information, such as reviewing a document, can refresh or reactivate a witness’ memory accurately. In addition, different arbitrators will have different philosophies about the role and importance of witness evidence and the extent to which they should become involved, if at all, in discussions with the parties or the witnesses about the way in which witness evidence is prepared. Accordingly, the Task Force recognises that some arbitrators will not consider it appropriate to take some of the steps suggested – but they are included in the Report so that they can be considered by all and used selectively by those who consider they may be helpful.
- 1.27** The Task Force is of the view that when dealing with something as complex and intangible as how to obtain the maximum value from witness evidence, there is no single ‘best’ practice. Given the variety of issues relative to witness memory (and therefore witness testimony), tribunals and parties need to evaluate what measures are called for in the particular circumstances, which measures are worth the effort, and how important the risk of memory distortion is to the outcome in light of the facts of the case.
- 1.28** Thoughtful analysis is required to avoid under – or over – correcting. For example, some practices, such as having counsel prepare a witness statement, can have a distorting effect upon the witness’ memory but, nevertheless, have a significant benefit in helping a lay witness communicate to the tribunal the witness’ understanding of the facts. All measures offered for thought in this Report are also subject to overriding legal requirements of the particular jurisdiction involved.

³ The Task Force is grateful to Task Force members Philippa Charles, Nadia Darwazeh and Pascal Hollander for their work on this Section, which also draws on work previously published by Dr Ula Cartwright-Finch.

- 1.29** Once the process of determining what happened in a dispute is based on a reconstruction of events after the fact, it is destined to be imperfect. The fact that witnesses' memories are imperfect does not mean that their testimony is not valuable or at times vital. The aspiration should be to reduce the imperfections to the extent reasonably possible in order that the decision rendered can be just, based on a reasonably close approximation of what in fact happened. The measures recommended in this Report are one step in that direction.
- 1.30** The value of witness evidence is affected by many factors, memory being just one. Factors such as cultural perceptions, manner of presentation, language, and cognitive biases by arbitrators, counsel and witnesses, all bear on the value of witness evidence. In the course of the Task Force's work, Task Force members made salient observations with respect to these other factors.
- 1.31** While the Task Force was tempted to study such factors as well, after careful consideration, it concluded that those subjects were beyond the Task Force's remit which was specifically to study and make recommendations about the effect of memory on the value of witness evidence. As a result, the many interesting and valuable observations made by Task Force members with respect to such other factors are not included in this final Report, but that is not intended to imply that witness evidence is not affected by factors other than memory.
- 1.32** The Task Force in fact considers that the value of witness evidence could be enhanced through further study of such other factors, quite apart from memory. The Task Force would encourage ICC and the arbitral community in general to consider studying such other ways to enhance the value of witness evidence in the arbitral process.
- 1.33** While the many salient points raised by Task Force members with respect to other factors that affect or might affect the value of witness evidence are not included in this final Report, one – cross-examination – warrants mention. Task Force members commented on the effect of cross-examination on witness evidence, there being a range of views on the subject. As the Task Force's remit is the effect of memory on the value of witness evidence, the Task Force sought to evaluate the effect of cross-examination on witness memory – not the effect of cross-examination on the value of witness evidence in general.
- 1.34** Dr Wade for sharing her knowledge explained:
- '[M]any studies have focused on the accuracy of eyewitness accounts and the factors that increase or decrease accuracy, [but] relatively fewer studies have examined memory accuracy as people recount their experiences on different occasions. Given there are few studies into the effect of cross-examination style questions on memory accuracy, it would be premature to make any practical recommendations.'⁴
- As a result, the Task Force makes no recommendations with respect to cross-examination.

4 While there are some limited studies on the effect of cross-examination on witness testimony in a criminal context, there is, as Dr Wade notes, little study of the effect of cross-examination on memory. Dr Wade explained: 'The most relevant study to date explored the effect of cross-examination-style questioning on memory accuracy in children (9-11 years), adolescents (14-16 years), and adults (25-60 years), Jack and Zajac (2014). This study also examined the effect of reminding witnesses about their original memory report on cross-examination performance. First, subjects watched a brief film of a simulated crime. Forty-five minutes later an experimenter interviewed the subject about the film following a standard police interview procedure which incorporated aspects of the cognitive interview. Eight months later the subjects were re-interviewed by an unfamiliar experimenter. Immediately beforehand, half of the subjects heard an audio recording of their original interview and half did not. All subjects then gave a new free-recall account, and were questioned as in the first interview. During the questioning, subjects were asked neutral (control) questions like they received in the original interview, and also cross-examination style questions that challenged their original responses (these questions challenged subjects' original yes-no responses, irrespective of accuracy). The results for the adult subjects showed that they were about twice as likely to alter their responses when asked cross-examination questions rather than control questions. Reminding subjects about their original testimony significantly reduced the number of changes they made when responding to control questions but not to cross-examination questions. Crucially, cross-examination questions did not reduce the overall accuracy of adult subjects' responses because when adults were challenged they were more likely to alter their incorrect responses than their correct responses'.

II. What existing research tells us about memory and eyewitness evidence

- 2.1** The starting point for this Task Force was to understand the existing research that has been undertaken into the fallibility of human memory insofar as it is relevant to witnesses. That research has largely focused on the memory of eyewitnesses, and the potential impact of erroneous memories on criminal justice.
- 2.2** Once that research was understood, the Task Force could move on to consider its potential impact on witness evidence in international arbitration. That consideration would necessarily include an assessment of whether new research would assist in confirming whether the conclusions drawn in relation to eyewitness memory are equally applicable to the memory of witnesses who give evidence in commercial disputes – typically business people who are recalling meetings, discussions and other events relating to a business transaction.
- 2.3** At the outset of its work, the Task Force was introduced to Professor Maryanne Garry, at the School of Psychology of the University of Waikato in New Zealand. Professor Maryanne Garry and her co-author Eryn Newman describe scientific studies that lead to the conclusion that ‘memories are not an objective, unyielding imprint of the past, but a subjective, pliable patchwork of experience, thoughts and daydreams’.⁵
- 2.4** Professor Garry and Eryn Newman’s chapter describes studies which investigate the impact that exposure to post event information (‘PEI’) can have on a person’s memory. In particular, it looks at the impact that misleading PEI can have on the way in which a witness recalls a specific event. The following short excerpts from the chapter provide a snapshot of some of the key findings:

‘Over the last four decades, hundreds of experiments conducted in laboratories all over the world have demonstrated that people unwittingly adopt misleading suggestions as their own memories. Although here we focus on how information after an event can shape people’s memory reports, information that people encounter before an event can also shape memory.’

‘Talking to co-witnesses after an event, viewing media reports, or retelling an experience to friends or officials are all opportunities for PEI [post event information] to creep into memory reports.’

‘This line of research suggests that simply sharing our experience with someone else can be an opportunity for misinformation to invade memory.’

‘This research tells us that misinformation doesn’t just alter details in our memory, it can add information to memory that was never there in the first place.’

‘Guessing and describing can act as misinformation, so that details people first offer as guesses can later corrupt memory for the event.’

‘A memory for the event becomes weaker, it becomes more susceptible to misleading PEI.’

‘When the misinformation messenger seems particularly credible, inaccurate PEI is more likely to creep into people’s memory. Findings from co-witness research fits with this idea: witnesses who believe that another witness saw an event for longer are more likely to adopt that witness’ inaccurate suggestions.’

‘If people can track the sources of their memories easily and they are told to watch out for errors, they can better avoid misleading suggestions. In general, warnings are most effective when they occur before the PEI, because people can carefully scrutinize subsequent information and protect themselves from misleading suggestions.’

- 2.5** The scientific research that these short excerpts relate to suggests not only that human memory is very unreliable, but also that a witness’ exposure to pre and post event information regarding an event can add to, detract from or change a memory of the event.

5 E.J. Newman, M. Garry, ‘False Memory’ (Chap. 7), in *The SAGE Handbook of Applied Memory*, T.J. Perfect, D.S. Lindsay (eds.) (SAGE Publications Ltd, 2013).

- 2.6 The potential relevance for the witness evidence that is presented in international arbitration is clear. The way in which witness evidence is currently prepared and presented in arbitration proceedings includes multiple opportunities for a witness to be exposed to PEI, including potentially misleading PEI. Does that lead to a risk that the evidence of honest witnesses may be less reliable than arbitral tribunals currently assume?
- 2.7 As a first step in answering that question, Dr Ula Cartwright-Finch⁶ and Dr Kimberley Wade prepared a report on three specific areas of research that are particularly pertinent to witness evidence in international arbitration. This report entitled 'Selected Review of Scientific Literature relating to Memory and Witness Evidence' (Appendix 1 to the Task Force's Report) focuses on three areas:
- How the specific wording of a question can change the way a witness replies.
 - The way in which a witness may be influenced by information received after an event (the so-called 'misinformation effect'), including (i) situations where distortions are introduced into the witness' own memory reports; (ii) misinformation arising in the context of discussions between co-witnesses; and (iii) the creation of entire false memories.
 - How the act of retelling a story from a particular perspective can change a witness' memory.
- 2.8 Readers are encouraged to read the report of Dr Cartwright-Finch and Dr Wade in full. This section follows with a brief summary of some of the studies described in the Report and the conclusions that can be drawn from them.

A. The impact of phrasing on responses to questions

- 2.9 The preparation of witness evidence in arbitration typically involves a witness being questioned or interviewed by a lawyer who represents the party that wishes to rely on that witness evidence. That lawyer may go on to prepare a first draft of a witness statement based upon the answers given by the witness. Studies which have looked at the impact of phrasing in questions on the memory recall of a witness are therefore of interest.
- 2.10 Studies have shown that qualifying descriptors in a question can heavily influence the answer given. For example, in one study, participants who were asked to estimate 'How long was the movie?' answered with an average of 130 minutes vs those who were asked 'How short was the movie?' who responded with 100 minutes on average.
- 2.11 Similarly, in a separate study, the question 'Do you get headaches *frequently*, and if so how often?' tended to produce a different answer to the question 'Do you get headaches *occasionally*, and if so, how often?' Those answering the first question reported on average 2.2 headaches per week, whereas those answering the second question reported only 0.7 headaches per week.
- 2.12 The conclusions drawn from these and similar studies is that the specific wording used in witness interviews is important. Changing just one word within a question can materially change the evidence that a witness recounts.

B. The misinformation effect

- 2.13 The misinformation effect describes a phenomenon where typically misleading information which participants are exposed to after an event interferes with or impairs their original memory of that event.
- 2.14 Potential witnesses in arbitration proceedings may well come into contact with such misinformation. This might come from management, colleagues or fellow witnesses, or it might come from in-house or external counsel who discuss the witness evidence in preparation of the case. The potential effect of misinformation on witness memory is therefore of interest.

6 Ula Cartwright Finch has over a decade of experience acting as counsel in international, commercial, and investment treaty arbitrations. Dr Cartwright-Finch also holds a PhD in Cognitive Psychology from UCL and has done considerable work in the area of psychology and law, with a particular focus on memory and witness evidence.

- 2.15** One way in which misinformation can be transmitted is from another witness. For example, studies have shown that where two subjects viewed somewhat different versions of an incident (e.g. highly similar scenes of a mock crime that are filmed from different camera angles) and discussed the events subsequently, they unwittingly transmitted misleading information to each other, which can substantially alter a witness' memory and report. Even more, the report by Dr Cartwright-Finch and Dr Wade informs that people tend to incorporate details of other witnesses' memory reports into their own memory reports, even if that information contradicts what they have observed.
- 2.16** The relevance of this to international arbitration is evident. Disputes in arbitration normally involve multiple persons with knowledge of the pertinent facts (witnesses), and as part of the normal process of dealing with problems, those persons communicate and interact with each other, both before and after counsel are on the scene. Beyond that, it is not unusual for witnesses to be interviewed or debriefed together.
- 2.17** Of particular relevance to international arbitration is a recent large cross-cultural study, reported by Dr Cartwright-Finch and Dr Wade, that demonstrates the effect of co-witness discussion on memory. This study included pairs of participants from ten countries (Brazil, Canada, Colombia, India, Japan, Malaysia, Poland, Portugal, Turkey and the United Kingdom) who each watched slightly different versions of the same film and then discussed the conflicting details they had viewed. Participants often reported details on the memory test that they had not witnessed. The key takeaway for international arbitration was that culture did not keep witnesses from incorporating details of other witnesses' memory reports into their own memory reports, even if that information contradicted what they had observed. Regardless of whether that incorporation was the result of a memory distortion or of witnesses' trusting reliance in their co-witness, the study is relevant to international arbitration.
- 2.18** The misinformation effect has been replicated across thousands of studies in a wide variety of contexts and using a variety of different stimuli.
- 2.19** A witness' exposure to misinformation may come about in different ways, one of which is in the form of questions that are put to the witness. For example, participants in a study who were asked to recall 'Did you see *the* broken headlight?' were far more likely to recall a broken headlight than participants who were asked 'Did you see *a* broken headlight?'. The simple use of the definite article which implied that there was a broken headlight in the video clip that the participants had viewed was sufficient to affect the participants' recollection.
- 2.20** Studies show that the incidental presentation of misinformation can strengthen the memory changing effect: participants in a study who had been shown a video clip where no school bus had been present were more likely to respond positively to the question 'Did you see the children getting on the school bus?' than they were to the question 'Did you see the school bus?'.
- 2.21** Studies have also shown that misinformation can have the effect of overwriting an existing factual memory in addition to supplementing memory with additional (inaccurate) details. For example, participants who had seen a video of a car accident next to a 'Stop' sign were asked questions which included reference to the fact that the car had been stopped next to a 'Yield' sign. When later asked to identify the correct image from the video, 59% chose the image with a 'Yield' sign and only 25% chose the correct image with the 'Stop' sign that had featured in the video.

C. False memories

- 2.22** The studies referred to above examined memory in the context of a participant passively witnessing an event such as a road accident. A series of striking studies extended these results to show that it is possible, in some circumstances, to lead participants to 'remember' entire fabricated events which have happened to them personally, so-called 'false memories'.
- 2.23** For example, participants who were reminded of true events from their childhood were, over time, led to also recall a fabricated event (getting lost in a shopping mall) by the inclusion of questions about that fabricated event in successive interviews with the researchers. Over the course of multiple interviews, some participants reported the episode with greater detail, confidence and embellishment.

- 2.24** Misinformation can therefore be used to implant entire events within a person's memory. A further example of this was a study that involved the digital manipulation of old photographs. By showing adult participants a photo which had been digitally enhanced to show them riding in a hot-air balloon, some participants were led to report complete or partial memories relating to a totally fabricated hot-air balloon ride. This further extension of the false memory effect has significant implications given the widespread availability of digital tools designed to doctor photographs and documents.
- 2.25** False memories can arise from manufactured evidence. Dr Cartwright-Finch and Dr Wade report on one experiment in which a subject participating in a gaming exercise next to another subject was asked to corroborate that he had seen the other subject cheating. Those subjects shown a false video were more likely to provide corroboration (of something they had not seen and had not happened – cheating) than those who had not seen the video. The saying that 'seeing is believing' is especially fraught with risk in the modern digital world.

D. The impact of retelling on subsequent recall

- 2.26** Research has been conducted to examine how taking a particular perspective after an event is encoded into memory can bias later recall of the event towards a biased perspective. Of course, in the context of a commercial dispute, a witness is very often engaged in telling his or her story from a particular perspective – most commonly that of a claimant or respondent by whom they are often employed. The potential impact of this biased retelling on the witness' memory is therefore relevant to the typical arbitration scenario.
- 2.27** Participants in one study were given a story about their first week of a new year at college and the interactions they had with two roommates. One group were asked to write a letter complaining about one of the roommates. Another group were asked to write a letter recommending one of the roommates. A third (neutral) group were just asked to write about the roommates.
- 2.28** When their recall was later tested, the participants' recollection of the original roommate story was materially influenced by the biased retelling that they had been asked to undertake when writing the letters. Participants remembered more about the roommate they had written about, and also made more biased errors about that roommate. The neutral group did not demonstrate the same errors in the recall task. Thus, participants in this study used the original story to suit their task, and that act of perspective-taking affected their subsequent recall of the original story.

E. Maximising the completeness and accuracy of witness memory reports

- 2.29** Dr Cartwright-Finch and Dr Wade report on studies that show how steps can be taken to ameliorate distortions on memory. For example, studies indicate that people are much less likely to experience memory errors if they can retrieve information in memory that helps them to identify any details that are distorted or have been suggested to them.
- 2.30** Dr Cartwright-Finch and Dr Wade note a number of steps that can be taken to ameliorate distorting effects, such as:
- a)** Have witnesses provide a complete account of the witnessed event immediately after it has happened. Doing this will reinforce the memory for later recall and reduces the chances of subsequent contamination.
 - b)** As discussed above, the phrasing of a question can impact the witness' answer and affect memory subsequently. The authors cite the use of open-ended questions rather than specific or potentially leading questions as one technique to reduce distorting effects.
 - c)** Where a witness is unsure or tentative about an answer, the questioner can have a distorting effect upon subsequent memory; interviewers should not reinforce tentative or unsure responses as this can inflate a witness' confidence in testimony they are actually uncertain about.

