

Manuscript version: Author's Accepted Manuscript

The version presented in WRAP is the author's accepted manuscript and may differ from the published version or Version of Record.

Persistent WRAP URL:

<http://wrap.warwick.ac.uk/159938>

How to cite:

Please refer to published version for the most recent bibliographic citation information.

Copyright and reuse:

The Warwick Research Archive Portal (WRAP) makes this work by researchers of the University of Warwick available open access under the following conditions.

Copyright © and all moral rights to the version of the paper presented here belong to the individual author(s) and/or other copyright owners. To the extent reasonable and practicable the material made available in WRAP has been checked for eligibility before being made available.

Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge. Provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

Publisher's statement:

Please refer to the repository item page, publisher's statement section, for further information.

For more information, please contact the WRAP Team at: wrap@warwick.ac.uk.

The Science of Witness Memory: Implications for Practice and Procedure in International Arbitration

Kimberley A. WADE & Ula CARTWRIGHT-FINCH*

Witness evidence plays a lead role in international arbitrations, yet the reliability of witness evidence in arbitral contexts has received little attention from legal practitioners. Hundreds of scientific studies have highlighted the fragile nature of witness memory and the ease with which memories can become unwittingly corrupted. In this article, we explain why the psychological research on witness memory is relevant to international arbitration and outline some of the key findings that have important implications for procedure and practice. Alongside the large body of science illustrating the malleability of witness memory, there exists a substantial amount of research outlining how best to preserve or maximize the quantity and quality of witness evidence. Indeed, many simple measures can be adopted by arbitrators and counsel, when eliciting and presenting witness evidence. When educated on the psychological science concerning the factors that can render even the most meticulous and honest witness prone to error, fact-finders will be in a far better position to assess witness evidence in international arbitrations.

Keywords: Witness memory, witness statement, witness evidence, testimony, misinformation, cognitive bias, psychology, probative value, reliability

* Kimberley A. Wade, Professor of Psychology at the University of Warwick (k.a.wade@warwick.ac.uk). Prof. Wade holds a Ph.D in Cognitive Psychology from Victoria University of Wellington, New Zealand. Her research examines aspects of autobiographical and episodic memory, with a focus on the impact of social, cognitive and environmental factors on autobiographical memory distortions. She is a Fellow of the Association for Psychological Science. Ula Cartwright-Finch, Managing Director of Cortex Capital (ucf@cortexcapital.org). Dr Cartwright-Finch holds a Ph.D in Cognitive Psychology from University College London and has extensive Counsel experience in international arbitration. She trains and educates arbitration professionals on legal psychology topics including witness memory, decision-making and virtual hearings. Dr Cartwright-Finch is an Honorary Research Fellow at the University of Warwick.

1. INTRODUCTION

Witness evidence often plays a starring role in international arbitrations. While civil law jurisdictions typically accord far less weight to witness testimony than do common law jurisdictions, common practice in arbitration has converged on the preparation of extensive witness statements alongside the written submissions. Less common among arbitrators and arbitration practitioners is a proper understanding of how that preparation can impact a witness's memory and the reliability of the resulting testimony. This is a serious problem in cases where recollections of historical events are fundamental to the dispute and where documents are not available to test the witness evidence. It can also threaten testimony intended to present factual background by way of scene-setting. Awareness of these issues is increasing gradually. A significant step forwards was marked by the launch in 2021 of the International Chamber of Commerce ('ICC') Commission Report on The Accuracy of Fact Witness Memory in International Arbitration ('ICC Report on Witness Memory').¹ A great deal is yet to be done, however, in educating arbitration players on this topic and how they might adapt their practices and procedures to maximize the reliability of witness evidence.

Our aim in this article is to take the work of the ICC Report on Witness Memory forward by opening up the conversation between legal practitioners and memory scientists on the application of research and theory on witness memory to international arbitration proceedings. We start by discussing the importance, and varied roles, of witness evidence in determining modern disputes, and some of the key events that have stimulated interest amongst legal practitioners in the limitations of witness evidence. We then outline two common misconceptions about memory: the first is the pervading belief that memory faithfully records all of our experiences and 'replays' them on demand; and the second is the tendency for people to believe they already have an excellent understanding of the various factors that can render memory unreliable. Next, we describe the main research paradigm, introduced in the 1970s, that psychological scientists use to study witness memory in the lab, before outlining eight key findings from witness memory research that have implications for practice in international arbitration settings. We hope our review of these findings in the psychological literature convinces readers that even the most scrupulously honest witness is not immune to error. We show why it is important that parties,

¹ Accessible at <https://iccwbo.org/publication/icc-arbitration-and-adr-commission-report-on-the-accuracy-of-fact-witness-memory-in-international-arbitration/>.

counsel and arbitrators consider the entire context in which an event is witnessed and a witness statement is produced. After that, we discuss the robustness of the research on witness evidence and explain why scepticism about the applicability of witness memory research to legal practice is unfounded. For those readers who remain doubtful about the relevance of witness memory research to international arbitration settings, we also present the first empirical study to demonstrate that witnesses in arbitration settings are prone to the same systematic memory errors that plague witnesses in other settings. Finally, we outline a number of simple measures that can be adopted by all players in the arbitral process to preserve and maximize the quantity and quality of witnesses' memory reports.

2. GROWING CONCERNS ABOUT THE RELIABILITY OF WITNESS EVIDENCE

In an age of increasing documentation, emails, and electronic data, it may be tempting to conclude that witness evidence has little relevance in the determination of modern disputes. Current practice shows, however, that factual recollection remains a vital part of international arbitration. In complex and often long-running disputes, witness evidence is invariably used to provide important context in order to familiarize the tribunal with the background story and to orient them within the facts of the dispute. Such factual scene-setting often relies on memory of repeated events or common business practices, such as the regularity of certain meetings or the usual steps involved in a particular process. Witnesses also provide evidence on contested factual matters which may ultimately determine the outcome of the case.

The process of preparing witness evidence also forms one of the most time- and cost-intensive phases of an arbitration. Gathering evidence, drafting lengthy statements and refining those documents with a witness constitutes a hugely time-consuming and expensive process for counsel and parties. When it comes to time spent at final hearings, a large proportion (if not the majority) is devoted to interrogating the fact witnesses. Arbitrators' determinations of witness credibility can also be decisive for a case. As such, it is in everyone's interests to make sure that witness evidence is as reliable as possible, and that arbitrators and counsel are equipped to weigh evidence appropriately.

Finally, even though we are electronically recording and archiving more information than ever before (via electronic documents, meeting recordings, emails, diaries, photos, and so on), we know

that electronic records are not infallible.² The alarming emergence of deepfakes reminds us that the electronic record is not incorruptible and research on the effects of digital manipulation shows that people frequently struggle to detect document tampering.³ Deliberate tampering aside, even where records exist, witnesses frequently disagree over what was said or done outside the written print.