- d) Studies show that warning witnesses that they have been misled – after being misled but prior to having their memories tested – can reduce memory errors; reminding witnesses that their task is to report only their own personal knowledge can reduce memory distortion.
- e) Studies also show that witnesses have more accurate and less distorted memory recounts when encouraged to identify the source of their knowledge.

F. Conclusions

2.31 The Task Force was persuaded that the existing research raised two important questions in the context of international arbitration:

- Is there a risk that in some cases, witness evidence which is based upon witness memory is not as reliable as a tribunal might have assumed?
- If so, are there steps that can be taken to improve the reliability of witness evidence?

2.32 In order to answer the first question, the Task Force felt that further scientific research would be helpful. Specifically, the Task Force wanted to test whether similar results would be produced by a study which tested witness memory in the context of a commercial dispute which might typically be the subject of international arbitration proceedings. The next section of this Report describes the study that was undertaken and its findings.

III. Do the same witness memory issues arise in international arbitration?

- 3.1** In order to test memory in a commercial setting, the Task Force and Dr Wade developed a witness memory experiment. The experiment was designed as an online study. A total of 316 adults, working across a broad range of industries and roles, participated in a standard witness memory experiment. The experiment confirmed that memory mistakes also occur in a commercial setting typical of arbitration proceedings. Details of this experiment are set out in Dr Wade's experimental report (Appendix 2).
- 3.2** For purposes of the experiment, participants initially read about a contractual agreement between two companies that ultimately led to a dispute. Participants first read a summary of the contractual relationship between a printing company and an industrial flooring company. The printing company contracted the flooring company to replace the floor in their printing plant. Next, participants studied the contract and purchase order created for the works before reading a transcript of an in-person meeting that took place between the two companies not long before the works commenced.⁷
- 3.3** In order to examine how participants' (biased) perspective might affect their subsequent memory of key events, some participants were instructed to imagine they were the Managing Director of the printing company and others were instructed to imagine they were the Managing Director of the flooring company. Some (control) participants were not told to imagine anything. Further misleading information was introduced in the course of the experiment.
- 3.4** After a short delay, participants were informed that a dispute has arisen between the two companies around two issues.
- 3.5** First, the flooring company's invoice included a surcharge that the printing company claimed they had never agreed to pay. In fact, no such agreement for the payment of a surcharge was reached at the meeting.

⁷ The Task Force questioned whether the experience of participants who read a case study was comparable to the experience of witnesses who lived through the events in question. Dr Wade's opinion was that the underlying mechanisms of human memory work in much the same way, so the findings from the case study are a good indicator of how witnesses in a real commercial dispute would respond.

- 3.6 Second, the new tile floor started to crack not long after being installed; the printing company believed that the tiles were not fit for the purpose required by the contract. The contract said nothing about the printing machines being rolled around the floor which would add to the load; however, the printing company argued that a representative from the flooring company was indeed aware that the machines moved around because he saw the machines moving during a meeting at the printing plant. The flooring company claimed that they were not aware that the printing machines would be rolled around; the facts of the case made it clear that the participants on the part of the flooring company could not observe machinery being moved around while they visited the printing company.
- 3.7 On this second issue, some of the participants, in addition to imagining being managing directors of either company, received additional (misleading) information in form of a memo by their own company's in-house counsel. While the in-house memo for the flooring company group suggested that the witnesses could not observe machinery being moved around, the memo provided to the printing company group suggested the opposite, i.e. that the staff of the flooring company could observe machinery being moved around (as stated, no such observation was possible).
- 3.8 Participants were then informed that the two companies agreed to arbitration and that they (each participant) had been called upon as a fact witness.
- 3.9 Participants then answered a series of questions about their memory of events. Most importantly, they were asked two questions about the key issues set out above.
- 3.10 First, participants were asked whether the printing company agreed to a surcharge at the in-person meeting. While the answers appeared to fit the prediction that participants would be biased towards their own company, the analyses showed that there was no (statistically) significant association between the company that participants imagined they worked for and their response to this question. The available data, however, suggests that this is because participants found the issue too complicated.
- 3.11 Second, participants were asked whether a representative from the flooring company viewed the machinery on the factory floor being moved around. In regard to the second issue, the results revealed that instructing participants to imagine that they worked for one of the two companies and exposing participants to (biased) post-event information in the form of an in-house memo, influenced how they responded on the witness memory test.
- 3.12 Among the participants who imagined being the Managing Director of the flooring company, 66% responded that machinery could not be observed being moved around. This number increased to 78% for those participants who were further exposed to the in-house memo (suggesting that machinery could not be observed being moved around). For the participants who were asked to put themselves in the shoes of the Managing Director of the printing company, only 43% stated that machinery could not be observed being moved around; this number dropped to 29% for those participants who were further exposed to a misleading in-house memo (wrongly suggesting that machinery could be observed being moved around). It is interesting to compare these percentages with the control group containing participants who were not affiliated to either company and did not receive a biasing memo. In the control group, 50% responded that the machinery could not be moved around. This compares to 78% for the flooring company group that received a biasing memo in favour of the flooring company, and to 29% for the printing company group that also received a biasing memo in favour of the printing company.
- 3.13 The results from Dr Wade's study were consistent with those found in witness memory studies conducted in the criminal context. In particular, biasing people in favour of a particular company and exposing them to suggestive post-event information affected their memory reports. Each of these factors led participants to recall details in a way that better supported their own company's case. Taken together, these findings illustrate that just like witness memory in the criminal context, witness memory in business settings is liable to error.

IV. Accuracy of witness memory and its significance in international arbitration

- 4.1 The existing research (summarised in Section II of this Report) and Dr Wade's study (summarised in Section III) show that a high level of interaction between a witness and other sources of information can lead to distortions of memory.
- 4.2 In modern arbitration proceedings, such interaction starts when potential witnesses first receive information about what ultimately turns out to be a material fact. For instance, memory may be influenced by discussions between the potential witnesses as co-workers. Such interaction continues when the potential witness provides information to in-house counsel or external counsel for the purposes of drafting submissions. The level of interaction even increases when it comes to the stage of preparing witness statements, preparing - to the extent permissible - witnesses for the evidentiary hearing, and finally the examination of witnesses. If one applies the existing research to international arbitration proceedings, there undoubtedly is a high risk of memory distortions.
- 4.3 On this basis, it is tempting to recommend reducing the level of interaction, in order to reduce the level of memory distortions on the part of fact witnesses. However, such a recommendation would be premature for two reasons.
- 4.4 First, fact witness evidence in international arbitration is not just about memory. Parties also adduce fact witness evidence for other purposes in which memory plays only a limited role, or no role at all (see paragraphs 4.6 to 5.4 below).
- 4.5 Second, some of the procedures that entail the risk of memory distortions are beneficial for other reasons. In the view of the Task Force, it is therefore necessary to weigh the advantages and disadvantages of such procedures in order to avoid recommending a cure that is worse than the disease. This balancing exercise is discussed in Section VI 'Conclusions and recommendations' at the end of this Report.

A. Fact witness testimony is not only about memory

- 4.6 The research referred to in Section II was predominantly carried out in the area of criminal law, i.e. with a focus on eyewitnesses. In a criminal context, the essence of fact witness testimony (a witness to a crime) is about what witnesses have seen or have heard. Naturally, avoiding distortions of memory is highly important in such a setting. In international arbitration, the emphasis is usually different. Proving disputed facts that are material to the outcome of the case is not the only purpose of fact witness evidence.
- 4.7 As a discussion at an early meeting of the Task Force demonstrated, a party to arbitral proceedings and its counsel might decide to present the evidence of a particular witness to an arbitral tribunal for a variety of reasons. To give one commonly quoted example, witnesses can be used to give general background information and to 'set the scene' in which the dispute arose. When used in that way, it is quite possible that the evidence of a witness will not concern disputed facts at all.
- 4.8 For example, a joint venture dispute where the issue is whether one joint venture partner had performed its obligations to support the joint venture in accordance with the terms of a joint venture agreement. The CEO of the claimant describes in his/her witness statement the nature of that claimant's business, how the business had grown over the years and what its hopes and aspirations were when entering into the joint venture.
- 4.9 These are not matters which turn on the CEO's memory of specific events, and it is quite possible that they are not disputed by the respondent. The CEO's evidence is not material to the arbitral tribunal's determination of the issues in the case concerning an alleged failure of the respondent to perform specific obligations under the joint venture agreement. Nonetheless, the claimant and its counsel may well feel that it is helpful to include that material in the CEO's witness statement in order to give the

arbitral tribunal what it feels is relevant background to the case and to its position. They may also feel that it is helpful to their case for the tribunal to be able to meet, hear from and ask questions to a senior member of the claimant's management.

4.10 Recognising that in international arbitration witness evidence is used for purposes beyond proving disputed facts, the Task Force decided to explore in more detail what those uses were.

4.11 To this end, the Task Force circulated a questionnaire to members of the ICC Commission on Arbitration and ADR. These members include arbitrators, counsel, and user representatives from around the world. For the purposes of this Report, the questions in the questionnaire included:

- What are the purposes for which fact witness evidence is actually used in international arbitration?
- Are there purposes for which fact witness evidence is used which you do not consider useful?
- Could any of these purposes be served by other means?

4.12 These questions are addressed in Section IV(B) below, on the basis of the responses received from Commission members (a selection of which are quoted).

B. Different purposes of fact witness testimony

1) Proving disputed facts

4.13 The principal function of witness evidence was summarised succinctly in the following response:

'To prove disputed facts, in particular those that cannot be proven by written evidence.'

4.14 This is uncontroversial. Where a party needs to prove a fact in order to make good its claim or defence, and that fact cannot be proven by documentary evidence, then witness evidence (if available) may be essential. There is unlikely to be any alternative. Of course, if the fact that needs to be proved arises out of historic events, then the accuracy of the memory of the witness of those events is important.

2) Explaining documents

4.15 Parties sometimes choose to present witness evidence on matters which are also addressed in documentary evidence. The reasons for this can vary. The following examples were given:

'To provide a context for the contemporaneous documents.'

4.16 It may be helpful for an arbitral tribunal to understand the context in which important documents have been created or sent. For example, when reading a sequence of emails which set out a discussion between the parties on a particular topic, it may be relevant to hear evidence about a telephone conversation that took place on the same topic between the same parties in the course of that exchange. Whilst what was said on the telephone call may not be disputed, if the content of the conversation helps to explain the position a party has taken in a later email, that party may well feel that it is necessary to produce witness evidence of the conversation.

'Sometimes the plain language of a document can be misleading or can have several meanings. A witness can explain what he/she meant when he/she wrote (or received) a document.'

4.17 Whether witness evidence about what a witness meant when he or she wrote or agreed to wording in a document is relevant is likely to depend on a couple of factors.

4.18 Having a witness explain what he or she meant when using particular words in an email or letter may well help the tribunal understand what the witness was trying to say in that communication.

4.19 It is worth noting in this context that the relevance or admissibility of a witness evidence about his or her subjective intention when agreeing to certain ambiguous language in a contract may well depend on the governing law. National laws differ in the approach that they take to establish the true meaning of an ambiguous provision in a contract.

- 4.20 Whilst witness evidence to explain documents may be considered useful in some cases, it is worth noting that amongst the ways in which witness evidence is used which responders to the questionnaire felt were not useful, high on the list was repetition of documentary evidence. For example:

'If relevant and material facts are already well documented by written exhibits, a repetition of the respective content by witnesses may not be very useful, but only time consuming and costly.'

3) Providing context and 'telling the story'

- 4.21 Many members of the Task Force and Commission members who responded to the questionnaire stated that they use witness evidence to tell their or their client's story.

'To tell the party's story on a more personal/engaging level.'

'Filling in background and painting the tapestry of the factual matrix – there is often a lot of context behind a dispute that is not reflected in the documents.'

'Increase credibility of the party's position.'

- 4.22 Some responders said that it was important to be able to put a human face on information contained elsewhere in the documents and that witnesses could be used to elicit sympathy from the tribunal, for example by creating an impression that the party is a reputable company that always honours its commitments.

- 4.23 It is certainly common in international arbitration (perhaps increasingly so) for witness statements to include sections (sometimes lengthy) which provide background information from the perspective of that particular witness. Those responding to the Task Force's questions as counsel seemed to consider this to be more important and more useful than those responding as arbitrators. One arbitrator, however, commented:

'Witness evidence could be used to get an impression of the persons involved in the disputed fact patterns – all with the purpose to have a sound basis coming as close as possible to the "truth" to render an award.'

- 4.24 Whilst using witness evidence to tell a party's story may be a popular technique, many counsel and arbitrators who responded to the questionnaire expressed frustration at the use of witness evidence to argue a party's case. A commonly held view is that it is inappropriate for witness statements to be used to advocate a case, make legal arguments, offer opinions on legal interpretation and generally to address matters which are properly the domain of legal submissions. One arbitrator put it in these terms:

'Sometimes testimony by a party's officers is submitted as evidence with little purpose beyond explaining that party's position with respect to the dispute. That purpose is, in my view, better left to the party representatives and their written submissions or oral presentations. Similarly, the meaning and significance of documentary evidence submitted by the parties should primarily be explained to the tribunal in written or oral submissions. It is not always necessary to have witnesses explain the meaning of a document, especially where its text is clear on its face.'

- 4.25 Frustration was also expressed at witness statements that set out irrelevant information about the witness' personal background. A number of arbitrators also commented that witness evidence is used by some parties simply because the opposing party has done so. It was described as 'a ritual rather than a means to put a spotlight on really decisive factual issues'. One arbitrator commented that witness evidence is used 'all too often' to obstruct or delay the proceedings by submitting witness testimony on irrelevant or immaterial facts. Again, however, the question arises as to whether such perceived lack of focus could be avoided if a tribunal shares its preliminary views on what is relevant and material with the parties at an early stage. Another arbitrator was critical of witness statements that were 'used by lawyers to provide a slanted narrative description'.

4) Providing technical explanations

- 4.26** In technical cases, such as engineering or infrastructure disputes, witnesses often give testimony on the technical aspects of a dispute. While such explanations could in theory be left to expert witnesses, the parties' employees involved in such disputes often have a knowledge that equals the knowledge of expert witnesses, or might even be superior in case of highly specialised industries. Such witnesses, for instance, can provide useful explanations to a tribunal about a project in general, the functioning of a piece of machinery or even the root cause of a defect. In such cases, fact witness testimony is more about the witness' knowledge and experience; such that memory distortions are less relevant.

C. Conclusions

- 4.27** The responses to the questionnaire showed that there was no common ground as to whether the various purposes for which witness testimony is actually used in arbitration are all valid. For instance, some responders believed that providing context, also in the form of information that is not strictly material and relevant, is a valid purpose; at the same time, other responses indicated that such circumstantial information would render witness testimony less efficient.
- 4.28** To a certain extent, but not solely, these differences corresponded with legal backgrounds, i.e. whether responders had a common law or a civil law background. Generally, responders with a civil law background believed that fact witness testimony would benefit from being limited to facts that are disputed and relevant to the outcome of the arbitration. Responders with a common law background tended to accept a wider approach to fact witness testimony as useful. Another soft dividing line could be discerned between responders who answered from an arbitrator perspective and those who answered from a counsel perspective. Maybe not surprisingly, arbitrator answers favoured a more focused and narrower approach to witness testimony than counsel did. This held particularly true for witness statements.
- 4.29** Whilst the responses to the questionnaire provided a fascinating insight into the different reasons that parties and arbitrators consider witness evidence to be useful, it is not this Task Force's mandate to evaluate the usefulness of the mentioned purposes.
- 4.30** Having regard to this Task Force's topic, i.e. memory distortions, the following conclusions can be made.
- a)** The degree to which the probative value of witness evidence depends on the accuracy of memory varies in light of the different purposes that parties pursue by adducing fact witness evidence. If, for instance, a witness provides certain background information to a project, typical business procedures in his or her company, the mechanism of a piece of machinery, etc., such information is rather based on experience, education or knowledge. If, for instance, a witness describes the process of effecting payments within their company, e.g. how invoices are scrutinised and who has authority to greenlight payment, such testimony is about knowledge rather than memory. It is not about what a witness has perceived, i.e. has heard or has seen, at a specific point in time. For such witnesses, it is unnecessary to consider steps and procedures that reduce the likelihood of memory distortions.
 - b)** On the other hand, if fact witness testimony is about specific events, such as statements that were made during a meeting (in particular a meeting for which no written record exists) the accuracy of memory is likely to be important.
- 4.31** In light of these conclusions, the Task Force therefore considered that it would be helpful to set out steps that could be taken to ensure that witness memory is preserved as best as it can be. This is the focus of the next section of this Report. Such steps can be considered in cases where the accuracy of witness memory is likely to be material to the outcome of the case.

- 4.32** However, the Task Force also concluded that such steps may not be relevant, feasible or practical in many cases. Before embarking on steps which seek to preserve the accuracy of witness memory, it is first necessary to decide whether the accuracy of witness memory is likely to be a material factor in deciding the case. If witness evidence is being produced in the case for some of the reasons described in this section which do not depend upon witness memory, then the steps discussed in the next section of this Report are unlikely to be warranted.

V. Measures that can be taken to improve the accuracy of witness memory

- 5.1** This Section of the Report describes certain measures that can be adopted to preserve or increase the accuracy of witness memory.⁸
- 5.2** There was a wide consensus among the Task Force that the options listed in this Section must not be understood as 'rules' or 'best practices' that the Task Force would recommend be complied with. Rather, it is an open list that practitioners can consider and select from as appropriate.
- 5.3** The measures described are not intended to be one-size-fits-all. Given the variety of issues relative to witness memory (and therefore witness testimony), tribunals and parties need to evaluate what measures are called for in the particular circumstances, which measures are worth the effort, and how important the risk of memory distortion is to the outcome in light of the facts of the case. Thoughtful analysis is required to avoid under- or over-correcting.
- 5.4** Section V categorises measures into two groups. The first group is comprised of measures that can be taken to reduce distorting influences and their effect (A). As it might not be possible to eliminate distorting effects completely given the very nature of human memory, the second group is comprised of steps that can be taken to allow the tribunal and the parties to identify and weigh the distorting influences that might exist, and thereby take them into account when weighing the witness testimony (B). These steps are set out by reference as to whom they are aimed at – in-house counsel, external counsel, or arbitrators.

A. Measures that can be taken to reduce distorting influences and their effect on witness evidence

1) In-house counsel

- 5.5** In-house counsel are often the 'first responders' on the scene when a dispute arises, and therefore have the opportunity to take steps to mitigate or eliminate the factors that can distort the memory of witnesses. In-house counsel could:
- a)** Establish procedures for teams to keep contemporaneous written or oral notes of issues being discussed at the time the relevant events unfold, especially in a potentially or actually contentious situation.
 - b)** Emphasise to witnesses the importance of their own recollection being presented to external counsel. It is likely to be in the party's interests for counsel to be able to assess the witnesses' evidence fully, including the points which are unhelpful to its case.
 - c)** Where practicable, meet with likely witnesses individually, and avoid meeting with likely witnesses in groups to discuss the case, either internally or with external counsel, in order to avoid memory contamination.
 - d)** Strive to have present in witness interviews only those persons needed to conduct the interview effectively.

⁸ See also, U. Cartwright-Finch, 'Human Memory and Witness Evidence in International Arbitration', in T. Cole (ed.) *The Roles of Psychology in International Arbitration*, p. 119-229 (Wolters Kluwer, 2017).

- e) Avoid setting out a 'party line' to prospective witnesses which may have the effect of modifying their recollection of events so as to match the 'party line'.
- f) Discourage witnesses from needlessly discussing the matter amongst themselves. If witnesses do wish to do so, in-house counsel may be present to help ensure that the witnesses' memory is not impacted by such discussions.
- g) Involve external counsel early in the process (once a matter becomes contentious), then identify and preserve witness evidence while it is still fresh and authentic. This may include facilitating early witness interviews with potential witnesses and/or providing to all prospective witnesses guidelines aimed at reducing the risk of confabulation/false memory creation.

2) Outside counsel of party presenting witnesses

- 5.6** Outside counsel often play a central role in the gathering of evidence once a dispute has arisen and, in the process of gathering facts, interact with witnesses in ways that can affect the witness' later memories. Outside counsel may consider the following measures:

(i) Conducting interviews

- 5.7 Timing.** Interview witnesses at the earliest opportunity. The memory is likely to be more accurate (i) the closer to the event that is being recalled and (ii) the less it has been exposed to contamination from other sources of information.⁹
- 5.8 Setting of interviews.** Where feasible, interview witnesses individually – not in a group – to minimise memory contamination, i.e. to avoid having the memory of a witness change based on discussions with other individuals. In cases where outside counsel becomes involved only at a later stage, after the start of the dispute, establish how much prior discussion and contact there has been among the witnesses in order to gauge the extent the recollection may have already been modified.¹⁰
- 5.9 Keep an accurate record of interviews.** Consider having two persons conduct the interview, with one person being the primary interviewer and the other keeping detailed notes. Also consider keeping an audio or video recording (but to be clear, the Task Force is not proposing that witness interviews be recorded or taped as a general practice).¹¹
- 5.10 First interview of the witness.** Conduct the first interview with the following guidelines in mind (these guidelines are for consideration in each case and may not be appropriate in every situation):
- a) Put the witness at ease and in a condition to communicate the most accurate version of the facts by explaining some basic guiding principles:
 - Remind the witness that it is normal to have forgotten details and events. If the witness does not remember, they should simply say so. If the witness is making assumptions (e.g. on the basis on minutes of meetings or a calendar entry, the witness assumes that they attended a particular meeting), the witness should state that it is an *assumption* that is being made.
 - Ask witnesses to distinguish between what they remember rather than what another person may have told them or what they may have read. If witnesses relay information outside their personal scope of memory, they should state the source of such information.¹²
 - b) Assuming it is true, take steps to assure that telling the truth will not result in personal consequences to the witness.

⁹ Ibid. p. 38.

¹⁰ Ibid. pp. 23-31.

¹¹ Ibid. p. 40.

¹² Ibid. pp. 30-31, 39-40.

- c) Inquire about the discussions and correspondence that the interviewees already had regarding the memory they are being asked to recall.
- d) Reconstruct the trajectory of the witness' experiences since the event being recalled occurred. Who did the witness communicate with, how many times, under what circumstances, what documents did the witness see or generate, etc.¹³
- e) Strive to make the questions unbiased and open-ended and review them in advance more than once to assure their 'neutrality'.¹⁴ Unless carefully drafted, questions can be leading or impliedly suggest an answer unintentionally.
- f) Use neutral language during interview and avoid qualifying descriptors as these may influence the witness' recalling of the memory. For example, do not ask 'How aggressively did the Respondent's manager react?' or 'How stubbornly did they resist your request?' as the qualifying descriptors 'aggressively' or 'stubbornly' may impact the witness' response. Instead, use more neutral language: 'How did the discussion at the meeting progress?'.¹⁵
- g) Avoid intervening and influencing a witness' answer. Specifically avoid interruptions, inappropriate questioning styles, leading questions/responses and interrogative pressure. Let the witness tell their story first before conducting more in-depth questioning.¹⁶
- h) Avoid giving feedback to the witness on their answers, irrespective of whether such feedback may be negative or positive (e.g. avoid stating that you agree or disagree with the witness' answers, or that the evidence/response given to the question conflicts with the pleaded case or is otherwise unhelpful to the party's position).
- i) During the interview, use care not to steer the witness towards a particular version of the facts, whether implicitly or subconsciously, by suggesting answers through questions or otherwise.¹⁷
- j) Avoid summarising, to the extent possible the interviewee's answer, as it may distort the answer. If you are summarising in order to condense the answer, try to use as much as possible the witness' own words.
- k) If the answer is unclear or incomplete, ask the question again or in a different way.¹⁸
- l) Avoid needlessly showing the witness other sources of information that may contaminate their memory, such as other witness statements, submissions, etc.
- m) Ask whether the witness has contemporaneous notes. If so, ask for a copy of such notes.
- n) Have witnesses recount their understanding of the facts before providing them with documents that could affect their memory (e.g. bearing in mind the sheer volume of emails received daily by most senior employees, it is entirely possible that the witness will not have an independent recollection of sending or receiving any given communication, nor of their contemporaneous reaction to it). Use of documents to 'fill in' a chronological narrative may risk altering the recollection of the witnesses as to how the matters at issue developed, if they have no independent recollection of those documents. If a witness is still using such documents to 'fill in' the gaps, the witness should state that they have no independent recollection of those facts and that they are relying on documents.

13 Ibid. p. 39

14 Ibid. p. 40.

15 Ibid. pp. 12-23.

16 'Guidelines on Memory and the Law: Recommendations from the Scientific Study of Human Memory', pp. 29, 30-32 (British Psychological Society, 2008); See also U. Cartwright-Finch, *supra* note 8, at p. 40.

17 U. Cartwright-Finch, *supra* note 8, at p. 40.

18 'Guidelines on Memory and the Law', *supra* note 16, at p. 32

- o) Instruct the witness at the end of the interview:
 - to avoid needlessly talking about the testimony with other witnesses; and
 - to keep notes of matters that the witness might remember following the interview.
- p) If necessary, conduct follow up interviews with the witness in line with the guidelines for the first interview, set out above.

(ii) Assessing information relayed by witness

- 5.11 Take into account the period of time elapsed between the experience and its recall.¹⁹
- 5.12 Consider to what extent the reliability of a witness' recollection may be influenced by the effect that facts being recalled could have on the witness' own position.
- 5.13 Are any of the matters at issue likely to result in consequences for the witness personally, in terms of disciplinary proceedings or a risk to a future career progression?
- 5.14 Are any of the matters in relation with witness memory a matter of personal embarrassment or sensitivity that may impact how witness memory of the incident was encoded or the way in which it is reported when retrieved?
- 5.15 Does the witness have a stake in the importance of its evidence (e.g. does the party's position on a particular issue depend solely or largely on that evidence)?
- 5.16 To what extent has the witness already discussed the issues and/or the evidence with (i) other witnesses, (ii) in-house counsel or management, prior to the witness speaking with external counsel? Has the witness adopted a 'party line' as a result?
- 5.17 Consider what extrinsic or neutral contemporaneous evidence supports or conflicts with the witness' recall as produced in the first meeting with counsel. To what extent are any conflicts material to the issues to be decided by the Tribunal?
- 5.18 Consider whether any such conflict should or must be put to the witness before completing preparation of the witness statement, and how to do so without affecting the witness' recollection.
- 5.19 Identify, where possible, any direct conflicts of recall between the witnesses. Is it possible that those conflicts are the result of the way in which the witnesses experienced the relevant event, such that their mental imagery conflicts with the accuracy of the memory (though each witness independently believes in the truth of their recollection)?²⁰
- 5.20 Consider the possibility that the witness may have been subject to the 'misinformation effect' of having been told of others' perspectives (during meetings with other witnesses, senior management, etc.) in a way that modifies the witness' independent recollection.²¹
- 5.21 Explain to the client team, in instances of conflict between witness' recollection of events, that discussions should be avoided between the client team and the witness which may result in a 'misinformation effect' or a 'confabulation' by the witness.

(iii) Preparation of the witness statement

- 5.22 Establish good practice rules at the beginning of the arbitration regarding who should draft the witness statement, the language to be used, the number of drafts, etc. This includes clear communication with the external counsel team, the in-house team, the witnesses themselves, and potentially also the Tribunal.

¹⁹ 'Guidelines on Memory and the Law', supra note 16, at pp. 17-18

²⁰ 'Guidelines on Memory and the Law', supra note 16, at p. 20.

²¹ K.J. Cochran, R.L. Greenspan, D.F. Bogart, E.F. Loftus, **Memory blindness: Altered memory reports lead to distortion in eyewitness memory**, *Mem Cogn* 44, 717-726 (Springer, 2016), p. 2

- 5.23 Consider providing the witness with a list of topics/key questions to answer in their own terms/ language as a first step, either before or after the initial meeting with the witness.
- 5.24 For witnesses capable of doing so, consider having them draft the first draft of the witness statement. Depending on how specific or general the scope of their evidence is, and their facility with the language or experience, the product of that process may need a little, or a lot, of polishing, but it should preserve the witness' own voice in the giving of their evidence and, at a minimum, ensure that the version of the facts as presented is one with which they are satisfied.
- 5.25 Particularly where a witness does not speak the language of the arbitration (or is not fully at ease with the language) steps may be taken to ensure that in the first instance the written testimony is completed in that witness' first language and translated into the language of the arbitration with care to preserve its idioms.
- 5.26 Consider avoiding numerous drafts and re-drafts of the statements. Every iteration of a witness' evidence following comment or amendment by any other person, including in house or external counsel, is more likely than not to move the witness' account closer to the pleaded case of the party submitting the testimony.
- 5.27 Consider drafting witness statements of co-witnesses independently, i.e. without having witnesses read the drafts of each other's statements. Although this is common practice in some jurisdictions, the process whereby each witness corroborates the testimony of the others (albeit sometimes with minor deviations) itself runs the risk that the witness' own recollection becomes co-mingled with and affected by the recollection of the other witnesses.
- 5.28 Deploy documents carefully. It is important to clarify whether the witness has any independent recollection of drafting or receiving documents to which the statement may refer. It may even be helpful, from an authenticity perspective, for a witness to explain that they have no independent recollection of a document, but for it to appear as context for the matters which they do independently recall.

(iv) Preparation of the witness ahead of the hearing

- 5.29 Consider carefully the extent of witness preparation that is permitted under the rules that apply to the arbitration. In some jurisdictions, it is both permissible and deemed desirable for party counsel to prepare witnesses for the hearing on how to respond to the anticipated topics for questioning. In other jurisdictions, advocates are not permitted to confer with the witnesses regarding their testimony in advance of the hearing and 'preparing' a witness may be a breach of professional conduct rules.
- 5.30 Taking into account the techniques described above in the context of witness interviews and the preparation of witness statements, care can be taken to avoid memory contamination in the course of preparing a witness ahead of a hearing.

B. Measures to help identify and weigh distorting influences that might exist and take them into account when weighing witness testimony

- 5.31 Disputes are the product of events that unfold over the course of time. The memory of witnesses begins with their first involvement with the transaction or incident that gives rise to the dispute and is then both further formed and affected by subsequent events.
- 5.32 Basic practices such as good recordkeeping and contemporaneous notes during the course of a transaction or project (pre-dispute) serve both to provide evidence of what happened at a time when the witness' memory was fresh and unaffected by information learned subsequently and to help the witness later to recall facts. However, the focus here is on practices that come into play after a dispute has arisen.

1) Steps that can be taken by all players

5.33 All players in the process, including in-house counsel, outside counsel and arbitrators must evaluate, deal with, and can impact witness memory. The more players understand the memory process, the better positioned they will be to help enhance the value of witness evidence. Therefore, each player can:

- a) Educate themselves to understand better the workings of human memory, particularly since research continues to refine the understanding of the workings of human memory.
- b) Consider training to be able to conduct cognitive interviews, which are said to yield more accurate information. The conduct of cognitive interviews includes several components, which focus on using basic principles in memory and cognition such as building a rapport with witnesses and having them participate more actively during the interview process, e.g. by reinstating the witness mentally in the situation when the relevant events happened.²²
- c) Be aware of what affects memory, including in particular:
 - misinformation effect: where (usually misleading) information received after an event interferes with or impairs a witness' memory of that event;
 - memory conformity: where a witness' memory appears to change in order to match and corroborate potentially conflicting information subsequently provided by another witness;
 - age of the witness: elderly individuals may be more susceptible to memory dysfunction;
 - vividness of the memory;²³
 - one's own bias affecting one's perception of witness memory recollection. For example: (i) impact of one's perception as a result of statements that are well-structured and worded vs less 'polished' statements; (ii) coherence and completeness are not necessarily reflective of a better memory; incomplete accounts are the norm in human memory and therefore do not indicate inaccurate memory; extremely coherent narratives may be indicative of prior preparation and rehearsal; (iii) witness confidence is not by itself a good indicator of memory accuracy.²⁴

2) Steps that can be taken by the arbitral tribunal

5.34 There are steps that an arbitral tribunal may consider taking with a view to reducing the distortions of witness memory and in evaluating witness evidence in the light of distortions.²⁵

5.35 For example, where no process has been put in place at the outset, counsel can consider seeking guidance from the tribunal on how to moderate meetings or discussions around the giving of evidence by the witnesses. To date, in the international arbitration context, there is limited guidance on the steps which may be taken by party counsel to 'prepare' a witness, and there are no applicable general standards. The IBA Guidelines on Party Representation in International Arbitration include

22 'Guidelines on Memory and the Law', supra note 16, at p. 33, Communication in Investigative and Legal Contexts Integrated Approaches from Forensic Psychology, Linguistics and Law Enforcement, G. Oxburgh et al. (ed.) (Wiley, 2015), pp. 81-97.

23 'Guidelines on Memory and the Law', supra note 16, at pp. 17-18, 22-23.

24 'Guidelines on Memory and the Law', supra note 16, at p. 31. Dr Wade and Dr Cartwright-Finch report that research suggests that witnesses who include a high volume of peripheral detail in their memory reports are perceived as more credible than witnesses who provide few peripheral details (e.g. Wells, Leippe, 1981). An example of this comes from Bell and Loftus (1998), participants were presented with a mock testimony transcript of a witness to a shooting. Some participants read testimony that contained a large amount of detail (e.g. witnesses who purportedly recounted the exact items the culprit purchased before shooting a store clerk), and others read testimony that contained few details (e.g. witnesses who merely stated that the culprit asked the clerk for a few items). Participants viewed the 'high detail' testimony as an indicator that the witness was attentive to the crime and observed the shooting under good viewing conditions. Of course, such trivial and peripheral detail in a witness' testimony tells us little about how accurate their accounts really are. But this trivial information is persuasive, and we all have a tendency to think 'people who recall trivial details have a really good memory'. Training would help all participants have a better appreciation of their own biases and perceptions with respect to a witness' memory.

25 Further suggestions are set out in the Task Force's 'Conclusions and recommendations' (at para. 6.1).

provisions covering interactions between party counsel and witnesses, which include a permission for the party counsel to assist in the preparation of witness statements and to meet and discuss the witness evidence to prepare witness' prospective testimony. The comments on these paragraphs of the Guidelines state:

'The preparation may include a review of the procedures through which testimony will be elicited and preparation of both direct testimony and cross-examination. Such contacts should however not alter the genuineness of the Witness ... evidence, which should always reflect the Witness's own account of relevant facts, events or circumstances ...'²⁶

5.36 The tribunal might also consider requiring that each witness statement include information about the way in which it was prepared (particularly if it is not in the witness' native language) and the extent to which the witness has considered or discussed evidence with the other witnesses. Alternatively, even where such information is not required by the tribunal, counsel for a party may choose to include the information in the written statements of its witnesses with a view to enhancing the reliability of the evidence of those witnesses in the eyes of the tribunal.