Despite the prevalence and importance of witness evidence in international arbitration proceedings, the reliability of witness evidence in these contexts has received little attention from legal practitioners. The IBA Guidelines on Party Representation in International Arbitration ('IBA Guidelines on Party Representation')⁴ released in 2013 contain high level commentary on accepted best practice in relation to the preparation of witnesses, recognizing that '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'.⁵ In particular, the IBA Guidelines on Party Representation provide that representing counsel are permitted to help witnesses prepare their written witness statements, whilst seeking to ensure that a witness statement reflects the witness's own account. In relation to pre-hearing preparation, the guidelines note that 'Such contacts should ... not alter the genuineness of the Witness ... evidence, which should always reflect the Witness's own account of relevant facts, events or circumstances'.⁶ Thus, while the IBA Guidelines on Party Representation urge practitioners to elicit and provide veridical witness testimony, they are silent on the various risk factors and on how to minimize those risks.

In addition to a seminal English court judgment discussing the fallible nature of memory and the various ways the process of litigation can impact its reliability,⁷ a small number of legal

² For example, see the allegations of a 'ghost-written' court judgment and a forged expert report in Chevron's long-running dispute against the Republic of Ecuador, including an arbitration claim at the Permanent Court of Arbitration under the Treaty between the United States of America and the Republic of Ecuador concerning the Encouragement and Reciprocal Protection of Investment (terminated on 18 May 2018, by unilateral withdrawal by the Republic of Ecuador) ('United States--Ecuador BIT'); *Chevron Corp. and Texaco Petroleum Corp. v. Republic of Ecuador*, Case No. 2009-23 (Perm. Ct of Arb'n).

³ For empirical research on people's (in)ability to detect different types of image manipulations see Sophie J. Nightingale et al., *Can People Identify Original and Manipulated Photos of Real-World Scenes?* 2 Cog. Res. Princ. Imp. 30 (2017), David J. Robertson et al., *Detecting Morphed Passport Photos: A Training and Individual Differences Approach*, 3 Cog. Res. Princ. Imp. 27 (2018).

⁴ Accessible at www.ibanet.org/Publications/publications_IBA_guides_and_free_materials.aspx.

⁵ Comments to Guidelines 18-25 (Witnesses and Experts), IBA Guidelines on Party Representation.

⁶ Comments to Guidelines 18-25 (Witnesses and Experts), IBA Guidelines on Party Representation.

⁷ In *Gestmin SGPS SA v. Credit Suisse (UK) Ltd* [2013] EWHC 3560, a commercial case relating to alleged negligent investment advice where the events in question spanned several years, Leggatt J

practitioners began to pick up on the theme. Most notable among them was Toby Landau QC's speeches in 2010⁸ and 2015⁹ in which he discussed how the same memory biases plague the preparation of witness evidence in international arbitration. The second author (Ula Cartwright-Finch, UCF) began her work on this topic in 2014, going on to publish a detailed analysis of the scientific literature on human memory and how it applies to witness evidence in international arbitration.¹⁰ Subsequently, the ICC formed a Task Force on Maximizing the Probative Value of Witness Evidence on which we (Kimberley A. Wade (KAW) and UCF) served as Scientific Advisors. The Task Force was one of the ICC's largest ever, with contributions from 124 members spread across 49 jurisdictions. Several years' work culminated in the launch of the ICC Report on Witness Memory in April 2021. Throughout the life of the Task Force and afterward, interest in the topic has continued to spread among the arbitration community with panel discussions and workshops on witness memory featuring regularly at conferences and events.¹¹

3. COMMON MISCONCEPTIONS ABOUT MEMORY

Before turning to the scientific research on witness evidence, we want to highlight some of the prevailing myths about human memory. Although decades of science have confirmed that witness memory is prone to error,¹² laypeople through to legal professionals and decision-makers often

concluded that 'Considerable interference with memory is ... introduced in civil litigation by the procedure for preparing for trial' (para. [20]). Leggatt J's comments in *Gestmin* remain perhaps the most famous analysis of fact witness memory in English law.

⁸ Guest speech titled, *Tainted Memories: Exposing the Fallacy of Witness Evidence in International Arbitration*, delivered at the 2010 Kaplan Lecture in Hong Kong.

⁹ Guest speech titled, *Unreliable Recollections, False Memories and Witness Testimony*, delivered at the 2015 meeting of the ICC Commission on Arbitration and ADR.

¹⁰ See Ula Cartwright-Finch, *Human Memory and Witness Evidence in International Arbitration*, ch. 9 in Tony Cole, Ed. *The Roles of Psychology in Arbitration*, Wolters Kluwer (2017).

¹¹ In parallel with (but entirely separate from) the work of the ICC Task Force, the English Commercial Court formed a Witness Evidence Working Group in 2018 to consider potential improvements to current practice relating to the preparation of factual witness evidence in the Business and Property Courts. That work has also played a major role in highlighting the fragile nature of witness evidence, and culminated in 2021 in new rules, including a Statement of Best Practice governing the preparation of trial witness statements (including witness statements in arbitration claims) in the English Courts. See Practice Direction 57AC — Trial Witness Statements in the Business and Property Courts, supplementing the Civil Procedure Rules in England and Wales.

¹² See, e.g., Hiroshi Ito et al., *Eyewitness Memory Distortion Following Co-Witness Discussion: A Replication of Garry, French, Kinzett, and Mori (2008) in Ten Countries*, 8 J Appl. Res. Mem. Cogn. 68 (2019); Elizabeth F. Loftus, *A 30-year Investigation of the Malleability of Memory*, 12 Learn. Mem. 361 (2005); Elizabeth F. Loftus & John C. Palmer, *Reconstruction of Auto-mobile Destruction: An Example of*

overestimate their memory knowledge and hold misconceptions about how memory works.¹³ Two long-standing and common misconceptions have significant implications for how people view witness testimony. First, people often believe that memory faithfully *records* all of our experiences and replays them on demand. Put another way, people tend to think that memory is a permanent and comprehensive store of information.¹⁴ This misconception can lead to the dangerous mistaken corollary that witness evidence is reliable, accurate and complete. Second, people are largely unaware of the various factors that can render memory unreliable. It is common knowledge, according to surveys of laypeople, that the way in which a person is questioned can influence what that person recalls.¹⁵ Relatively few people, however, are aware of the distorting effects that many other factors have on memory, including (but not limited to) one's personal expectations, perspectives, stereotypes and motivations. Nor do people understand the effects of hypnosis, witness age (child witness accuracy and older witnesses) or emotional arousal and stress on memory.¹⁶ One recent study revealed that laypeople's beliefs are now better aligned with expert opinion — at least on some aspects — than they were twenty-five years ago.¹⁷ Yet, this study also

the Interaction Between Language and Memory, 13 *J Verb. Learn. Verb. Be.* 585 (1974); Kimberley A. Wade et al., *A Picture is Worth a Thousand Lies*, 9 *Psychon. Bull. Rev.* 597 (2002).

¹³ One requirement for the admissibility of expert testimony in North American criminal courts is that the testimony must pertain to topics that are beyond the common knowledge of a typical juror. Expert testimony about the reliability of memory has frequently been ruled inadmissible, because judges have considered the content of such testimony to be 'common sense'. This has motivated memory researchers to examine laypeople's knowledge of memory processes. See Tanja R. Benton et al., *Has Eyewitness Testimony Research Penetrated the American Legal System? A Synthesis of Case History, Juror Knowledge, and Expert Testimony*, ch 4, Ron C. L. Lindsay et al. Eds., vol 2, *Handbook of Eyewitness Psychology: Memory for People*, Erlbaum (2007). For a review of research on beliefs about memory see James Ost et al., *Latent Variables Underlying the Memory Beliefs of Chartered Clinical Psychologists, Hypnotherapists and Undergraduate Students*, 25 *Memory* 57 (2017).