5.37 The tribunal can give instructions to the witness prior to his/her examination at the hearing:

- > Alert the witness about the importance of distinguishing between personal knowledge and information gained post-event from secondary sources.
- > Explain that it is permissible to answer 'I don't know' or 'I don't recall' as memories are incomplete.²⁷
- > Exclude witnesses from the hearing room until they have given their evidence (known in some jurisdictions as 'invoking the rule').

5.38 As explained at the beginning of this Section, it is not recommended that the steps set out above are taken routinely in the arbitral process. They are steps that, where appropriate, can help to protect the authenticity of witness memory. But whether any particular step is useful, appropriate or even possible needs to be assessed in the specific circumstances of each case. Some of the factors that may be taken into account when making such an assessment are addressed in Section VI 'Conclusions and recommendations' below.

VI. Conclusions and recommendations

A. Assessing the needs of each specific case

6.1 Sections III and IV of this Report describe the scientific research that demonstrates how the memory of an honest witness may be at risk of being corrupted by the interactions that commonly take place in the preparation and presentation of that witness evidence in arbitration proceedings.

6.2 This finding could lead one to conclude that steps should be taken to avoid this potential corruption of witness evidence in all cases. After all, arbitral tribunals may place significant reliance on the evidence of witnesses they consider to be reliable in deciding the case. Parties also invest significant time and cost in the preparation of witness evidence and the witnesses themselves bear what can be a significant personal burden in providing their written evidence and then appearing at a hearing to be cross-examined. Given the significant investment in witness evidence made by all participants in the arbitral process, would it not make sense to systematically take some or all of the steps described in Section V to ensure that the memories of the witnesses who give evidence are as accurate as they can be?

26 'IBA Guidelines on Party Representation in International Arbitration', supra note 1, Comments to Guidelines 18-25 ('Witnesses and Experts').

27 See U. Cartwright-Finch, supra note 8, at pp. 30-31; 'Guidelines on Memory and the Law', supra note 16, at p. 2; Communication in Investigative and Legal Contexts, supra note 22, at pp. 189-190.

- 6.3 In the view of the Task Force, the answer to that question is 'No'. There are two main reasons for this.
- 6.4 First, it is important to take into consideration the different roles that witness evidence can play in arbitration proceedings. As can be seen from the analysis in Section V of this Report, fact witness testimony in arbitration proceedings often does not depend on accurate memory. Where witness evidence is used to provide context or to put a human face to a party's story (for example), the accuracy of the witness' memory may not be a relevant issue.
- 6.5 Second, even when the accuracy of witness memory is important, it does not necessarily follow that current practices should be changed in order to minimise the risk of memory distortions. There are numerous other considerations that need to be taken into account:
- a) One of the key findings of the research summarised in Sections III and IV is that contact between a witness and post-event information, be it in the form of written documents or interaction with other participants, can change memory. Minimising the risk of memory distortions would therefore also mean minimising such contact. In that case, one would have to question practices such as exposing witnesses to written records of the relevant facts, in particular the recollections and statements of other witnesses, etc. Such exposure, however, can also be efficient in terms of refreshing a witness' memory. Witnesses who testify virtually unprepared are often unhelpful as their testimony remains vague, incoherent and fragmented. A witness who is exposed to useful post event information and whose testimony is thoroughly and professionally prepared by lawyers will be more to the point, consistent and complete.
 - b) On the other hand, such testimony, usually presented in the form of a witness statement, is often the result of a joint effort between a witness and counsel, which can produce a reconstruction of the pertinent events based on various sources which does not necessarily recount the witness' actual memory. There is no general answer as to which source is the most accurate. The answer will depend on the specifics of the case and also on the predilections of the participants.
 - c) Moreover, efforts to keep witness memory pristine must be balanced with practical and/or countervailing considerations. For example, some practices, such as having counsel prepare a witness statement, can have a distorting effect upon the witness' memory but, nevertheless, have a significant benefit in helping a lay witness communicate to the tribunal the witness' understanding of the facts. And while one way to avoid memory contamination is to interview witnesses individually, sometimes that is not practical. Even more, sometimes a group meeting is helpful and productive as witnesses can help each other to remember details.
 - d) While interviewing a witness multiple times with respect to the facts risks *altering* a witness' memory and *embedding* into the witness' mind post-event information that differs from the reality of what happened, multiple interviews can sometimes allow counsel to distinguish between a witness' original memory and memories formed by post-event information, and identify what the witness' personal knowledge really is. Sometimes, the most accurate determination of the facts can be obtained by reviewing with a witness, on more than one occasion, his or her explanation of what happened and presenting the witness with evidence that would appear to be contrary to his or her recollection (in order to allow the witness to explain the seeming inconsistency). While this runs the risk of putting post-event information into the witness' mind, that process is instinctively logical and natural. It also reduces the risk that at a hearing, the witness, under pressure, will be confronted with contradictory evidence and be unable to explain the seeming contradiction articulately even though the witness, but for being surprised with the evidence, would have a legitimate and rational explanation for the contradiction.
 - e) Another example which may not always be workable in practice is that the witness drafts the first version of his or her witness statement. Sometimes the witness lacks the sophistication or language skills to draft a well-organised statement that communicates the facts in a logical useful fashion, albeit that the witness is fully capable of accurately and precisely recalling what happened. Alternatively, in the case of some busy high-level executives, their schedules simply do not allow them to take the time to put into writing the knowledge they have and have faithfully communicated to counsel who can prepare the first draft.

- 6.6 In essence, the suitability and utility of each of the suggestions in Section VI can be evaluated only in the context of the specific circumstances of each case.

B. The role of the arbitral tribunal

- 6.7 Whilst the value of witness evidence is impacted by each of the players in the arbitral process (in-house counsel, outside counsel, party representatives, arbitrators and the witness), the Task Force considers it important to stress certain views regarding the specific role of the arbitral tribunal.
- 6.8 Section V above describes various steps that an arbitral tribunal might take with a view to reducing distortions of witness memory and evaluating witness memory in the light of distortions. These include the possibility of inquiring, where useful, into the way in which witness evidence has been prepared in advance of the hearing.
- 6.9 The Task Force is firmly of the view that the preparation of witnesses and witness evidence, including the practices identified in Section V, should not become subject to routine inquiry by tribunals or now become yet another topic for requests for documents. Such inquiries should be reserved for exceptional situations, in which witness preparation is an important issue going to the essence of the particular testimony.
- 6.10 The importance of delving into witness preparation and witness statement preparation must be measured by the importance of the testimony itself in the context of the dispute and the importance of determining whether a material or important part of the testimony is or is not affected by memory distortion. In any event, any such inquiries must take into account issues of privilege and attorney work product.
- 6.11 With these points in mind, when considering steps to take in order to mitigate effects of imperfect memories a tribunal could ask itself the following questions:
- a) Should it discuss with the parties the taking of witness evidence at the outset of the proceedings (during the case management conference) to avoid memory contamination?
 - b) How detailed should such discussion be?
 - c) Should it issue 'do's and don'ts' in the taking of witness evidence in Procedural Order no. 1?
 - d) If it provides guidelines at the case management conference, does it put a respondent at a disadvantage considering that claimant has probably already spoken to potential witnesses?
 - e) Should it require or invite witnesses to include in their witness statements a description of how their evidence has been prepared?
 - f) Is it useful to investigate at the hearing how witnesses were prepared for the hearing in order to assess the reliability of their evidence?
 - g) How deep should the investigation by a tribunal be? Should it cover matters such as: how many rounds of interviews, were notes consulted, did the witness review submissions and/or the statements of other witnesses; what preparation did the witnesses undertake for cross-examination?
 - h) Is such investigation compatible with attorney-client privilege?

C. Avoiding the conclusion that witness evidence is second best

- 6.12 The effort to enhance the value of witness evidence takes place in a context of diverse views within the arbitral community. Much of the discussion surrounding the subject of witness evidence is influenced by preconceived notions over the value of witness evidence, the means to present it and to elicit it. Cultural differences and legal traditions must be taken into account. While in some jurisdictions 'witness preparation' is frowned upon or not permitted, in other jurisdictions the failure to prepare a witness would be highly questionable.

- 6.13** Driven in part by the fact that memory distortions do affect witness evidence, the suggestion has been made that contemporaneous documents are more reliable than witness evidence. That view is not universally shared. As one Task Force member put it by way of example:

'The contemporaneous documents are already constructed in order to tell a story; the minutes of meetings are drafted by somebody to create a reality; most people never bother to read them, and therefore they don't get challenged at the next meeting.'

Contemporaneous documents also come in different forms, some of which will provide more reliable evidence than others; a written transcript of a discussion at a meeting will self-evidently provide more reliable evidence than a contemporaneous note of the meeting made by a meeting participant.

- 6.14** As the Task Force believes that witness evidence can be valuable and important, the Task Force considers that a predetermined view of the hierarchy of the value of different types of evidence (such as that documents should be accorded more weight than testimony) is neither justified nor prudent. By enhancing the strength of witness evidence and proposing procedures to enhance the prospects that a witness testimony will reflect the witness' personal knowledge, the Task Force's proposals are aimed at ameliorating the concern that in part drives the view that documents should weigh more than testimony. When dealing with something as complex and intangible as how to obtain the maximum value from evidence in general and witness evidence in particular, there is no single 'best' practice. Instead, it is critical to rigorously analyse all the pertinent factors and forces in play that affect the particular witness evidence without preconceived notions as to what evidence is more valuable, witness testimony or documentary evidence, written witness statements versus oral testimony in direct examination, and counsel-led cross-examination versus tribunal-led witness questioning.²⁸
- 6.15** While procedures such as cross-examination or tribunal-led questioning and leading questions can (and do) impact the value of witness evidence, the Task Force does not take a position as to which procedure better enhances the value of witness evidence. Accordingly, the suggested procedures do not address such issues; such determinations are best left to the parties and arbitrators in light of the specific circumstances of the case.

D. Training and awareness

- 6.16** As noted at the outset, in-house counsel, outside counsel and arbitrators can all take steps to better understand the functioning of human memory and thereby better understand the strengths and weaknesses of the recounting process and know how to aid in that process, in order to get as close to an accurate understanding of what happened as reasonably possible.
- 6.17** The Task Force believes that better training of counsel and arbitrators would help to reduce the occurrence of distortions in human memory and reduce the effect of the remaining distortions upon the value of witness evidence. Training courses, with trainers to also include psychologists, and the creation of a database of relevant publications would be valuable resources.
- 6.18** In advocating greater awareness of those actions which risk corrupting witness memory, the Task Force is conscious that it is also to some extent providing a road map for those parties and counsel who consider that it would be to their advantage to take those very actions in order to corrupt the memory of their witnesses in a way that supports their case. Not only would such an approach be unethical (and potentially unlawful), but as arbitrators are themselves increasingly alive to the issues, it is undoubtedly highly risky, and very likely to prove counterproductive. Tribunals are typically

28 Some Task Force members stressed the important role that cross-examination plays in testing whether a witness' evidence is reliable and exposing situations where a witness is, subconsciously or otherwise, giving evidence which supports one party's case but is incorrect. It is beyond the scope of this Report to comment on the efficacy of cross-examination in eliciting the truth and, as has already been noted, the impact of cross-examination on human memory has yet to be the subject of much scientific study.

unimpressed when they get the impression that witnesses are simply 'towing the party line'. The adverse impression that this creates can not only damage the credibility of the witnesses, but also the credibility of the party itself.

- 6.19** Once the process of determining what happened in a dispute is based on a reconstruction of events after the fact, it is destined to be imperfect. The fact that witnesses' memories are imperfect does not mean that their testimony is not valuable or at times vital. The aspiration should be to reduce the imperfections to the extent reasonably possible in order that the decision rendered can be just, based on a reasonably close approximation of what in fact happened, and in the process enhance the satisfaction of users with the arbitral process.

Appendix 1: Selected Review of Scientific Literature Relating to Memory and Witness Evidence

by Ula Cartwright-Finch and Kimberley Wade

Introduction

1. Human memory has been the subject of rigorous scientific research for more than a century. Within this field, considerable work has addressed memory in the context of law, including the evaluation of evidence in legal proceedings. A large body of research relevant to this Report has looked at how witness' recollection of an event can be altered by misleading or doctored information presented to them after the event. For example, witnesses who are asked misleading questions about a video clip they have just watched (e.g. 'How fast was the car going when it passed the barn?' – when in fact there had been no barn in the video clip) often assimilate the misleading details into memory and wrongly report their presence in subsequent recall tests (*Loftus*, 1975). Another study demonstrates that participants can be induced to believe or remember fabricated childhood events by showing them photographs that have been doctored to depict the event (e.g. an old photograph of the participant as a child is manipulated to show them riding in a hot-air balloon) (*Wade, Garry, Read & Lindsay*, 2002). There are hundreds of studies examining these effects.
2. In this chapter, we have chosen a selected number of studies that typify these effects across three specific areas of research particularly pertinent to witness evidence in international arbitration:
 - I. How the specific wording of a question can change the way a witness replies;
 - II. The way in which a witness may be influenced by information received after an event (the so-called 'misinformation effect'), including:
 - A. situations where distortions are introduced into the witness' own memory reports;
 - B. misinformation arising in the context of discussions between co-witnesses; and
 - C. the creation of entire false memories.
 - III. How the act of retelling a story from a particular perspective can change a witness' memory.
3. In Part IV, we outline methods that have been shown to reduce a witness' suggestibility, and therefore maximise the completeness and accuracy of witness memory reports.

I. The impact of phrasing on responses to questions

4. Numerous studies published since the 1970s have shown that the wording of a question can influence a witness' memory report. Much of this early work was pioneered by Elizabeth Loftus and colleagues.

(i) Adjectives and adverbs can alter answers to uncontextualised questions (*Harris*, 1973)

5. A study published in the early 1970s examined whether it was possible to influence the response to a question by the way it was phrased. This experiment presented adult participants with a series of uncontextualised questions. The participants were told that the study was about the accuracy of guessing measurements and asked them to make 'intelligent a numerical guess as possible' in response to those questions. Instead of neutral phrasing, each question included a quantitative adjective or adverb in one of two forms. For example:

Subject of question	Question form 1	Question form 2
Height of a basketball player	How <i>tall</i> was the basketball player?	How <i>short</i> was the basketball player?
Running time of a film	How <i>long</i> was the movie?	How <i>short</i> was the movie?

6. The results showed that participants' responses were influenced heavily by the qualifying descriptor in the question. For example, participants who were asked to estimate 'How long was the movie?' answered with an average of 130 minutes versus those who were asked 'How short was the movie?' who responded with 100 minutes on average. No further explanation or context was given in relation to either question. Similarly, participants guessed on average that the basketball player was 190cm and 175cm in response to Question forms 1 and 2 respectively. This experiment demonstrates that the way a question is worded can have a significant impact on the response.

(ii) Numbers and adverbs skew responses to questions about personal experience (Loftus, unpublished)

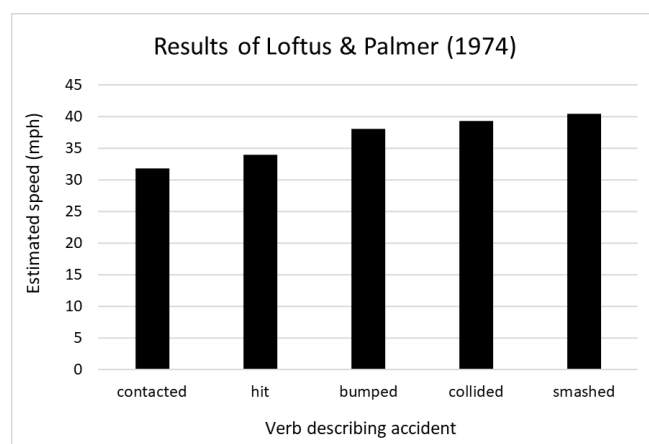
7. A subsequent experiment looked at the effect of phrasing on questions about people's personal experiences, in particular in relation to their experience of headaches and headache-relieving drugs. This study asked participants to report how many headaches they typically experience and how many headache products they had tried. These questions were presented in one of two different ways:

Subject of question	Question form 1	Question form 2
Frequency of headaches experienced	Do you get headaches <i>frequently</i> , and if so, how often?	Do you get headaches <i>occasionally</i> , and if so, how often?
Headache-relieving products tested	In terms of the number of total number of products, how many other products have you tried? One? Two? Three?	In terms of the number of total number of products, how many other products have you tried? One? Five? Ten?

8. This research showed that participants answered differently depending on the qualifying adverb and the suggested numbers in each of the questions. For instance, when asked about the frequency of headaches in Question form 1, participants reported experiencing an average 2.2 headaches per week, as compared with 0.7 headaches per week in response to Question form 2. Similarly, participants said they had tried an average 3.3 headache products in response to Question form 1 contrasted to 5.2 products in response to Question form 2.