¹⁴ For studies on beliefs about memory, see Shazia Akhtar et al., *The 'Common Sense' Memory Belief System and its Implications*, 22 *Int'l J. Evidence & Proof*, 289 (2018); Elizabeth F. Loftus et al., *Near-Natal Memories, Past-life Memories, and other Memory Myths*, 36 *Am. J. Clin. Hypn.* 176 (1994); Lawrence Patihis et al., *Are the 'Memory Wars' Over? A Scientist-Practitioner Gap in Beliefs About Repressed Memory*, 25 *Psychol. Sci.* 519 (2014); Daniel J. Simons & Christopher F. Chabris, *What People Believe about how Memory Works: A Representative Survey of the U.S. Population*, 6 *PLoS ONE*, e22757 (2011).

¹⁵ T. R. Benton et al., *Eyewitness Memory is Still Not Common Sense: Comparing Jurors, Judges and Law Enforcement to Eyewitness Experts*, 20 *Appl. Cognitive Psych.* 115 (2006).

¹⁶ J. Don Read & S. L. Desmarais, *Lay Knowledge of Eyewitness Issues: A Canadian Evaluation*, 23 *Appl. Cognitive Psych.* 301 (2009).

¹⁷ Kimberley Wake et al., *Laypeople's Beliefs about Memory: Disentangling the Effects of Age and Time*, 28 *Memory*, 589 (2020).

showed that the erroneous belief that memory is permanent still stands strong, which highlights the need for continued education about memory and its limitations.

4. HOW SCIENTISTS STUDY WITNESS MEMORY IN THE LAB

Research into the reliability of witness memory started to surge in the late 1970s when Dr Elizabeth Loftus, a leading US psychologist in the field of human memory, revolutionized the field by publishing a new paradigm for examining witness memory in the lab. Loftus and colleagues also provided compelling data that challenged the credibility of witness testimony in the courtroom.¹⁸ Since then, hundreds of studies conducted by scientists around the globe have used the paradigm that Loftus introduced to investigate the many extraneous factors that can influence the quality and quantity of a witness's report. It is important to note that the psychological literature on witness memory is vast. At the time of writing, a search of the term 'witness memory' on Google Scholar reveals more than 5,500 hits (publications) in 0.10 seconds.

Loftus' paradigm for exploring witness memory was a simple three-stage procedure.¹⁹ In Phase 1, participants view a video or slideshow of a target event, or even a live staged event, depicting a mock crime or some scenario that may require witness testimony in real life. For instance, participants might view a scene in which a caretaker enters an office, conducts some repairs, steals US\$20 and a calculator, and then leaves.²⁰ Phase 2 typically comes after a short delay, designed to mimic real-world scenarios and to provide time for memory to fade. In Phase 2, participants are exposed to a mixture of accurate and misleading information about the events they have witnessed. This information is called *post-event information* and is often presented in the form of a questionnaire about the original event, or a narrative describing the original event. The post-event information is usually cleverly crafted such that some participants are exposed to misleading suggestions about certain aspects of the original event, whereas others are not. Returning to our caretaker example, participants who viewed a hammer in the slideshow might read a summary that

¹⁸ See Elizabeth F. Loftus, *Leading Questions and the Eyewitness Report*, 7 *Cognitive Psychol.* 560 (1975), Elizabeth F. Loftus et al., *Semantic Integration of Verbal Information into a Visual Memory*, 4 *J Exp. Psychol. Hum L.* 19 (1978).

¹⁹ Elizabeth F. Loftus et al., *Semantic Integration of Verbal Information into a Visual Memory*, 4 *J Exp. Psychol.-Hum L.* 19 (1978).

²⁰ This example comes from Michael McCloskey & Maria Zaragoza, *Misleading Postevent Information and Memory for Events: Arguments and Evidence against Memory Impairment Hypotheses*, 114 *J Exp. Psychol. Gen.* 1 (1985).

suggests the caretaker placed the calculator beneath a ‘tool’ in his toolbox (generic true information, the *control* item), whereas others might read he placed it beneath a ‘wrench’ (misleading information, the *misled* item). In Phase 3, participants complete a memory test to determine the accuracy of their memory for the original event. In our example, they might be asked to complete the following sentence, ‘The man slid the calculator beneath a (hammer/wrench) in his toolbox’. The researchers look to see whether the participants who were exposed to misleading post-event information incorporate that information into their memory—and indeed, participants frequently do. This finding has been dubbed the *misinformation effect*.²¹

Since Loftus’ early work, hundreds of studies using a variety of research materials and different participant samples have demonstrated that the misinformation effect is a powerful and robust phenomenon.²² Misleading post-event information can modify people’s memory reports in subtle or dramatic ways, changing, for example, a person’s facial appearance, the colour of a car, the brand of a soft drink, a stolen object, or what was said in a conversation. Misinformation tends to induce the greatest distortion when encountered after a delay, rather than immediately after the event.²³ The source of the misinformation also matters. People are more likely to be swayed by misinformation when the ‘misinformation messenger’ is deemed trustworthy or apparently unbiased,²⁴ or powerful and socially attractive.²⁵ There is also evidence that the emotionality of a witnessed scene may affect susceptibility to misinformation. One study has shown that misinformation regarding negative scenes was twice as likely to distort memory than misinformation regarding either neutral or positive scenes.²⁶

²¹ James P. Tausignant et al., *Discrepancy Detection and Vulnerability to Misleading Postevent Information*, 14 *Mem. Cognition*, 329 (1986).

²² See, e.g., Emily R. Spearing & Kimberley A. Wade, *Providing Eyewitness Confidence Judgements During Versus After Eyewitness Interviews Does Not Affect the Confidence-Accuracy Relationship*, *J Appl. Res. Mem. Cogn* (forthcoming); Kathryn A. Braun & Elizabeth F. Loftus, *Advertising’s Misinformation Effect*, 12 *Appl. Cognitive Psych.* 569 (1998); Rachel Sutherland & Harlene Hayne, *Age-related Changes in the Misinformation Effect*, 79 *J Exp. Child. Psychol.* 388 (2001).

²³ For studies on how a delay affects the potency of misinformation, see Elizabeth F. Loftus, *Eyewitness Testimony*, Cambridge, MA: Harvard University Press (1979).

²⁴ David H. Dodd & Jeffrey M Bradshaw, *Leading Questions and Memory: Pragmatic Constraints*, 19 *J. Verb. Learn. Verb. Be.* 695 (1980).

²⁵ Lana A. Vornik et al., *The Power of the Spoken Word: Sociolinguistic Cues Influence the Misinformation Effect*, 11 *Memory*, 101 (2003).

²⁶ Stephen Porter et al., *Blinded by Emotion? Effect of the Emotionality of a Scene on Susceptibility to False Memories*, 35 *Can. J. Beh. Sci.* 165 (2003).

Memory researchers are frequently asked whether any individuals are immune to these sorts of memory distortions, and the simple answer is ‘No’. Seemingly everyone experiences errors in memory: infants through to older adults (even pigeons, rats and gorillas have all been shown to be prone to the detrimental effects of misinformation).²⁷ We cannot, of course, rule out the possibility that some group of individuals, yet to be discovered, might be immune to memory distortions, but to date, the empirical evidence strongly suggests that malleable reconstructive processes are fundamental to human memory.²⁸

5. APPLYING WITNESS MEMORY RESEARCH TO INTERNATIONAL ARBITRATION

Several findings in the witness memory literature have significant implications for practice in international arbitration. We now highlight some of the most pertinent research and explain why each finding is relevant to the international arbitration setting. When thinking about the myriad factors that can influence witness memory, it is helpful to distinguish between *contextual* factors that are inherent to the witness or the reported situation itself, and *retrieval* factors that exert their control when a witness retrieves information from memory, typically during an interview. We posit that four contextual factors (schemas, stress and arousal, culture, alcohol and drugs) and four retrieval factors (co-witness discussion, perspective, interviewing procedures, memory blindness) are particularly relevant to international arbitration.

5.1 CONTEXTUAL FACTORS

5.1.1 *Schemas*

Ample research shows that the way in which witnesses process information can affect what they remember. ‘Schematic processing’ is thought to be one of the most pervasive sources of

²⁷ For research on memory distortions with three-month old infants see Carolyn Rovee-Collier et al., *Infants’ Eyewitness Testimony: Effects of Postevent Information on a Prior Memory Representation*, 21 *Memory*, 267 (1993). For research on pigeons and rats see Maryanne Garry & David N. Harper, *Pigeons, Rats, and Humans show Analogous Misinformation*, 22 *Int. J. Comp. Psych.* 75 (2009). For research on gorillas see Bennett L. Schwartz et al., *Event Memory and Misinformation Effects in a Gorilla (*Gorilla gorilla gorilla*)*, 7 *Anim. Cogn.* 93 (2004).

²⁸ Lawrence Patihis et al., *False Memories in Highly Superior Autobiographical Memory Individuals*, 110 *P. Natl. Acad. Sci. USA*, 20947 (2013).

predictable errors in memory.²⁹ Schemas are organized knowledge that are based on our beliefs and expectations about the nature, characteristics, functions and behaviours of objects, people and events. For example, someone who regularly attends weekly team meetings will develop a schema representing how those meetings typically run (e.g., how long they are, who usually chairs, the topics often discussed, etc.). Reference to schema-based knowledge — such as regular business meetings or typical sales negotiations — is common in fact witness evidence in international arbitration. Schemas are vital to numerous cognitive tasks. For instance, they direct attention to relevant and useful information; facilitate information processing; direct the integration of new information with old information; provide structure and meaning to experiences; guide information searches and retrieval; and provide scaffolding for evaluative processes (e.g., problem solving, setting goals, making plans). Despite their usefulness in many everyday cognitive activities, however, schemas can contribute to systematic errors in perception, judgment and memory, leading to selective memory or forgetting, as well as false memories for events that never occurred or distortions for those events that did occur.³⁰

Many studies have demonstrated schema-based distortions in perception and memory, showing that schemas can bias veridical memory toward schema-relevant features. For instance, participants who were told that a person in a photo had just won money tended to recall his expression as one of happiness, but those who were told he was being threatened by a vicious dog were more likely to remember his expression as fearful.³¹ Other studies have shown how causal schemas, which guide how a person considers plausible causes for a given effect, can distort memory for facial expressions.³² Likewise, motion schemas which guide how a person considers the movement of objects and people can affect memory for other people's actions.³³ Schemas can

²⁹ For a review, see Deborah Davis & Elizabeth F. Loftus, *Internal and External Sources of Misinformation in Adult Witness Memory*, ch 2 Michael P. Toglia et al., Eds. *The Handbook of Eyewitness Psychology*, Vol 1. Memory for Events. Lawrence Erlbaum Associate Publishers (2007).

³⁰ For reviews of empirical findings see Robert S. Wyer, Jr & Thomas K. Srull, *Memory and Cognition in its Social Context*, New York Psychology Press (1989); Robert S. Wyer, Jr. *Social Comprehension and Judgment: The Role of Situation Models, Narratives, and Implicit Theories*. Mahwah, NJ: Lawrence Erlbaum Associates (2004).

³¹ Yaacov Trope, *Identification and Inferential Processes in Dispositional Attribution*. 93 *Psychol. Rev.* 239 (1986).

³² See Jamin Halberstadt, *The Paradox of Emotion Attribution: Explanation Biases Perceptual Memory for Emotional Expressions*, 12 *Curr. Dir. Psychol. Sci.* 197 (2003); Jamin Halberstadt, *Featural shift in Explanation-Biased Memory for Emotional Faces*, 88 *J. Pers. Soc. Psychol.* 38.

³³ Deborah Davis et al. *Unconscious Transference as an Instance of 'Change Blindness'*. Paper presented at the American Psychological Society Convention, Los Angeles, CA.

even induce people to remember schema-consistent information that was not part of the witnessed event.³⁴ In the context of commercial disputes, schemas relating to certain sales negotiations may lead a witness to misremember the demeanour — and potentially the perceived intent — of a witness for the other side, if the setting for the recollected conversation was typically contentious, for example. In investment disputes, witnesses for claimant investors may similarly misremember oral representations which they say ground a legitimate expectation of favourable treatment by the host state, if the relevant conversation took place during a series of amicable investment discussions.

One line of schema research that is particularly relevant to international arbitration proceedings is the research on memory for conversations. Studies have shown that schemas can lead people to misremember *who said what*, or the tone and content of conversations in predictable, schema-driven ways.³⁵ For instance, when participants were asked to recall which individual speaker contributed a particular statement to a group discussion, participants were more likely to misattribute the statements of one member of a social category to another person from the same category, such as a person of the same age, gender, race, attractiveness, or wearing similar coloured clothing, than to someone from a different category.³⁶ Although such errors can be benign, they are raised and disputed surprisingly often in international arbitration. A case may hinge, for example, on which person gave a critical instruction in a construction project or whether a particular pre-contractual statement was intended to be legally binding.

5.1.2 *Stress and Arousal*

The effect of stress on witness memory has also received considerable attention from psychological scientists. The findings suggest that stress or negative emotion can have a detrimental impact on the quality of a witness's report. A meta-analysis conducted in 2004 examined the effects of high stress on witnesses' ability to recall relevant event details and to

³⁴ Deborah Davis & Elizabeth F. Loftus, *Internal and External Sources of Misinformation in Adult Witness Memory*, ch. 2 in Michael P. Toglia et al., Eds. *The Handbook of Eyewitness Psychology, Vol 1. Memory for Events*. Lawrence Erlbaum Associate Publishers (2007).

³⁵ For a review see Deborah Davis & Richard Friedman, *Memory for Conversation: Orphan Child of Witness Memory Researchers*. ch. 1 in Michael P. Toglia et al., Eds. *The Handbook of Eyewitness Psychology, Vol 1. Memory for Events*. Lawrence Erlbaum Associate Publishers (2007).