(iii) The strength of the words in a question can change an eyewitness' testimony (Loftus & Palmer, 1974)

9. In light of the results of these early studies on the impact of question phrasing, scientists became interested in whether an eyewitness' testimony could be influenced by the questions they were asked at interview.
10. A seminal study in this area looked at eyewitness' reported memory of the speed a car was travelling before a traffic accident. The design of this study was simple: participants watched a short video clip showing a road traffic accident and were asked questions about what they had seen shortly afterwards. Included in the interview was a question asking the participants to estimate the speed the car had been travelling at the time of collision. In this question, the experimenters varied the verb that was used to describe the accident: 'collided', 'contacted', 'bumped', 'hit' and 'smashed'. Participants' memory of estimated speed was influenced by the phrasing in the interview question. Specifically, the stronger the verb used to describe the collision, the faster the speed the participants estimated the cars had been travelling (see the graph below).



11. This study demonstrates clearly the importance of specific wording within witness interviews. In particular, the experiment provides compelling evidence that changing one word within a question can systematically change the evidence a witness recounts about a particular feature of an event (e.g. speed).

II.A The misinformation effect

12. The misinformation effect describes a powerful and reliable phenomenon where typically misleading information which a participant is exposed to after an event interferes with or impairs their original memory of that event. The misinformation effect has been demonstrated in participants of all ages, for various types of events (live events, emotional events, naturally occurring events), and for various types of misinformation (about places, objects, people, settings).

(i) Questions containing suggestive wording can change memory for specific items (Loftus & Palmer, 1974)

13. One of the first studies in this area asked whether the manipulation described above in the context of eyewitness testimony affected the witness' subsequent memory of the traffic accident. The first phase of this experiment repeated the design of *Loftus & Palmer* Experiment 1. In the second phase, the same participants were recalled a week later and asked whether they saw any broken glass in the video clip. There was no broken glass in the video clip. However, participants who were asked to estimate the speed of the cars with the 'smashed' variation of the question in the first phase were significantly more likely to confirm that they had seen broken glass than those in the 'hit' variation of the question. Exposure to words or questions that convey different connotations with regard to the consequences of an event (e.g. breakage) therefore appeared to alter the subsequent memory of that event.

(ii) Questions containing, implying or presupposing a particular fact can change memory for specific items (Loftus & Zanni, 1975)

14. In a similar study, scientists manipulated the initial interview phase so that the question presupposed or implied a particular fact about the scene of a traffic accident, using a very subtle change in language. In the first phase of this experiment, participants were asked one of two questions:

Critical question	Grammatical structure	Implication/presupposition
Did you see <i>a</i> broken headlight?	Indefinite article	None
Did you see <i>the</i> broken headlight?	Definite article	There was a broken headlight in the video clip the participant had seen

15. In the second phase of the experiment, participants were later asked about their memory for specific aspects of the scene, including whether or not there was a broken headlight in the video clip. Participants who had been asked about the broken headlight with the definite article form of the question in the first phase were significantly more likely to confirm that there had been a broken headlight than those who had been asked the same factual question in the neutral, indefinite article form.

(iii) Initial interview questions can change memory for large objects, and incidental presentation of misinformation strengthens the effect (Loftus, 1975)

16. The studies discussed so far deal with relatively small aspects of a particular scene, such as the speed of a vehicle or the presence of a broken headlight. However, studies have shown that presuppositions embedded in initial interview questions can lead witnesses to (wrongly) report the presence of entire, large objects in a scene. In one study for example, participants reported having seen a large barn adjacent to the road on which a car was driving. In another study, participants confirmed the existence of a school bus in a short video clip when none had appeared.
17. An interesting result uncovered by this study is that the presupposition has a stronger influence if it is presented incidentally rather than as the subject of the question. For instance, participants were more likely to report having seen a school bus in a video clip they had watched (where no school bus had been present) if they were asked 'Did you see the children getting on the school bus?' compared with participants who were asked directly 'Did you see the school bus?'.
18. It is evident from these studies that subtle changes in the way an initial round of questions is presented, such that they suggest or presuppose certain (misleading) facts, can distort a witness' memory for an event when tested at a later date.

(iv) Questions that directly contradict what the witness saw also distort memory (Loftus, Miller & Burns, 1978)

19. A further variation in this line of studies looked at whether misinformation presented during the initial interview phase would interfere with subsequent memory if it directly contradicted what the participant had actually seen. Previous studies had focused on altering a specific detail such as speed, or wrongly suggesting the presence of an item such as glass.
20. In this study, participants were shown a series of photographs of a traffic accident, one of which featured a car stopping at a junction with a 'Stop' sign. Participants were then asked various questions about the accident, including whether another car had passed the target car 'when it was stopped at the Yield sign'. In the second phase of the experiment, participants were presented with several pairs of photographs and asked to identify the photograph from the original series. One of these pairs featured a photograph of a car next to a 'Stop' sign (the correct image) and a photograph of a car next to a 'Yield' sign (incorrect image). Of the participants who had been fed misinformation implying the presence of a 'Yield' sign during the initial interview phase, 59% identified the wrong image out of the critical pair, compared to 25% who had not been asked the misleading question. This study demonstrates that misinformation can have the effect of overwriting an existing factual memory in addition to supplementing memory with additional (inaccurate) details.
21. Taken together, the misinformation effect literature shows that witnesses' reports can be swayed by information they encounter after a critical event. Recent research has explored the long-term effects of misleading witnesses about what they have seen.

(v) Witnesses sometimes fail to detect alterations to their own memory reports, and such alterations can influence people's memories (Cochran, Greenspan, Bogart & Loftus, 2016)

22. Using a variant of the misinformation procedure, one study has looked at whether people would detect alterations to their own memory reports, and whether such alterations would influence their memories later on. In two experiments, participants witnessed a mock theft and were then asked questions testing their memories for details of the event (Experiment 1) or details of the perpetrator (Experiment 2). Later, participants were shown their own memory reports and, unbeknownst to them,

some of their responses had been altered by the experimenters (e.g. the colour of the thief's jacket). Finally, the participants were asked the memory questions a second time, to determine whether the misinformation (i.e. the altered statement) had affected their memory. The majority of participants failed to detect the alterations to their statements, and exposing participants to misleading versions of their own statements caused their memories to change to fit with those reports. These studies illustrate the long-term effects the misinformation can have on witness memory.

II.B Co-witness discussion

23. The studies presented so far demonstrate that misinformation can corrupt memory, and that misinformation effects can occur easily, even without any intention to deceive. More recent studies have shown that witnesses can readily mislead each other when they discuss an event they have observed. Studies examining the effect of co-witness discussion on memory are typically a variation of the standard misinformation effect described above. First, pairs of participants view an event together, but unbeknownst to them, they watch slightly different versions of the same materials (e.g. highly similar scenes of a mock crime that are filmed from different camera angles). After viewing, the pairs discuss what they have observed, and in the process, unwittingly spread misleading information to each other. This socially-transmitted misinformation can substantially alter a witness' report.
24. **Co-witnesses can misinform one another when they discuss events they have observed (Ito et al., 2018).** A recent and large cross-cultural study demonstrates the effect of co-witness discussion on memory. In this study, pairs of participants from ten countries (Brazil, Canada, Colombia, India, Japan, Malaysia, Poland, Portugal, Turkey, and the United Kingdom) sat beside each other viewing different versions of the same movie while believing they were watching the same version. Later, the participants worked together in their pairs to answer questions about the video, which encouraged them to discuss the conflicting details they had viewed. Finally, the participants' memories were tested, individually, to determine the extent to which they incorporated details that only their partner could have observed into their own witness reports. In spite of cultural differences, all ten samples showed similar results. Participants often reported details on the memory test that they had not witnessed. That is, they reported details that their co-witness talked about during the discussion phase of the study. Some of these witnesses may have actually experienced memory distortions, whereas some may have merely trusted their partner to be correct and thus reported the non-witness detail. Regardless of the mechanism, this study, and many others, illustrate that people tend to incorporate details of other witnesses' memory reports into their own memory reports, even if that information contradicts what they have observed.

II.C False memories

25. The research into the misinformation effect discussed in Part I above examined memory for specific aspects or items in a visual scene, within the context of a participant passively witnessing an event such as a road accident. A series of striking studies have extended these results to show that it is possible, in some circumstances, to lead participants to 'remember' entire (fabricated) events which happened to them personally (so-called 'false memories').

(i) Participants can be induced to remember entire fabricated childhood events (Loftus & Pickrell, 1995)

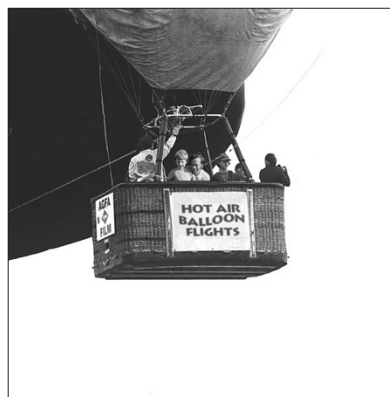
26. One of the first demonstrations of false memories developed what has been termed the 'lost-in-a-mall' technique. In this study, adult participants were told they were taking part in a study about childhood memories. With the participants' consent, the researchers contacted their family members to gather stories about their childhood. The researchers summarised those stories and asked the participants to recall as much as they could about each one. Participants were asked to write down as much as they could remember in relation to each story and were also interviewed about their recollections a number of times over the course of a few weeks. However, in addition to the childhood stories obtained from the participants' family members, the researchers included one fabricated story about the participant getting lost in a shopping mall for a period of time, being found by an older woman and later reunited with their family.

27. Typically, during the first round of interviews the participants reported no recollection of the fabricated story about getting lost in a shopping mall. However, over the course of the repeated interviews, a handful of the participants (around 30%) reported apparent memories of the fabricated event. Initially, these false memories were described as vague recollections, but over the course of the multiple interviews, some participants reported the episode with greater detail, confidence and embellishment. This method therefore offered a dramatic illustration of the way that misinformation can be used to implant entire events within participants' memory.

(ii) Participants can be induced to remember impossible childhood events (Braun, Ellis & Loftus, 2002)

28. Scientists have also succeeded in implanting false memories for events which could never have happened. In this study, the researchers devised a different method whereby participants were asked to evaluate and then reflect on a series of images which had been manipulated to contain misinformation. In particular, the researchers gathered a group of adult participants who had visited Disneyland in their childhood and showed them a number of adverts for the theme park. Some of the Disneyland adverts had been manipulated to include the Warner Brothers character, 'Bugs Bunny'. The participants were asked to rate the adverts along various dimensions (unpleasant-pleasant, unfavourable-favourable) and to imagine their childhood trip to Disneyland. Later, the participants were asked various questions about their trip to Disneyland including whether or not they remembered seeing 'Bugs Bunny'. A significant proportion of the participants who had been exposed to the misleading Disneyland/ 'Bugs Bunny' advert said that they did remember seeing 'Bugs Bunny' during their trip even though this could never have happened. And the more often participants were exposed to the fake advert, the more likely they were to 'remember' it happening.
29. The proportion of participants who were susceptible to false memories was smaller than those seen in the earlier misinformation studies. Nevertheless, it remains a striking effect within the research in this area and extends the original findings significantly.

(iii) Fabricated evidence can induce people to remember fabricated childhood events (Wade, Garry, Read & Lindsay, 2002; Garry & Wade, 2005; Wade, Garry, Nash & Harper, 2010; Nash, Wade & Lindsay, 2009)



Sample of doctored hot-air balloon photos used in Wade et al. (2002)

30. Scientists later devised a method for implanting false memories of theoretically possible but factually fabricated childhood events involving the manipulation of old photographs of participants. In this study, the researchers gathered photographs of the (adult) participants when they were children and digitally enhanced one of them to show the participant riding in a hot-air balloon. Over the course of several interviews, the participants were asked to recount everything they could remember about each photograph and were encouraged to imagine the event if they struggled to remember. The researchers found that half of the participants showed some evidence of believing or remembering the event relating to the fabricated hot-air balloon ride. This further extension of the false memory effect has significant implications given the widespread availability of digital tools designed to doctor photographs.

(iv) Misleading or fabricated evidence can induce false testimony (Wade, Green & Nash, 2010; Nash & Wade, 2009)

31. The fact that photographs can elicit false memories of personal experiences does not speak closely to situations in which people might testify about events that never occurred. There are no, or at least only minor, ramifications for misremembering a pleasant childhood event. However, interviewers sometimes use photographs or other documentation when trying to 'jog' a witness' memory. Concerns about these techniques led some researchers to develop a new 'false video' procedure for exposing mock witnesses to doctored evidence and then attempting to obtain false testimony. In this procedure, participants are filmed while completing a computerised gambling task. During the task, they take (play) money from a bank when they answer questions correctly and return money to the bank when they answer questions incorrectly. After a delay, participants are (wrongly) informed that the participant sitting next to them during the gambling task (a research confederate) had cheated and took money from the bank when they should have returned it. In reality, the confederate did not cheat, but participants are led to believe that the 'other participant' was clearly trying to earn more money in order to win a cash prize. Participants are then randomly assigned to one of the experimental conditions. In the study by *Wade, Green & Nash*, some participants watched a digitally manipulated video of the confederate cheating. Some were told that incriminating video evidence existed. The remaining participants were told nothing about video evidence. Finally, all participants were asked if they could corroborate the (false) accusation that the other participant cheated by signing a statement confirming that they had actually witnessed the cheating. Overall, 20% signed the witness statement, knowing that their corroboration would result in disciplinary action against the accused student. Most importantly, though, participants who viewed the false video evidence were more likely to sign the statement than those who were merely told the video existed and were significantly more likely to sign the statement than those who were told nothing about the video evidence.

III. The impact of retelling on subsequent recall

32. In the studies described above, participants typically try to recall an event they have seen as accurately as possible. This method does not reflect how people typically remember in everyday situations. More commonly, we talk about an event or retell a story for a particular purpose – to entertain or to persuade the listener, for example – rather than to provide the most accurate account of the information.
33. Several studies have shown that what a person recalls and how they recall it depends on their goal and their audience. For example, participants who are retelling an event tend to speak for longer and remember more details about the event if they are speaking to an attentive listener compared with an inattentive listener (*Pasupathi, Stallworth & Murdoch, 1998*). People also modify the amount of information they provide during retelling depending on how much they think their audience needs to understand. When asked to repeat a short story they had read about a visit to the doctor's surgery, participants describe more details when they imagine they are speaking to hypothetical Martians versus when they are speaking to their peers (*Vandierendonck & Van Damme, 1988*). More recent research has looked at whether these differences in retelling a story can impact memory for the

original story. The research discussed in this Part examines the question of how having a particular perspective when an event is encoded in memory, or how taking a particular perspective *after* an event is encoded into memory, can bias later recall of that event towards the biased perspective.

(i) Repeated conversational retelling of an unfamiliar story leads to simplification and errors (Bartlett, 1932)

34. A very early study provides evidence that retelling a story influences memory and that people adapt their recollections to fit their prior understanding. In this study, British participants were told an unfamiliar Native American legend 'The War of the Ghosts' and were asked to repeat it shortly afterwards and again at various intervals of months or years. According to the study, the participants remembered the basic gist of the story in their retelling. However, the story became much shorter over time and the participants changed details in the story which were unfamiliar to them so that those details matched their personal experience more closely. For example, according to anecdotal reports by the experimenter, one participant changed 'canoe' to 'boat' in a subsequent retelling; another replaced 'hunting seals' with 'fishing'.
35. This pattern of results was replicated in later studies which introduced greater control over the experimental design (e.g. the intervals between retelling) and the analysis of reported details (e.g. *Bergman & Roediger, 1999*). It provides a useful demonstration of the constructive nature of memory and highlights the role of repeating a story on subsequent memory.

(ii) Biased retelling leads to biased memory of the original information (Tversky & Marsh, 2000)

36. Subsequent studies examined the impact of retelling a story from a particular (biased) perspective on a participant's memory for the original story.
37. In one study, participants were given a story describing their first week of a new year at college and the interactions they had with two roommates. The story contained sufficient detail that each of the two roommates displayed some fun and some annoying behaviours. After reading the story, the participants were asked to write a letter to a fraternity/sorority house recommending one of the roommates (social condition), a letter to the Office of Student Housing complaining about one of the roommates (annoying condition), or as much as they could remember about one of the roommates (control condition). Participants then completed an unrelated task for 20 minutes, after which they were asked to recall the original Roommate Story as accurately as possible.
38. The results showed that participants in the biased conditions included more details from the story that were consistent with the goal of their letters (perspective-relevant information). They also contained more elaborations about the target roommate than the neutral recollection. Moreover, the act of biased retelling had an impact on remembering: during the later recall task, participants in the biased conditions remembered more perspective-relevant information about the discussed roommate than the non-discussed roommate. They also made more biased errors, that is wrongly attributing perspective-relevant details, to the discussed roommate as compared to the non-discussed roommate. Participants in the neutral condition did not demonstrate this pattern of errors in the final recall task. Thus, participants in this study used the original story information selectively to suit their task, and that act of perspective-taking affected their subsequent recall of the original story.

(iii) Biased recollection leads to biased memory in the context of criminal law (Tversky & March, 2000)

39. A similar study used the same method to examine the effect of biased retelling in the context of criminal law. In this study, the story featured a murder where there were two suspects. Each of those suspects committed some incriminating actions and some actions which would exonerate them from the crime. After reading the story, participants were asked to write a summation for the jury arguing that one of the suspects should be convicted (*bias condition*). In the *control condition*, participants were asked to write as much as they could about one of the suspects. Participants completed an unrelated filler task for 20 minutes and then were asked to recall as much as they could about the original story.