³⁶ See reviews of this research in Deborah Davis, Markus Kimmelmeir, & William C. Follete, *Memory for Conversation in Trial*, ch. 12 in Y. Ian Noy & Waldemar Karwowski, Eds. *Handbook of Human Factors in Litigation*. CRC Press (2004).

identify a perpetrator in a mock crime. The meta-analysis combined data from eighteen published studies that examined witness memory for event details (e.g., a perpetrator's appearance and actions), and sixteen published studies that examined memory for a perpetrator's face.³⁷ The results showed that when participants experienced heightened stress or negative emotion while watching a mock crime, their ability to recall details accurately and to identify the perpetrator correctly was substantially impaired.

We also know that high levels of stress experienced in real world settings tend to impair witness memory.³⁸ A compelling example comes from Morgan III and colleagues who investigated the memories of military personnel undergoing challenging survival training that involved direct personal threat and heightened levels of stress.³⁹ During survival school training, the soldiers experienced sleep and food deprivation over a 48-hour period before being subjected to isolation from their colleagues. Next, the soldiers were interrogated in a well-lit room for 30 minutes at a time. The soldiers underwent a second interrogation approximately 4 hours after the first. Crucially, each soldier experienced a high-stress and low-stress interrogation. In the high-stress interrogation, the interrogator physically confronted the soldier and in the low stress interrogation there was no physical confrontation. Later, the soldiers were asked to identify their interrogators from a photo lineup. The soldiers who took part in the high stress interrogation were significantly worse at identifying any of their interrogators than those who had taken part in the low stress interrogation. Taken together, these findings suggest that if witnesses experience stress or negative emotion when witnessing some key event, then that experience is likely to impair the accuracy of their statement. While physical confrontation may feature only occasionally in international arbitration — such as in the physical expropriation of assets in an investment treaty dispute — many businesspeople operate under high levels of stress day-to-day, and those emotions are likely to heighten when arguments arise.

³⁷ Kenneth A. Deffenbacher et al. *A Meta-Analytic Review of the Effects of High Stress on Eyewitness Memory*, 28 *Law Human Behav.* 687 (2004).

³⁸ See Lorraine Hope et al. *Memory and the Operational Witness: Police Officer Recall of Firearms Encounters as a Function of Active Response Role*, 40 *Law Human Behav.* 23 (2016); Lorraine Hope et al. *Witness in Action: The Effect of Physical Exertion on Recall and Recognition*, 23 *Psychol. Sci.* 386 (2012).

³⁹ Charles A. Morgan III et al., *Accuracy of Eyewitness Memory for Persons Encountered During Exposure to Highly Intense Stress*, 27 *Int. J. Law Psychiatry* 265 (2004); Charles A. Morgan III et al., *Accuracy of eyewitness identification is significantly associated with performance on a standardized test of face recognition*, 30 *Int. J. Law Psychiatry* 213 (2007).

5.1.3 Culture

The role of culture in shaping a witness's memory is starting to pique the interest of memory researchers. New research suggests that the way in which we have been socialized can affect how we encode, remember and report information. The researchers in one study recruited 200 participants from rural and urban Ghana (typifying collectivistic culture) and the Netherlands (typifying individualistic culture) and showed them detailed photographs of crime scenarios taking place in both Ghanaian and Dutch settings.⁴⁰ Shortly after viewing the photographs, the participants reported everything they had seen in a memory test before answering some specific questions designed to cue their memories for both central and background details of the scenes (e.g., 'How was the attacker dressed?' and 'Can you describe the colour of the building?'). The results showed that in line with a large body of research, central details dominated in the witnesses' memory reports, but more interestingly, the Dutch participants reported the most details, both central and background. The researchers speculate that one possible explanation for this result is a difference in linguistic elaboration across the two cultures — that is, the extent to which members of a particular culture use descriptive language. An alternative explanation posited by the authors of the paper is that individuals from collectivistic cultures may have a tendency to be more modest or restrained when providing their memorial accounts compared to those from individualistic cultures. The results also showed that for both cultural groups, participants reported more correct central details when the crime was witnessed in their own native setting compared with the same crime in a non-native setting. This occurred for Ghanaian participants when they were asked to freely report what they recalled, and for Dutch participants when they were asked more specific questions about their memories of the photos. These findings highlight the importance of considering the cultural background of a witness when eliciting information from them and suggests the need for further scientific research on this topic.⁴¹ This contextual factor is particularly pertinent for disputes submitted to international arbitration where, very often, the parties hail from jurisdictions with contrasting cultural sensitivities.

⁴⁰ Nkansah Anakwah et al., *Cross-Cultural Differences in Eyewitness Memory Reports*, 34 *Appl. Cognitive Psych.* 504 (2020).

⁴¹ For research comparing memory for objects across different cultures see Brenda. I. Wong et al. *Cultural Differences in Memory for Objects and Backgrounds in Pictures*, 49 *J. Cross Cult. Psychol.* 404 (2017).

5.1.4 Alcohol and Drugs

Many studies have examined the influence of alcohol and drugs on human memory. A 2007 review of lab-based, basic research on the effects of alcohol on memory showed that acute alcohol consumption impairs how people remember previous experiences.⁴² Yet, the more applied research exploring the effects of alcohol on witness memory has produced mixed results. For example, one experimental study showed that moderately intoxicated mock witnesses were no less accurate or prone to suggestion than their sober counterparts when they were asked to recall a target event immediately.⁴³ However, witnesses who were moderately intoxicated during the memory test (as well as during the event) showed significantly poorer memory performance than their sober counterparts when they were questioned 1 week later. In one clever field study, the researchers recruited participants who were drinking in bars and invited them to view a mock crime before having their memories tested 3-5 days later when they were sober.⁴⁴ Compared to sober mock witnesses, the participants who were moderately intoxicated (average Blood Alcohol Concentration [BAC] = .06%), or highly intoxicated (average BAC = .16%), while watching the mock crime showed impaired memory, recalling up to 33% fewer correct details.

Finally, a recent meta-analysis which aggregated data across 10 studies exploring alcohol intoxication and witness memory showed that alcohol intoxication may reduce the amount of correct information a witness reports (i.e., a reduction in the completeness of the report), but may not increase the number of errors.⁴⁵ The meta-analysis also showed that the effect of alcohol on memory is moderated by multiple factors, including the level of intoxication: high levels of intoxication (BAC of .10% or above) had a large, detrimental effect compared to no intoxication, but moderate levels of intoxication (BAC of .03-.09%) had a smaller detrimental effect on memory. Studies have shown similar detrimental effects of smoking marijuana on witness

⁴² Miriam Z. Mintzer, *The Acute Effects of Alcohol on Memory: A Review of Laboratory Studies in Healthy Adults*, 6 Int. J. Disabil. Hum. De. 397 (2007).

⁴³ Nadia Schreiber Compo et al., *Witness Memory and Alcohol: The Effects of State-Dependent Recall*, 41 Law Human Behav. 202 (2017).

⁴⁴ Kim Van Oorsouw & Harald Merckelbach, *The Effect of Alcohol on Crime-Related Amnesia: A Field Study*, 26 Appl. Cognitive Psych. 82 (2012).

⁴⁵ Theo Jores et al., *A Meta-Analysis of the Effects of Acute Alcohol Intoxication on Witness Recall*, 33 Appl. Cognitive Psych. 324 (2019).

memory.⁴⁶ While marijuana may be off the menu in business dining settings, alcohol is not uncommon. Critical conversations that take place over drinks may suffer the specific memory issues described above when reported in witness evidence. This contextual factor could therefore play an important role in disputes featuring discussions during client social events, such as a mis-selling claim where a private investor alleges that they were not properly advised about the risks of a particular financial product during the business lunch at which they were discussed.

5.2 RETRIEVAL FACTORS

Once an event is encoded in memory there may be a short or long delay until the witness is required to retrieve it from memory for the purposes of legal proceedings. During this storage period, witnesses might speak about their experience with co-witnesses, co-workers, managers, or close confidants, long before counsel are on the scene. They might also read documents or media reports that contain information relating to the events they have in memory. When they are eventually asked by counsel to retrieve the information from memory for the purposes of drafting a witness statement, they will likely have several more discussions and discover further information relevant to the event(s) they have witnessed. Through these activities, the witness may encounter information about the event that is or is not consistent with what they know and remember. They may also be questioned in ways that suggest to them a particular, desirable response. As mentioned earlier, such post-event misinformation may be mistakenly incorporated into memory, thereby adding false information to the witness's report or replacing veridical information in memory.⁴⁷

5.2.1 *Co-Witness Discussion*

When multiple people participate in a group situation (such as a business meeting), they may remember the details of that situation differently, for many reasons, for instance, due to differences in arousal or attention, differences in information processing (schemas), their differing vantage points or due to mistakes in memory. As such, when co-witnesses discuss an event they jointly experienced, they can potentially contaminate one another's memory reports.

⁴⁶ See Kathy Pezdek et al., *Marijuana Impairs the Accuracy of Eyewitness Memory and the Confidence-Accuracy Relationship, too*, 9 J. Appl. Res. Mem. Cogn. 60 (2020); John C. Yuille et al., *An Exploration on the Effects of Marijuana on Eyewitness Memory*, 21 Int. J. Law. Psychiat. 117 (1998).

⁴⁷ Elizabeth F. Loftus, *A 30-year Investigation of the Malleability of Memory*, 12 Learn. Mem. 361 (2005).

Many studies have demonstrated the negative effects of co-witness discussion on memory.⁴⁸ In a recent large-scale, international collaboration, Ito and colleagues recruited 486 participants from 10 countries: Brazil, Canada, Colombia, India, Japan, Malaysia, Poland, Portugal, Turkey, and the United Kingdom.⁴⁹ Participants took part in pairs and were asked to sit side-by-side while watching subtly different versions of a mock crime movie on a single screen. For instance, one witness viewed a man wearing a blue baseball cap whereas the other witness viewed a man wearing a black baseball cap. Although the co-witnesses were viewing the same screen, unbeknownst to them two slightly different versions of the movie were being projected using polarized video projectors, and the co-witnesses wore polarized glasses which restricted their view to only one of the projections. After a brief delay, the co-witness pairs discussed what they had seen and worked together to answer questions about the event. They discussed questions about details that differed between the two movie versions and details that remained the same. Finally, the participants individually completed a memory test about what they observed in the movie. The results showed that participants frequently reported seeing details they had only heard about from their co-witness partner — the *co-witness conformity effect* — and this pattern was observed in every country. In fact, when participants were exposed to misinformation from their co-witness, 80% of the time they reported an incorrect answer on the memory test. This study shows that the co-witness suggestibility effect is robust and common to many cultures.

Taken together, the studies on co-witness discussion and witness memory suggest that interviewers must be cautious when eliciting information from multiple witnesses. Interviewing multiple witnesses together during the fact-gathering stage of an arbitration risks those witnesses contaminating one another's memories of the reported events. Similarly, interviewers could establish potential sources of co-witness contamination by asking about any relevant conversations to date, and minimize the risk of future effects by discouraging any further discussions with others.

⁴⁸ For sample studies using different procedures to study the effect of co-witness discussion on memory accuracy, see Glen E. Bodner et al., *Reevaluating the Potency of the Memory Conformity Effect*, 37 Mem. Cognition 1069 (2009); Helen M. Paterson & Richard I. Kemp, *Comparing Methods of Encountering Post-Event Information: The Power of Co-Witness Suggestion*, 20 Appl. Cognitive Psych. 1083 (2006); Fiona Gabbert et al., *Memory Conformity: Can Eyewitnesses Influence Each Other's Memories for an Event*, 17 Appl. Cognitive Psych. 533 (2003); Kazuo Mori, *A Revised Method for Projecting Two Different Movies to Two Groups of Viewers Without their Noticing the Duality*, 39 Behav. Res. Methods. (2007).

⁴⁹ Hiroshi Ito et al., *Eyewitness Memory Distortion Following Co-Witness Discussion: A Replication of Garry, French, Kinzett, and Mori (2008) in Ten countries*. 8 J Appl. Res. Mem. Cogn. 689 (2019).

5.2.2 Perspective

Taking a particular perspective after an event has been encoded in memory can also affect a witness's subsequent memory report. Research on perspective-taking and memory is highly relevant to international arbitration as witnesses are often engaged in telling their story from a particular perspective, typically that of the claimant or respondent by whom they are (or were) employed. In one study, participants were given a story that supposedly described their first week of a new year at college and the interactions they had with two roommates.⁵⁰ The story described how each roommate displayed some typically fun and some typically annoying behaviours. After reading the story, some participants were asked to write a letter of recommendation for one of the roommates to a fraternity/sorority house (the 'social' experimental condition), others were asked to write a letter of complaint about one of the roommates to the Office of Student Housing (the 'annoying' experimental condition), and others were simply asked to write as much as they could remember about one of the roommates (the 'control' condition). Participants then completed an unrelated task for 20 minutes before attempting to recall the entire original roommate story as accurately as possible.

The results showed that the mere act of retelling the story in a biased way affected how participants recalled the original story. Participants in the biased retelling groups remembered more perspective-relevant information about the discussed roommate than the non-discussed roommate, and made more errors — that is, they wrongly attributed perspective-relevant details to the discussed roommate as compared to the non-discussed roommate. Participants in the control condition did not show this pattern of errors when asked to recall the story. This study, along with many others,⁵¹ provides compelling evidence of how perspective-taking can influence our memory reports. When recounting past experiences, we often exaggerate, minimize and add or omit information to garner sympathy, entertain, express pride, hide mistakes, achieve goals or even show loyalty to one's employer. These simple acts, which may be harmless in most situations, can have important implications in the context of witness memory.

⁵⁰ Barbara Tversky & Elizabeth J. Marsh, *Biased Retellings of Events Yield Biased Memories*, 40 *Cognitive Psychol.* 1 (2000).

⁵¹ See, e.g., Nicole M. Dudukovic et al., *Telling a Story or Telling it Straight: The Effect of Entertaining Versus Accurate Retellings on Memory*, 18 *Appl. Cognitive Psychol.* 125 (2004); Elizabeth J. Marsh et al., *How Eyewitnesses Talk about Events: Implications for Memory*, 19 *Appl. Cognitive Psychol.* 531 (2005).