40. The results showed a similar pattern. Asking participants to retell the story from a biased perspective led them to selectively include more perspective-relevant details from the story (i.e. more incriminating actions). Moreover, the act of biased retelling influenced later memory for the original story. Participants recalled more incriminating items for the discussed suspect and recalled more exonerating items for the non-discussed suspect. Participants also made more mistakes in the bias condition, wrongly attributing incriminating items to the discussed suspect than the non-discussed suspect. This study underlines the significance of these results in the context of legal proceedings. Recalling an event from a particular perspective affects later memory for that event. In particular, biased retelling improved memory for information which supports the rehearsed perspective but leads to greater errors in memory in the direction of the bias.

IV. Maximising the completeness and accuracy of witness memory reports

41. Research shows that people are much less likely to experience memory errors if they can retrieve information in memory that helps them to identify any details that are distorted or have been suggested to them. For instance, misinformation effects can be reduced or even eliminated when people detect a discrepancy between their memory for the witnessed event and some misleading suggestion (*Tousignant, Hall & Loftus, 1986; Putnam, Sungkhasettee & Roediger, 2017*). But detecting a discrepancy between genuine and distorted information in memory is contingent on the witness having an accurate memory for the witnessed detail in the first place. Relatedly, in extreme cases where people are given blatantly contradictory suggestions, they may not be misled at all (*Loftus, 1979*).
42. To help witnesses detect discrepancies between what they remember and (potentially misleading) information they have been exposed to after the event, it is important to question them in ways that will enhance the accuracy, completeness and durability of their memory. By doing this, interviewers can increase a witness' resistance to suggestion. Various procedures have been shown to reduce a witness' suggestibility:
- a) Have witnesses provide a complete account of the witnessed event immediately after it has happened. Such immediate recall can serve to reinforce and enhance memory for the witnessed event, and is thought to increase the likelihood that witnesses will detect misleading suggestions that conflict with what they observed (*Gabbert, Hope, Fisher & Jamieson, 2012*). Moreover, forgetting will be minimised and there will be little opportunity for the memory to be contaminated by other sources.
 - b) Use open-ended questions wherever possible and avoid the use of specific or potentially leading questions.
 - c) Never press a witness to speculate about events they do not remember and accept 'I don't know' in response to any question. Relatedly, interviewers should not reinforce tentative or unsure responses as this can inflate a witness' confidence in testimony they are actually uncertain about.
 - d) Encourage witnesses to monitor the source of their memories. Many studies show that warning witnesses that they have been misled (after being misled but prior to having their memories tested) can reduce memory errors (see *Blank & Launey, 2014*, for a review). Remind witnesses that their task is to report only those details they specifically remember seeing, and to refrain from reporting other details they merely believed happened.
 - e) Rather than asking witnesses whether or not they witnessed an event, encourage them to identify the source of the details they recall. When people are informed that their memories may be based on several sources of information (i.e. events they have genuinely witnessed, plus information they have gleaned from documents, co-witnesses, the media and so on), and they are asked to identify the source of their memories, they are better able to detect discrepancies between genuine memories and (misleading) post-event information they have encountered (*Lindsay & Johnson, 1989; Zaragoza & Lane, 1994*). Interviewers can also help witnesses in evaluating the validity and source of their memories by encouraging them to focus on aspects of their memories that can help them to distinguish between real and suggested events. For example, ask witnesses

if their memory is clear or murky, or if they can remember what they were thinking when a key event occurred. Examining specific features of memories can help witnesses to determine the source of their memories (*Mather, Henkel & Johnson, 1997*).

Conclusion

43. In summary, decades of research have illustrated the extent to which people can misremember minor details of events they have witnessed, through to entire, personal, events they have never experienced. Various factors can influence the susceptibility of memory and the magnitude of the misinformation effect, such as the interval between the event and subsequent recall, the credibility of the source of the misinformation, repetition of the misinformation and discussion of the event with a co-witness. The vast majority of research into the malleability of memory has focussed on witness memory within the criminal law context, but it is reasonable to expect that the factors that influence witnesses in criminal contexts will also affect witnesses in civil cases.¹

1 Further reading: For a recent and comprehensive review of the literature covering most of the issues discussed here, as well as other relevant research, see K.A. Wade, H. Rowthorn, D. Sukumar 'The Malleability of Memory' in *Cognitive Psychology of Memory*, J.T. Wixted (ed.), pp. 553-570 (Vol. 2 of *Learning and Memory: A Comprehensive Reference*, J.H. Byrne (ed.), Academic Press, 2nd ed, 2017).

Appendix 2: An Experimental Test of the Reliability of Witness Memory in a Business Context

By Dr Kimberley A. Wade, Department of Psychology, University of Warwick

Abstract: Decades of research show that witness memory is malleable, but existing studies of witness memory have centred on criminal settings and not business settings. The current study examined the extent to which two factors known to influence memory – having a biased perspective and misleading post-event information – also affect memory in the business context. A total of 316 adults, working across a broad range of industries and roles, participated in a standard witness memory experiment. Participants read about a contractual agreement between two companies that ultimately led to a dispute. After a delay, participants' memories for relevant events were tested. The results revealed that instructing participants to imagine that they worked for one of the two companies and exposing participants to (biased) post-event information in the form of an in-house memo, influenced how they responded on the witness memory test. Specifically, when participants imagined they were an employee of the company and read the biased memo, they were prone to incorrectly recalling key details in a manner that better advanced their own company's case. Taken together, these findings illustrate that just like witness memory in the criminal context, witness memory in business settings is liable to error.

Introduction

1. As outlined in Appendix 1, decades of research show that human memory is malleable. People with healthy, normally functioning memory systems can be wildly wrong about minor details of events or even entire events that never happened.¹ Much of the research into human memory distortions shows that information encountered after a significant event such as a crime – including leading questions, media reports, photographs, or the reports of others – can alter a witness' memory.^{2,3,4,5,6,7} Co-witnesses can also readily contaminate each other's memories when they discuss a crime they have witnessed,^{8,9,10} and people's beliefs, perspectives, and motivations affect what they

- 1 K.A. Wade, H. Rowthorn, D. Sukumar 'The malleability of memory' in *Cognitive Psychology of Memory*, J.T. Wixted (ed.), pp. 553-570 (*Learning and Memory: A Comprehensive Reference*, Vol. 2, 2nd ed, J.H. Byrne (ed.), Academic Press, 2017).
- 2 D. Wright, R.A. Nash, K.A. Wade, 'Encouraging eyewitnesses to falsely corroborate allegations: Effects of rapport-building and incriminating evidence', *Psychology, Crime & Law*, 21 (2015), pp. 648-660.
- 3 M. Garry, K.A. Wade, 'Actually, a picture is worth less than 45 words: narratives produce more false memories than photographs do', *Psychonomic Bulletin and Review*, 8 (2005), pp. 155-161.
- 4 J.L. Foster, T. Huthwaite, J.A. Yesberg, M. Garry, E.F. Loftus, 'Repetition, not number of sources, increases both susceptibility to misinformation and confidence in the accuracy of eyewitnesses', *Acta Psychologica*, 139 (2012), pp.320-326.
- 5 K.A. Wade, M. Garry, R.A. Nash, D. Harper, 'Anchoring effects in the development of false childhood memories', *Psychonomic Bulletin & Review*, 17 (2010), pp. 66-72.
- 6 A. Scoboria, K.A. Wade, D.S. Lindsay, T. Azad, D. Strange, J. Ost, I.E. Hyman, 'A mega-analysis of memory reports from eight peer-reviewed false memory implantation studies', *Memory*, Vol. 25 (2017) issue 2, pp. 146-163.
- 7 R.A. Nash, K.A. Wade, D.S. Lindsay, 'Digitally manipulated memory: Effects of doctored videos and imagination in distorting beliefs and memories', *Memory & Cognition*, 37 (2009), pp. 414-424.
- 8 H. Ito, K. Barzykowski, M. Grzesik, S. Gulgoz, C. Gurdere, S. Janssen, J.J. Yun Khor, H. Rowthorn, K.A. Wade, K. Luna, P. Albuquerque, D. Kumar, A.D. Singh, W. Ceconello, N. Laird, M. Baldassari, D.S. Lindsay, K. Mori, 'Eyewitness memory distortion following discussion: A replication of Garry, French, Kinzett, and Mori (2008) in ten countries', *Journal of Applied Research in Memory and Cognition*, Vol. 8, issue 1 (March 2019), pp. 68-77.
- 9 F. Gabbert, A. Memon, K. Allan, 'Memory conformity: Can eyewitnesses influence each other's memory for an event?', *Applied Cognitive Psychology*, 17 (2003), pp. 533-543.
- 10 L. French, M. Garry, K. Mori, 'You say tomato? Collaborative remembering leads to more false memories for intimate couples than for strangers', *Memory*, 16 (2008), pp. 262-273.

remember.^{11,12} We also know that distorted beliefs and memories have real consequences for those who develop them: they can affect a person's attitudes, intentions and behaviour.^{13,14,15} Finally, people prioritise ease and speed when attempting to verify their personal memories, a tendency that serves to maintain, rather than extinguish, memory distortions.¹⁶

2. Witness memory research has clear and important implications for legal settings. Indeed, research on the memory-distorting effects of leading questions has led to dramatic reforms in the policy and practice of criminal law. Yet, existing studies of witness memory have not centred on witnesses within the business context. Disputes in international arbitration typically play out in commercial settings, but little is known about the extent to which human memory is fallible in this situation. The present study aimed to fill this gap by adapting a common witness memory experimental procedure to examine the reliability of witness memory in a business context.
3. Although myriad factors can affect a witness' memory report, the current study focused on two factors: (1) a witness' biased perspective and (2) misleading post-event information. In *Part 1*, participants read a short vignette about a large commercial printing company ('Metro City Printing') that hired an industrial flooring company ('Tile Sales & Installation') to replace the floor in their printing plant. Next, participants studied the contract and purchase order created for the works before reading a transcript of an in-person meeting that took place between the two companies not long before the works commenced. Crucially, to examine how a (biased) perspective might affect subsequent memory of key events, some participants were instructed to imagine that they were the Managing Director of the printing company whereas others were instructed to imagine they were the Managing Director of the flooring company. Other (control) participants were not told to imagine anything.
4. In *Part 2*, after a short delay, participants were informed that a dispute had broken out between the two companies because (1) the flooring company's invoice included a surcharge that the printing company claimed they never agreed to, and (2) the new tile floor started to crack not long after being installed and the printing company believed that the tiles were not fit for the purposes required by the contract. The contract stipulated the maximum weight the tiles could tolerate but said nothing about the printing machines being rolled around the floor which would add to the load. The flooring company claimed that they were not aware that the printing machines would be rolled around, and the printing company argued that a representative from the flooring company was indeed aware that the machines moved around because he saw the machines moving during a meeting at the printing plant; the two companies agreed to arbitration. Each participant was then informed that they had been called upon as a fact witness.
5. Participants then answered a series of questions about their memory of events. Most importantly, they were asked two questions about the key issues. First, participants were asked whether the printing company agreed to a surcharge at the in-person meeting. To be clear, *no agreement* was made at the meeting. It was predicted that participants' responses would be influenced by the company they imagined they worked for. That is, participants who imagined working for the printing company should be biased towards saying that their company did not agree to the surcharge. These participants were therefore expected to answer 'No' more often than participants who imagined

11 B. Tversky, E.J. Marsh, 'Biased retellings of events yield biased memories', *Cognitive Psychology* 40 (2000), pp. 1-38.

12 E.J. Marsh, G. Cook, J. Hicks, 'Gender and orientation stereotypes bias source-monitoring attributions', *Memory*, 14 (2006), pp. 148-160.

13 K.A. Wade, S. Green, R.A. Nash, 'Can fabricated evidence induce false eyewitness testimony?', *Applied Cognitive Psychology*, 24 (2010), pp. 899-908.

14 R. Nash, K.A. Wade, 'Innocent but proven guilty: Eliciting internalized false confessions using doctored video evidence', *Applied Cognitive Psychology*, 23 (2009), pp. 624-637.

15 A. Scoboria, G. Mazzoni, J.L. Jarry, D.M. Bernstein, 'Personalized and not general suggestion produces false autobiographical memories and suggestion-consistent behavior', *Acta Psychologica*, 139 (2012), pp. 225-232.

16 K. A. Wade, R. A. Nash, M. Garry, 'People consider reliability and cost when verifying their autobiographical memories', *Acta Psychologica*, 146, (2014), pp. 28-34.

working for the flooring company. Second, participants were asked whether a representative from the flooring company viewed the machinery on the factory floor being moved around. The facts of the case made it clear that the representative from the flooring company *did not have an opportunity to view the printing machinery being moved around*. Again, it was predicted that participants' responses would be influenced by the company they imagined they worked for, as well as whether or not they were exposed to a biasing in-house memo related to this issue. That is, participants who imagined working for the flooring company should be biased towards saying that their representative did not see the machinery on the factory floor. These participants were expected to answer 'No' more often than participants who imagined working for the printing company.

I. Method

6. The Humanities and Social Sciences Research Ethics Committee at the University of Warwick, United Kingdom, approved this research (Reference 123/17-18).

(i) Participants

7. The study was conducted online and the total number of participants included in the final analysis was 316. Participants were recruited via two streams. First, a market research company recruited 428 adult residents of the UK or USA, who participated in exchange for e-points. A job role quota was used to ensure the participants represented a wide range of roles and levels. Participants were required to pass an attention check in *Part 1* (details provided below) to proceed to *Part 2*. Of the 428 participants who completed *Part 1* and passed the attention check, a total of 215 completed *Part 2* and were included in the analyses. Second, members of the ICC Commission on Arbitration and ADR were asked to invite colleagues, family members and friends to participate in the study. A total of 213 adults, resident in 32 countries, completed *Part 1* and passed the attention check. Of this group, a total of 101 completed *Part 2* and were included in the analyses.
8. Of the 316 participants who were included in the final analyses, 144 (45%) identified as women, 170 (54%) identified as men, and 2 preferred not to say. The participants had an overall mean age of 47.1 years (*Standard Deviation [SD]* = 12.2, *Range* = 19-83 years).¹⁷

(ii) Design

9. The design was a 2 (*Company imagined*: 'Metro City Printing' vs 'Tile Sales & Installation') x 2 (*Post-event information*: Absent vs Present) + 1 *control* between-subjects factorial design. Put simply, this means there were five groups, as outlined below, and the goal was to determine if the accuracy of witness memory is affected by whether the witness is biased in favour of a particular company and exposed to misleading post-event information. The control group was used to determine baseline memory performance; that is, how well people remember the details if they are not biased in any way or exposed to misleading information. Participants were randomly assigned to one of the five groups and there were 56 to 71 participants in each group:

17 Further demographic details are provided in Tables A1 and A2 (pages 56-58).

<i>Group 1</i>	<i>MCP</i> ('Metro City Printing'): participants who imagined they were the Managing Director of Metro City Printing and were not exposed to misleading post-event information
<i>Group 2</i>	<i>MCP+PEI</i> ('Metro City Printing' + Post-event Information): participants who imagined they were the Managing Director of Metro City Printing and were exposed to misleading post-event information
<i>Group 3</i>	<i>TSI</i> ('Tile Sales & Installation'): participants who imagined they were the Managing Director of Tile Sales & Installation and were not exposed to misleading post-event information
<i>Group 4</i>	<i>TSI+PEI</i> ('Tile Sales & Installation' + Post-event Information): participants who imagined they were the Managing Director of Tile Sales & Installation and were exposed to misleading post-event information
<i>Group 5</i>	<i>Control</i> : participants who did not imagine they worked for one of the companies and were not exposed to misleading post-event information

II. Procedure

(i) Part 1

10. All participants were told the aim of the study was to examine people's perceptions of company disputes. After providing informed consent, participants were randomly assigned to one of the five groups. *MCP* and *MCP+PEI* participants were instructed to imagine they were the Managing Director of 'Metro City Printing', a company that specialises in large scale printing. *TSI* and *TSI+PEI* participants were told to imagine they were the Managing Director of 'Tile Sales & Installation', a company that sells and installs industrial tile flooring. Control participants were not given any instructions to imagine. Next, all participants read a short vignette, at their own pace, that described how the tile flooring in the 'Metro City Printing' factory was old and needed replacing. The vignette explained that 'Metro City Printing' decided to hire 'Tile Sales & Installation' to replace the tile floor, and that 'Tile Sales & Installation' had created a contract and purchase order for this transaction. The wording of the vignette was adapted slightly across each group to encourage participants to imagine (if appropriate) their role in the transaction. For instance, *MCP* participants were told:

'The tile flooring in your printing plant is old and cracked ... You decide to hire Tile Sales & Installation ... As the Managing Director of Metro City Printing you are ultimately responsible for the printing plant, and the company's business and productivity. You are keen to ensure that the new tile flooring is of high quality, and that the installation occurs as quickly and as efficiently as possible.'
11. Next, all participants were asked to carefully read the purchase order and the contract between Metro City Printing and Tile Sales & Installation (see Figure 1). Participants could not proceed to the next part of the study until each document had been displayed on the monitor for at least 30 seconds. After reading each document, participants' memories were tested. Participants were asked to answer four questions about the contract and four questions about the purchase order, and these questions served as an attention check to ensure that participants were reading and understanding the documents. Participants who failed to answer at least half of these questions correctly were not included in the final analysis.