Relatedly, post-event information can also serve to activate a particular schema (knowledge structure), causing witnesses to remember people and events in biased ways. A seminal study illustrates this phenomenon.⁵² Participants viewed a video of a woman interacting with her husband. Either before or after witnessing the event, they were told that the woman was either a waiter or a librarian. Those told she was a waiter tended to remember her appearance and actions as more consistent with their stereotypes of waiters (e.g., drinks beer, affectionate with her partner, blond hair, listens to rock and roll), whereas those told she was a librarian tended to remember her appearance and actions as more consistent with a librarian (e.g., drinks wine, brown hair, likes classical music).

5.2.3 *Interviewing Procedures*

One of the most prolifically studied issues in witness evidence research is the way in which interviewing procedures can distort witness memory. This line of research began in the 1970s with Loftus and colleagues' seminal studies on the effects of question wording.⁵³ In these studies, participants typically viewed videos or slideshows of events and were later interviewed about their memories of the events. The interviewer's questions were sometimes manipulated such that they more or less strongly implied a particular answer (e.g., 'Did you see "the" [vs. "a"] broken headlight?'). One highly cited study shows that the strength of a verb can affect witnesses' estimates such as speed. For example, participants were asked, 'How fast was the car going when it "hit" [vs. "smashed"] into the other car?' When participants heard a verb that implies more forceful impact (e.g., 'smashed'), they provided higher speed estimates and were more likely to falsely report having seen broken glass than when they heard the verb 'hit'.⁵⁴ Other misinformation studies have shown that misleading questions can induce witnesses to both add new details to their memories (e.g., a conspicuous barn in a bucolic scene that actually contained no buildings) and alter memories of details they did see (e.g., a yield sign rather than a stop sign).⁵⁵ We know that

⁵² Claudia E. Cohen, *Person Categories and Social Perception: Testing some Boundaries of the Processing Effect of Prior Knowledge*, 40 *J. Pers. Soc. Psychol.* 441 (1981).

⁵³ For a summary see Elizabeth F. Loftus, *Eyewitness Testimony*. Cambridge, MA: Harvard University Press (1979).

⁵⁴ Elizabeth F. Loftus & John C. Palmer, *Reconstruction of Auto-mobile Destruction: An Example of the Interaction Between Language and Memory*, 13 *J. Verb. Learn. Verb. Be.* 585 (1974).

⁵⁵ For reviews, see Elizabeth F. Loftus, *When a Lie Becomes Memory's Truth: Memory Distortion after Exposure to Misinformation*, 1 *Curr. Dir. Psychol. Sci.* 121 (1992); Deborah Davis & Elizabeth F. Loftus, *Internal and External Sources of Misinformation in Adult Witness Memory*, ch. 2 in Michael P.

misleading information is more likely to create distortion when it targets a poorly remembered event, and when it targets peripheral rather than central detail.⁵⁶ Misinformation is also more powerful when it is subtle rather than blatant.⁵⁷

Relatedly, when questioning a witness it is natural for interviewers to want to reinforce a witness who is hesitant or unsure, particularly if the witness needs to be put at ease or encouraged to cooperate. Yet, when interviewers reinforce erroneous or unsure testimony, they can potentially inflate the witness's confidence in their mistaken testimony and ultimately distort the witness's memories.⁵⁸ Research has shown that confirmatory interviewer feedback is a potent catalyst for the development of false memories. As such, it is important for interviewers to refrain from providing a witness with feedback, including statements such as, 'That's right!' or 'Great, this fits with what we know'.⁵⁹

5.2.4 *Memory Blindness*

Using a variant of the misinformation procedure, researchers have also shown that witnesses may fail to detect alterations, made by others, to their own memory reports and that such alterations can influence a witness's memory later on.⁶⁰ In two experiments,⁶¹ participants watched a mock theft and then completed a memory test about the details of the event or the details of the perpetrator. Following a 10-minute delay, participants were shown their own memory reports. Unbeknownst to them, some of their responses had been altered by the experimenters (e.g., the colour of the

Toglia et al., Eds. *The Handbook of Eyewitness Psychology, Vol 1. Memory for Events*. Lawrence Erlbaum Associate Publishers (2007).

⁵⁶ See, e.g., Daniel B. Wright & Joanne N. Stroud, *Memory Quality and Misinformation for Peripheral and Central Objects*, 3 *Legal Criminol. Psych.* 273 (1998).

⁵⁷ For a review see Deborah Davis & Elizabeth F. Loftus, *Internal and External Sources of Misinformation in Adult Witness Memory*, ch 2 Michael P. Toglia et al., Eds. *The Handbook of Eyewitness Psychology, Vol 1. Memory for Events*. Lawrence Erlbaum Associate Publishers (2007).

⁵⁸ For a review of the research on confirmatory interviewer feedback see Steblay et al., *The Eyewitness Post Identification Feedback Effect 15 Years Later: Theoretical and policy implications*, 20 *Psychol. Public Pol. L.* 1 (2014).

⁵⁹ Jessica M. Hanba & Maria S. Zaragoza, *Interviewer Feedback in Repeated Interviews Involving Forced Confabulation*. 21 *Appl. Cognitive Psych.* 433 (2007); Maria S. Zaragoza et al., *Interviewing Witnesses: Forced Confabulation and Confirmatory Feedback increase False Memories*. 12 *Psychol. Sci.* 473 (2001).

⁶⁰ See, e.g., Anna Sagana, Melanie Sauerland, & Harald Merkelbach, *'This is the Person You Selected': Eyewitnesses' Blindness for Their Own Facial Recognition Decisions*, 28 *Appl. Cognitive Psychol.* 753 (2014).

⁶¹ Kevin J. Cochran et al., *Memory Blindness: Altered Memory Reports Lead to Distortion in Eyewitness Memory*, 44 *Mem. Cognition*, 717 (2016).

thief's jacket). After another short delay, participants completed a second memory test to determine whether the altered statement affected what they now recalled. Most participants failed to detect the alterations to their statements, and participants' memory reports frequently changed to fit with their altered statements. These experiments demonstrate the long-term effects of misinformation on witness memory, and how readily a witness's original memory may be tainted when their statement is modified by others. This research has important implications for international arbitration, where counsel typically take primary responsibility for drafting and revising witness statements.

In summary, the human memory system is an extraordinarily powerful and flexible system, built to cope with an enormous amount of incoming information. The mechanisms we use to process and remember information accurately can sometimes leave us vulnerable to error, and information is necessarily lost, distorted or overwritten in the process. This brief review represents only the tip of the iceberg of memory issues and research with potential relevance to international arbitration.⁶² We hope, however, that this review will give readers some appreciation that even the most scrupulously honest witness is not immune to error, and we urge practitioners always to consider the entire context in which an event is witnessed. Not only will this facilitate counsel and arbitrators in assessing witness evidence, but it will also alert fact-finders to when a witness might be particularly prone to suggestibility or error. Also, by acknowledging these factors and the role that they can play in shaping human memory, interviewers may also reduce any actual or perceived pressure on the witness to report details of the witnessed event that they either cannot recall, did not encode in memory, or feel extremely uncertain about.⁶³

6. ADDRESSING SCEPTICISM ABOUT THE APPLICATION OF PSYCHOLOGICAL RESEARCH TO LEGAL PRACTICE

For several years, we have been discussing the science of witness memory with international arbitration experts and practitioners in different parts of the world. We are frequently asked, 'Does

⁶² It is also worth noting that psychological research into witness evidence in remote (online) hearings is growing. See, e.g., Elena Bild et al., *Sound and Credibility in the Virtual Court: Low Audio Quality Leads to Less Favourable Evaluations of Witnesses and Lower Weighting of Evidence*, *Law Human Behav.* (forthcoming); Aldert Vrij & Maria Hartwig, *Deception and Lie Detection in the Courtroom: The Effect of Defendants Wearing Medical Face Masks*, 10 *J Appl. Res. Mem. Cogn.* 392 (2021).