Figure 1. Fictitious contract (page 45) and purchase order (page 46) between 'Metro City Printing' and 'Tile Sales & Installation'



CONTRACT TERMS

Preparation: Purchaser Metro City Printing, Inc. ("MCP") shall prepare the plant for the installation and provide access to the work crews of Tile Sales & Installations Company ("TSI") so that the installation process shall not be unreasonably impeded.

Warranty: TSI warrants that: a) for a period of twelve (12) months following the completion of installation, the tile shall be fit for its ordinary purposes; b) the installed tile shall be capable of withstanding 100 pounds per square inch, as large industrial printing presses (max weight being 3,800 pounds) will be placed on installed tile floor, which experiences heavy foot traffic, and c) the installation shall be performed in workmanlike manner, using material and techniques customary in the industry.

ALL OTHER WARRANTIES ARE DISCLAIMED.

Completion: Upon completion of the installation, TSI shall leave the premises in broom clean condition and shall remove and dispose of, in compliance with law, all existing tile that is to be removed and all debris and materials from the installation.

Applicable Law: This Purchase Order shall be governed by and construed under the law of Atlantis, without regard to its conflicts of law principles. The Parties expressly disclaim the application of the The United Nations Convention on Contracts for the International Sale of Goods.

Complete Writing: This is a fully integrated contract. There are no terms or conditions with respect to the subject matter hereof except as set forth in this writing. Both parties have reviewed this Contract and have agreed that all proper specifications have been included. No changes to the terms hereof shall be valid except by a writing signed by the parties hereto.

Attorneys' Fees: In the event of any litigation in connection with this Purchase Order, the prevailing party shall be entitled to recover its reasonable attorneys' fees and costs incurred.

Accepted as of the Effective Date:	
Metro City Printing, Inc. By: <i>E. Delaney</i> Elliot Delaney MCP Purchasing Manager	Tile Sales & Installation, Inc. By: <i>A. T. Almeida</i> Anthony Almeida TSI President



PURCHASE ORDER

EFFECTIVE DATE **Feb 14, 2017**
PO # **02102017**

PURCHASER

Metro City Printing, Inc.
1001 Main Street
Ocean City
Atlantis, FL 34678
Phone: (256) 786-2039

SHIP TO

SHIP VIA

F.O.B

SHIPPING TERMS

PRODUCT #	DESCRIPTION	QTY	PRICE	TOTAL PRICE
T 400/6	Ceramic engineered flooring tile for printing plant (Grade: Industrial; Color: Light gray)	36,280 square feet (estimated)	US\$10/square foot	US\$362,800 (to be adjusted for final square footage measurement)
TERMS OF PAYMENT			SUBTOTAL	362,800.00
<ul style="list-style-type: none"> US\$100,000 upon placement of the order. US\$226,586 upon commencement of the work. US\$50,000 upon completion. 			TAX (3.8%)	13,786.00
			SHIPPING/HANDLING	0
			TOTAL	\$376,586.00

Installation commencement date	April 1, 2017
Installation completion date	April 8, 2017

12. Next, participants were told that approximately one month before the flooring work is scheduled to commence, a meeting takes place at the printing plant between the purchasing manager of 'Metro City Printing' and the installation manager of 'Tile Sales & Installation'. *MCP*, *MCP+PEI*, *TSI* and *TSI+PEI* participants - but not control participants - were asked to imagine that they were also at the meeting. Control participants were simply told that a third person (not themselves) from *MCP* attended the meeting. The purpose of the meeting was to discuss the agreement and forthcoming works. Participants were asked to read a short transcript from the meeting, and unbeknownst to the participants, this transcript included critical about the two key issues that would be at the centre of the dispute between the two companies. Figure 2 shows the meeting transcript. Participants could not proceed until the transcript had been displayed on the monitor for at least 30 seconds.
13. Participants were then thanked for their time and informed that they would be sent a link to *Part 2* of the study in one day's time. They were asked to complete *Part 2* within three days of receiving the link.

Figure 2. Transcript from meeting which includes a short discussion between E. Delaney, purchasing manager at 'Metro City Printing'; and A. Specter, installation manager at 'Tile Sales & Installation'.

Transcript from meeting held on 28 February, 2017	
Delaney (MCP):	So, can I ask you, what tile do you recommend?
Specter (TSI):	T 400/6 is the tile of choice, durable, robust and easy to maintain.
Delaney (MCP):	That's what I thought, and I know other commercial printers have used this tile. We are looking forward to having these cracks repaired. They're a hazard!
Specter (TSI):	I bet! Can we confirm that the installation will not start earlier than 1st of April?
Delaney (MCP):	I think we can agree on that for now, yes. But, we do have a large order for printing material in the pipeline, and this order has been dragging on for a while now. We may have to start production for this order in April. If necessary, would it be possible to bring the works forward?
Specter (TSI):	It depends. How much time are we talking about?
Delaney (MCP):	Three weeks, I guess?
Specter (TSI):	Under normal circumstances, no problem at all. It's just that March is exceptionally busy. I can get it done, but I might have to sub-contract part of the works—we would need more people. In that case, the price we talked about wouldn't work.
Delaney (MCP):	I understand. How much extra are we talking about?
Specter (TSI):	That would be another \$20,000, including tax. How does that sound?
Delaney (MCP):	Well, that is quite a difference. Hopefully the need won't arise — if it does I will let you know. Is there anything else you need from us at this point?
Specter (TSI):	No, I think we are all set. We'll be in touch closer to the start date unless we hear from you first.

(ii) Part 2

14. Participants completed *Part 2* on average 1.9 days (Standard Deviation [SD] = 2.2 days) after completing *Part 1*. All participants were told that they will be asked to read more about the scenario involving 'Metro City Printing' and 'Tile Sales & Installation'. MCP, MCP+PEI, TSI and TSI+PEI participants were asked to imagine, once again, that they worked for their respective company. Control participants were not given any imagination instruction. Participants were told that the old tile floor in the 'Metro City Printing' plant continued to crack and the floor was becoming a danger to staff, so 'Metro City Printing' asked 'Tile Sales & Installation' to start the work three weeks earlier than scheduled in the contract. 'Tile Sales & Installation' agreed to this, completed the work, and sent 'Metro City Printing' an invoice that included a surcharge of \$20,000 for moving the start date forward. 'Metro City Printing' were 'baffled' by the surcharge and refused to pay because they believed their company never accepted such a surcharge.
15. Moreover, participants were told that the new tiles in the 'Metro City Printing' plant started to crack. 'Metro City Printing' claimed that the tiles were not fit for purpose, so 'Tile Sales & Installation' obtained an expert report which showed that the tiles were perfectly suitable for the heavy machines, but not for heavy machines that are being rolled around.
16. **Post-event information.** At this point, participants in the *MCP+PEI* and *TSI+PEI* groups only were exposed to (biased) post-event information in the form of a memo sent by their own company's in-house counsel. For each group, the memo included a legal evaluation of the opposing company's claims and suggested that the participant's own company was in the right. Figure 3 shows the biased memos. Importantly, the memo from the in-house counsel of 'Metro City Printing' stated that during the in-person meeting at the 'Metro City Printing' plant stated:

'... TSI's staff were clearly able to observe machinery placed on rollers, and such machinery being moved around. Accordingly, Tile Sales & Installation was under a contractual obligation to choose tiles that could endure (also) heavy loads applied by way of rolling printing machines.'
17. By contrast, the memo from the in-house counsel of 'Tile Sales & Installation' stated that:

'... our staff did not observe machines being moved around on occasion of the meeting that took place... Accordingly, Tile Sales & Installation was not under a contractual obligation to choose tiles that could endure (also) heavy loads applied by way of rolling printing machines.'
18. Participants were then told that the situation between the two companies was 'getting complicated' and they were instructed to take a break from reading about the business dilemma. They were given a short (approximately five minutes) filler task that required them to recall genuine events from their personal past and to write brief descriptions of those events. The filler task was not directly relevant to the current study – it was used here to create space between the biasing post-event information and the witness memory test. This gives participants' memories an opportunity to fade slightly (as memory would fade in the real world) before being tested.

Figure 3. Biasing in-house memos from the 'Metro City Printing' in-house counsel (page 49) and the 'Tile Sales & Installation' in-house counsel (page 50). These memos served to bias participants towards thinking their own company was in the right.



Inbox - MD@mcp.com

Yesterday at 09:56

Jennifer Milburn, MCP Legal Counsel

Re: Tile Sales and Installation Contract

To: Managing Director, MCP, Cc: Elliot Delaney, MCP

I have evaluated *Tile Sales and Installation's* claims.

To start with, it is correct that the Contract does not specify that some of our machines are placed on rollers and are in fact moved on a regular basis. It is a fact that such movement leads to additional load on the tiling. However, under the applicable law, the supplied tiles must be fit for the intended purpose, whereby the intended purpose is not only to be derived from the contractual specifications. It also includes intended purposes of which TSI was aware at the time the Contract was entered into. On occasion of the meeting that took place on 28 February 2017, TSI's staff were clearly able to observe machinery placed on rollers, and such machinery being moved around. Accordingly, TSI was under a contractual obligation to choose tiles that could endure (also) heavy loads applied by way of rolling printing machines.

I would be happy to discuss this further by phone.

Jenny

**Jennifer Milburn | In-house legal counsel, Metro City Printing 1001 Main
Street, Ocean City |**

Atlantis, FL 34678 | jmilburn@metrocityprint.com





Inbox - MD@tsi.tile

Yesterday at 09:56

Alison Bond, TSI Legal Counsel**Re: Metro City Printing Contract****To: Managing Director, TSI****Cc: A. Almeida, President, TSI**

I have evaluated *Metro City Printing's* claims.

To start with, it is important to note that the Contract does not specify that some of Metro City Printing's machines are placed on rollers and are being moved around. It is understood that this would have been highly relevant information, given that such movement leads to additional loads on the tiling. However, under the applicable law, the supplied tiles must also be fit for the intended purpose, whereby the intended purpose is not only to be derived from the contractual specifications. It also includes intended purposes of which we as the supplier were aware at the time the Contract was entered into. We understand, however, that our staff had no opportunity to observe rolling machines at any point in time. In particular, our staff did not observe machines being moved around on occasion of the meeting that took place on 28 February 2017 at Metro City Printing's factory. Accordingly, Tile Sales and Installation was not under a contractual obligation to choose tiles that could endure (also) heavy loads applied by way of rolling printing machines.

I would be happy to discuss this further by phone.

Ali

Alison Bond, Legal Counsel - TSI**9006 Central Avenue, Hamilton, FL 34576, a.taylor@tsi.tile**

19. **Witness memory test.** Next, participants were told that the two companies agreed to arbitration and they were asked to imagine that they were called upon as a fact witness. Participants were instructed to answer eight questions 'as honestly as possible, based on your memory of what occurred'. Questions 1 to 7 asked participants about details from the in-person meeting, whereas Question 8 asked about a detail in the contract (see Table 1 below). Questions 3 and 6 were the critical questions that centred on the two key issues in the dispute (the surcharge and tile suitability). After providing a response, participants were asked to rate their confidence on a 100-point scale from 0 ('Not at all confident') to 100 ('Extremely confident') (see Table A4, page 60).
20. **Key issues.** *Issue 1* centred on whether 'Metro City Printing' agreed to a US\$ 20,000 surcharge if the company required the flooring work to start earlier than the date specified in the contract. The contract stated that the work will commence on 1 April, but during the meeting, the 'Metro City Printing' representative asked the 'Tile Sales & Installation' representative whether it would be possible to carry out the works earlier if it should become necessary. The 'Tile Sales & Installation' representative stated that it would be possible, but 'Metro City Printing' would need to pay an extra cost of US\$ 20,000. The 'Metro City Printing' representative replied:

'Well, that's quite a difference. Hopefully the need won't arise – if it does I will let you know.'
21. Crucially, the 'Metro City Printing' representative did not agree to the surcharge during the meeting. Question 3 asked participants:

'During the meeting at Metro City Printing's plant on 28 February, did the Metro City Printing representative agree to a \$20,000 surcharge if the company opted for the works to start early?'
[Yes/No/Do not remember]
22. *Issue 2* centred on whether the tiles supplied by 'Tile Sales & Installation' were fit for the purpose required by the contract. The contract stipulated the maximum weight that the tiles could tolerate but stated nothing about the machines being rolled around the factory floor. 'Metro City Printing' argued that the 'Tile Sales & Installation' representative saw the machines being moved around during the onsite meeting and thus knew the exact purpose. Crucially, the 'Tile Sales & Installation' representative did not have the opportunity to view the machines rolling around the factory floor. Before reading the meeting transcript, participants were told that the meeting occurred in the offices on the second floor and the attendees by-passed the factory floor. Question 6 asked participants:

'When the meeting took place at Metro City Printing's plant on 28 February, did Tile Sale & Installation's representative have an opportunity to view the machinery on the factory floor being moved around?'
[Yes/No/Do not remember].
23. Finally, after completing the witness memory test, participants answered demographic questions before being debriefed.

Table 1. Part 2 witness memory test questions and response options.

Questions 3 and 6 were the critical questions that centred on the two key issues.

Question	Response options (*correct answer)
During the meeting at Metro City Printing's plant on 28 February, the Metro City Printing representative explained why they might need to bring the start date for the tile installation forward. What reason did he give?	<p>Metro City Printing might need to start production on a large order in April.*</p> <p>Metro City Printing's floor might dramatically deteriorate before the planned start date in April.</p> <p>Metro City Printing might purchase new, larger machinery that would arrive in the factory in April.</p>
During the meeting at Metro City Printing's plant on 28 February, what tile model did the Tile Sales & Installation representative recommend?	<p>S700/9</p> <p>T 400/6*</p> <p>P800/5</p>
During the meeting at Metro City Printing's plant on 28 February, did the Metro City Printing representative agree to a US\$ 20,000 surcharge if the company opted for the works to start early?	<p>Yes</p> <p>No*</p> <p>I do not remember</p>
When the meeting took place at Metro City Printing's plant on 28 February, how many heavy printing machines were being operated?	<p>5</p> <p>9</p> <p>14*</p>
When the meeting took place at Metro City Printing's plant on 28 February, how many employees were there working on the factory floor?	<p>25*</p> <p>36</p> <p>45</p>
When the meeting took place at Metro City Printing's plant on 28 February, did Tile Sale & Installation's representative have an opportunity to view the machinery on the factory floor being moved around?	<p>Yes</p> <p>No*</p> <p>I do not remember</p>
How many people were present at the meeting that took place at Metro City Printing's plant? Two? Three? Four? (drag the slider on the scale)	<p>Correct answer: 3</p>
Finally, thinking back to the contract created between Metro City Printing and Tile Sales & Installation, did you see a clause about additional surcharges for changes to the start date for the works?	<p>Yes</p> <p>No*</p> <p>I do not remember</p>

III. Results and discussion

(i) Preliminary analyses

24. Table A3 at the end of Appendix 2 shows the viewing duration statistics for the contract, purchase order, meeting transcript, and biasing memo presented to participants in *Part 1*. Importantly, across all of the groups, participants spent a similar amount of time viewing the case materials. Thus, any differences observed between the groups on the memory test cannot be attributable to the length of time that participants spent viewing or memorising the case materials.

(ii) Witness memory test

25. Recall that the primary purpose of the study was to examine whether the accuracy of witness memory is affected by whether the witness is biased in favour of a particular company or exposed to biasing post-event information. Table A4 at the end of Appendix 2 shows participants' performance on each question in the witness memory test. Questions 3 and 6, however, were the critical questions and the results are presented below.
26. Figure 4 shows participants' responses to Question 3:
'During the meeting at Metro City Printing's plant on 28 February, did the Metro City Printing representative agree to a US\$ 20,000 surcharge if the company opted for the works to start early?'

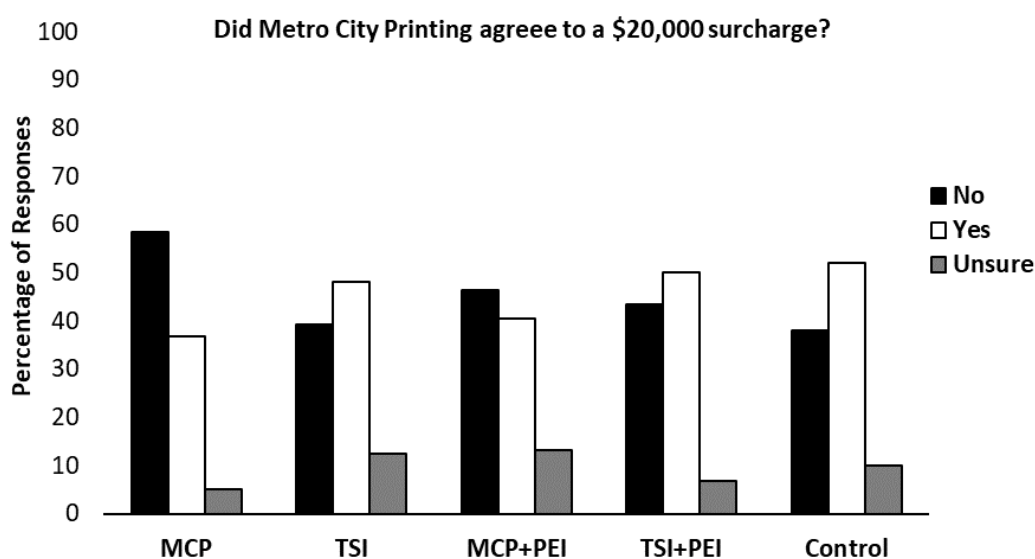


Figure 4. Percentage of responses (in each group) to the critical question about the US\$ 20,000 surcharge.

27. The correct answer was 'No'. (The biased memo did not contain details relevant to this issue so there is no reason to expect the biased memos to affect participants' responses). It was predicted that MCP and MCP+PEI participants would be more likely to respond 'No' than TSI and TSI+PEI participants. As Figure 4 shows, this prediction was not fully supported but there was a tendency for participants who imagined they worked for MCP to say 'No' more often than those who imagined they worked for TSI. In total, 58% of MCP participants and 46% of MCP+PEI participants said 'No', versus 39% of TSI participants and 43% of TSI+PEI participants.
28. The pattern appears to fit the prediction that participants would be biased towards their own company, but the inferential analyses showed that there was no (statistically) significant association between the company that participants imagined they worked for and their response to this question.

A binomial logistic regression (with 'I do not remember' responses excluded) revealed that the company (*MCP* vs *TSI*) was not associated with how participants responded, $\chi^2(2, N = 245) = 3.01, p = .22$. The biased memo was not associated with participants responses either, but this is unsurprising as the memo did not relate to the surcharge issue, $\chi^2(2, N = 245) = .51, p = .78$.¹⁸

29. There is a good explanation for why the inferential analyses were not statistically significant, despite the overall pattern of findings suggesting that the imagination instruction did in fact influence participants' responses. Figure 4 shows that participants found the question about the surcharge particularly difficult to answer. Performance in most groups is close to chance (i.e. participants are likely to be guessing the correct response). Even in the control group, where participants were not exposed to any suggestive influences, only 38% of participants responded correctly (i.e. 'No'), and we might expect 33% of participants in this group to respond correctly by chance alone. Poor performance on a memory test can obscure the effect of any experimental manipulation.
30. Figure 5 shows participants' responses to Question 6:

'When the meeting took place at Metro City Printing's plant on 28 February, did Tile Sale & Installation's representative have an opportunity to view the machinery on the factory floor being moved around?'

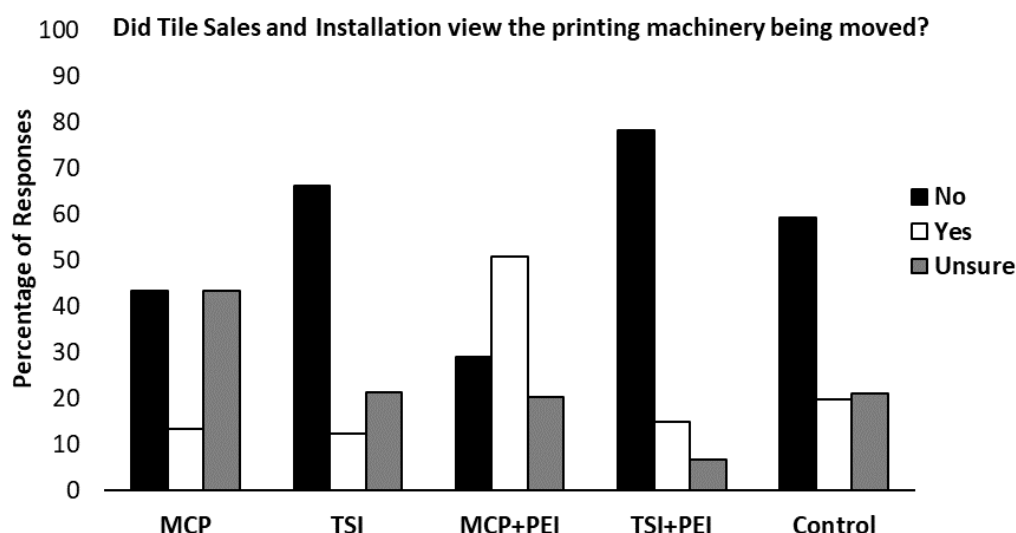


Figure 5. Percentage of responses (in each group) to Question 6.

31. The correct answer was 'No'. It was predicted that *TSI* participants would be more likely to respond 'No' than *MCP* participants. Moreover, the biased memo was directly relevant to this question and was expected to bias participants even more towards their own company's case. As Figure 5 shows, this was exactly what the results revealed. The figure shows that 66% of *TSI* participants and 78% of *TSI+PEI* participants said 'No' compared to only 43% of *MCP* and 29% of *MCP+PEI* participants. It is clear that the instruction to imagine one worked for a particular company and the biasing post-event information led participants to respond in a way that better suited their own company's case. The inferential analyses revealed a (statistically) significant association between the participants' imagined company and their responding ($\chi^2(2, N = 245) = 34.0, p < .001$) and between the biasing post-event information and participants' responding, $\chi^2(2, N = 245) = 21.6, p = .001$. The analyses indicates that

18 N = Number of participants; p = Probability value; χ^2 = The chi-square test statistic is used to determine if there is a (statistically significant) relationship between two variables.

participants were more likely to respond 'No' if they were *TSI* rather than *MCP* participants, and that participants were more likely to respond in favour of their own company if they were exposed to the biasing in-house memo versus not exposed.

Conclusion

32. The current experiment examined the accuracy of witness memory in a business context. The results were consistent with those found in myriad witness memory studies conducted in the criminal context. In particular, biasing people in favour of a particular company and exposing them to suggestive post-event information affected their memory reports. Each of these factors led participants to recall details in a way that better supported their own company's case. Taken together, these findings illustrate that just like witness memory in the criminal context, witness memory in business settings is liable to error.
33. It is worth noting that the current study was designed to mimic the real-world situation in which a cooperative and honest witness attempts to provide an accurate account of the events observed. During the witness memory test, participants were instructed to answer questions as honestly as possible, based on their memory of the events. And they were given unlimited time to respond to the memory questions. Even with these instructions to be as accurate as possible, the mere act of imagining that one worked for a particular company was enough to alter participants' memories. The current study did not explore the propensity of witnesses who may deliberately attempt to deceive an interviewer by reporting false information. The issue of deceptive witnesses was beyond the scope of this study.
34. A common concern – especially amongst professionals and practitioners – about online or lab-based research on witness testimony is that such studies tell us little about how witnesses behave in the real world. Indeed, the current study used written materials and a hypothetical case that unravelled over a short period. Participants were not real employees of the companies in the dispute and their memories were tested after only a short delay. Given the differences between the current study and the real-world conditions in which witnesses provide testimony, it is reasonable to question the generalisability of the research. What psychologists know from decades of research is that the findings observed in this type of (laboratory-analogue) study do generalise well to *real* fact witnesses. For example, studies into the memory-distorting effects of post-event information have shown that erroneous details can be implanted into memory for not only simulated events (e.g. a filmed event) but also for real events (e.g. a tragic terrorist bombing).¹⁹ The pattern of results observed in the current study has been demonstrated in myriad published studies since the 1970s that have used different groups of participants (e.g. young vs older adults, Western vs Eastern participants), a range of materials (written scenarios, live/staged events, video recordings, etc.) and different key issues (the appearance of a perpetrator, object, scene, etc.). The finding that suggestive influences can distort human memory is a common and robust one.

19 V.V. Nourkova, D.M. Bernstein, E.F. Loftus, 'Altering traumatic memories', *Cognition and Emotion*, 18 (2004), pp. 575-585.

Annexes

Table A1: Demographic information for each group

Demographic	MCP (n = 60)	TSI (n = 56)	MCP+PEI (n = 69)	TSI+PEI (n = 60)	Control (n = 71)
Gender					
Female	25	30	32	20	37
Male	35	24	37	40	34
Prefer not to say		2			
Age (years)					
Mean [M]	48.7	45.2	47.9	48.2	45.8
Standard Deviation [SD]	11.4	13.0	12.4	12.8	11.5
Range	24-71	20-65	20-83	28-65	19-65
Country of residence					
Afghanistan		2			1
Armenia	1				
Belgium			1		
Brazil	3			3	1
Canada	1	2	3	1	5
Croatia	1		1		1
Cyprus			1		
Denmark		1	1		
Ecuador	1	1			
France	2	3	3	1	2
Germany		2	1	1	4
Iran		1			
Israel					1
Italy					1
Luxembourg					1
Mexico				1	
New Zealand				1	
Palestine				1	
Peru	1			1	
Poland		1			
Portugal			2		3
People's Republic of China				1	1
Singapore			1		1
Slovakia				1	
Spain	1			1	
Sri Lanka	1				
Sweden					1
Switzerland	1			2	
Thailand				1	
Turkey					1
United Kingdom	23	19	30	21	34
United States of America	23	23	23	22	13
Prefer not to say	2	1	2	1	

Note: The acronyms are as follows: [1] *MCP* (Metro City Printing) - participants who imagined they were the Managing Director of Metro City Printing and were *not* exposed to misleading post-event information, [2] *TSI* (Tile Sales & Installation) - participants who imagined they were the Managing Director of Tile Sales & Installation and were not exposed to misleading post-event information, [3] *MCP+PEI* (Metro City Printing + Post-event Information) - participants who imagined they were the Managing Director of Metro City Printing and were exposed to misleading post-event information, [4] *TSI+PEI* (Tile Sales & Installation + Post-event Information) - participants who imagined they were the Managing Director of Tile Sales & Installation and were exposed to misleading post-event information, and [5] *Control* - participants who did not imagine they worked for one of the companies and were not exposed to misleading post-event information.

Table A2: Education and employment information for each group

Demographic	MCP	TSI	MCP+PEI	TSI+PEI	Control
Highest level of Education					
Secondary Education	3	1	3	2	3
Post-Secondary Education	7	6	8	9	3
Undergraduate Degree	20	30	29	17	33
Postgraduate Degree	25	14	24	27	25
Doctorate (PhD)	4	4	2	4	7
Other	1	1	1	1	
Prefer not to say					
Primary Area of Employment					
Agriculture, Forestry, Fishing or Hunting		2			
Arts, Entertainment, and Recreation	3	1		1	2
College, University, and Adult Education	2	3	3	5	5
Computer and Electronics Manufacturing			1		1
Construction	2		2	2	1
Finance and Insurance	3	2	2	2	6
Government and Public Administration		1	4	1	2
Health Care and Social Assistance	4		4	2	5
Homemaker	1		1		
Hotel and Food Services					1
Information Services and Data Processing	2	2	2		
Legal Services	17	12	16	17	17
Other Education Industry	2	1	5	2	
Other Industry	9	15	6	7	10
Other Information Industry	1	1	4	1	
Other Manufacturing	3		2	3	2
Primary/Secondary (K-12) Education	2	4	1	2	1
Publishing	3				1

Demographic	MCP	TSI	MCP+PEI	TSI+PEI	Control
Real Estate, Rental and Leasing				3	3
Retail	1	1	3	2	1
Retired/Unemployed	1	1	3		2
Scientific or Technical Services	1	2	1	4	2
Software			2	1	5
Student	1	1	1	1	
Telecommunications	1	1		2	1
Transportation and Warehousing		2	1	1	
Utilities			1	1	2
Wholesale		2	1		1
Prefer not to say	1	2	3		
Job Role					
Upper Management	7	4	11	11	7
Middle Management	9	8	4	4	11
Junior Management	1	4	3	3	3
Administrative Staff	7	8	9	6	11
Support Staff	4	5	10	5	7
Student	1	2	1	1	1
Other	2	2		1	1
Trained Professional	11	7	16	8	15
Skilled Labourer	1	1	1	2	2
Consultant	1	5	2	3	2
Temporary Employee		1		1	1
Researcher	2	1	1	2	1
Self-employed/Partner	13	7	8	13	9
Prefer not to say	1	1	3		

Table A3: Descriptive statistics from Part 1 showing the time participants spent viewing the contract/purchase order, meeting transcript and biasing memo.

	Descriptive	MCP	TSI	MCP+PEI	TSI+PEI	Control	Total
Contract & PO mins)	Median	2.42	2.25	2.06	2.07	2.23	2.42
	Mean \pm SD	4.39 \pm 9.26	2.98 \pm 2.70	3.53 \pm 7.57	3.05 \pm 3.49	3.01 \pm 2.58	3.39 \pm 5.81
	Min - Max	1.07 - 71.45	1.13 - 16.25	1.05 - 62.51	1.22 - 21.61	0.5 - 14.94	0.5 - 71.45
Meeting (mins)	Median	1.71	1.55	1.48	1.74	1.57	1.74
	Mean \pm SD	2.98 \pm 5.35	2.14 \pm 2.18	1.67 \pm 0.93	2.08 \pm 1.34	2.04 \pm 1.76	2.16 \pm 2.85
	Min - Max	0.53 - 34.88	0.52 - 21.54	0.52 - 4.76	0.53 - 6.41	0.4 - 13.2	0.4 - 34.88
Memo (mins)	Median	-	-	0.87	1.08	-	1.08
	Mean \pm SD	-	-	1.29 \pm 1.51	1.78 \pm 2.64	-	1.52 \pm 2.12
	Min - Max	-	-	0.52 - 10.01	0.52 - 17.53	-	0.52 - 17.53

Note: Two ANOVAs were conducted to determine the effect of Company (MCP and TSI) and Biasing Information (PEI and No PEI) on viewing duration. The results showed that the company and the biasing information did not affect participants' viewing durations for the contract and PO, $F(1,241) = .31$, $p = .58$, or for the meeting transcript $F(1,241) = 2.51$, $p = .11$. For the biasing memo, a t-test revealed that company did not affect viewing duration, $t(12) = -2.73$, $p = .19$.

Table A4: Descriptive statistics for Questions 1-8 for each group and for the entire dataset (total)

Question	Descriptive	MCP	TSI	MCP+PEI	TSI+PEI	Control	Total
Q1	Number	60	56	69	60	71	316
	% Correct	68	71	71	70	72	71
	% Incorrect	32	29	29	30	28	29
Q2	Confidence \pm SD	79 \pm 21.6	73 \pm 25.1	75.3 \pm 25.4	81.4 \pm 19.3	75.3 \pm 22.9	76.7 \pm 23.1
	% Correct	80	63	68	73	76	72
	% Incorrect	20	38	32	27	24	28
Q3	Confidence \pm SD	56.5 \pm 36.1	43.1 \pm 29.8	50.5 \pm 33.3	47.5 \pm 33.3	51.6 \pm 36.1	50 \pm 33.9
	% No	58	39	46	43	38	45
	% Yes	37	48	41	50	52	46
Q4	% Don't Know	5	13	13	7	10	9
	Confidence \pm SD	79.9 \pm 22.3	72.7 \pm 26.4	84.2 \pm 17.7	81.3 \pm 17.1	82.3 \pm 20.2	80.3 \pm 21
	% Correct	33	29	20	20	30	26
Q5	% Incorrect	67	71	80	80	70	74
	Confidence \pm SD	36.3 \pm 25.4	34.2 \pm 29	34.3 \pm 26.9	36.4 \pm 24.8	36.4 \pm 29.3	35.5 \pm 27
	% Correct	50	50	51	70	51	54
Q6	% Incorrect	50	50	49	30	49	46
	Confidence \pm SD	32.1 \pm 25.9	32 \pm 27.7	35.2 \pm 28	34.6 \pm 25.7	34.5 \pm 29.8	33.7 \pm 27.4
	% No	43	66	29	78	59	54
Q7	% Yes	13	13	51	15	20	23
	% Don't Know	43	21	20	7	21	22
	Confidence \pm SD	68.1 \pm 25.9	69.4 \pm 25.7	77.6 \pm 20.4	85.5 \pm 16.7	69.3 \pm 25.3	74 \pm 23.8
Q8	Mean (v1)	3.2 \pm 1.2	3 \pm 1.1	3.4 \pm 1.7	3.3 \pm 1.2	3.4 \pm 1.3	3.3 \pm 1.3
	Confidence \pm SD	53.6 \pm 28.3	48.6 \pm 22.9	57.4 \pm 28.5	51.9 \pm 21.9	63.4 \pm 29.3	55.3 \pm 26.7
	Mean (v2)	3.1 \pm 1.2	3.5 \pm 1.4	4 \pm 2	3.4 \pm 0.8	3.5 \pm 2	3.5 \pm 1.6
Q8	Confidence \pm SD	49.9 \pm 24.8	46.7 \pm 27.5	44.5 \pm 26.4	57.4 \pm 26.8	59.8 \pm 30.5	51.9 \pm 27.8
	% No (v1)	58	45	52	53	38	49
	% Yes (v1)	32	28	21	23	29	27
Q8	% Don't Know (v1)	10	28	27	23	32	24
	Confidence (v1)	76.4 \pm 17.7	65.6 \pm 28.5	76.7 \pm 21.8	76.4 \pm 23.2	74 \pm 22.7	74 \pm 23
	% No (v2)	48	52	33	47	41	43
Q8	% Yes (v2)	38	19	44	30	24	31
	% Don't Know (v2)	14	30	14	23	30	22
	Confidence (v2)	69.8 \pm 32.2	68.9 \pm 20.1	69.3 \pm 29	72.5 \pm 26.6	67.8 \pm 30.6	69.5 \pm 28

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