⁶³ Lorraine Hope & Fiona Gabbert, *Interviewing Witnesses and Victims*, ch. 6 in Neil Brewer & Amy Bradfield Douglass, Eds. *Psychological Science and the Law*, Guilford Press (2019).

the research actually apply to international arbitration proceedings?’ This is a reasonable question given that extant research on witness memory almost exclusively focuses on memory in criminal law contexts, where a target event, such as a burglary or mugging, occurs quickly, without warning, and is likely to elicit a substantial, negative emotional response in those who are involved. Such eyewitnesses are often neutral with respect to their relationship to the case, in contrast to fact witnesses in international arbitration who are often employees or directors of the party on whose behalf they are testifying. To our knowledge, there are no published studies exploring the reliability of witness memory in international arbitration settings, where the factual focus of a commercial dispute between two corporations, or an investment dispute between foreign investor and host state, unfolds over an extended period and involves critical information in a variety of modalities, such as written documents, verbal discussions, electronic communications, digital recordings, and so on. Given these striking differences between criminal contexts, on the one hand, and commercial or international law contexts, on the other, it is unsurprising that some legal practitioners might be sceptical about the generalizability of witness memory research to international arbitration proceedings. Let us explain, however, why that scepticism is misplaced.

First, most memory scientists — possibly all — would agree that the existing science on witness memory can inform practice and procedure around gathering and evaluating witness evidence in any context. There is little reason to doubt that the psychological mechanisms underpinning the research findings, including those presented above, can contribute to witness memory errors in any situation: breach of contract claims in commercial disputes, mis-selling claims in financial disputes, delay claims in construction cases, expropriation claims in investment treaty cases, and so on. Of course, all witnesses rely on the same cognitive and memorial processes to accurately report events that occurred in the past.

Second, there is good reason to feel confident that the findings in the witness memory literature are robust. Many of the studies we describe in this article have been replicated multiple times by researchers in different labs using a wide range of research materials, including highly contrived stimuli such as wordlists or static images, through to more ecologically valid, complex stimuli such as videos and live events. Many findings have been demonstrated in both demographically and geographically diverse participant samples, from college students, through to older adults, and often in community samples. Findings produced in lab-based witness research frequently converge with findings from other types of studies too, such as case and field studies or archival methods.

Finally, many phenomena studied in the witness memory literature have been subjected to meta-analysis — this is the process of combining data from a large number of independent primary studies focused on the same question to calculate a quantitative estimate of the studied phenomenon.⁶⁴ The scientific evidence is unambiguous: witness memory is malleable and myriad extraneous factors can taint a witness's report in systematic and predictable ways.

Despite our best efforts to explain why the psychological research is relevant to international arbitration settings, through several insightful discussions with arbitration professionals it became clear to us that many practitioners remained sceptical about the generalizability of witness memory research to commercial law contexts. Thus, as part of our work with the ICC Task Force, we conducted an experiment to demonstrate that the memory errors frequently observed in the criminal law context can also be observed in commercial settings. In the next section we describe that experiment.

7. CONFIRMATION OF THE MALLEABILITY OF WITNESS MEMORY IN A COMMERCIAL SETTING

In 2018-2019, we worked with the ICC Task Force on Witness Evidence and its Steering Group members to execute a large-scale witness memory experiment, details of which can be found in the ICC Report on Witness Memory.⁶⁵ Here we provide a summary of the experiment, which used the same three-stage witness memory procedure described above in section 4. To anticipate the results, we found that the memory of witnesses in business disputes is subject to the same distorting effects that research has proven exists in other contexts.

The ICC study focused on two key factors that could potentially influence witness memory in an international arbitration proceeding: (1) a witness's (biased) perspective, and (2) misleading post-event information. We adapted the standard three-stage witness memory procedure (described in section 4 above) and tested 316 adults from 32 countries (Mean age = 47 years, Age range =

⁶⁴ For examples of meta-analyses in the witness memory literature, see the following: Hartmut Blank & Céline Launay, *How to Protect Eyewitness Memory Against the Misinformation Effect: A Meta-Analysis of Post-warning Studies*, 3 J Appl. Res. Mem. Cogn. 77 (2014); Theo Jores et al., *A Meta-Analysis of the Effects of Acute Alcohol Intoxication on Witness Recall*, 33 Appl. Cognitive Psych. 324 (2019); Günter Köhnken et al., *The Cognitive Interview: A Meta-Analysis*, 5 Psychol. Crime Law 3 (1999).

⁶⁵ With particular thanks to Christopher Newmark, Ragnar Harbst, José I. Astigarraga and Helene van Lith. A copy of the report is available at <https://iccwbo.org/publication/icc-arbitration-and-adr-commission-report-on-the-accuracy-of-fact-witness-memory-in-international-arbitration/>.

19-83 years). Participants reported working across a broad range of industries and roles. The entire study was conducted online.

In Phase 1, participants were told that the aim of the study was to examine people's perceptions of company disputes.⁶⁶ Participants read a narrative about a contractual agreement between a printing company and an industrial flooring company: the printing company contracted the flooring company to replace the tile floor in their printing plant. The participants studied a realistic 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.

To determine whether a participant's (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. Following a short delay, participants were informed that a dispute had arisen between the two companies around two key issues.⁶⁷ 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 by the two companies when they met. 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 the in-person meeting at the printing plant. The flooring company claimed that they were not aware that the printing machines would be rolled around. 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.

To determine whether participants' memories could be affected by misleading post-event information, on this second issue, some of the participants in addition to imagining being Managing Directors of either company, received (misleading) information in the form of a memo

⁶⁶ Cover stories are frequently used in psychological research to prevent participants from altering their responses or behaviours when they know the true nature of the research.

⁶⁷ Delay periods in witness memory studies are typically used to allow participants' memories for the events to fade slightly. In real world witness scenarios, there is often a substantial delay between when an event is witnessed and subsequently recalled during an interview.

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 (which was true), the memo provided to the printing company group suggested the opposite, that is, that the staff of the flooring company *could* observe machinery being moved around (which was not true). Participants were then informed that the two companies agreed to arbitration and that they (the participant) had been called upon as a fact witness. Participants were then asked a series of questions about their memory of events.

The memory test contained two crucial questions about the key issues set out above. Here we describe those key questions and the results that were found.

First, participants were asked whether the printing company agreed to a surcharge during the in-person meeting (they had not). The data showed that participants tended to provide answers that supported their own company's case. Put simply, merely imagining that one worked for a particular company in the dispute appeared to affect participants' responses. The association between the participants' biased perspective and their response to the question did not reach statistical significance, but the available data suggest that this lack of statistical significance is likely to have occurred because participants found the issue quite complex and overall memory accuracy on this issue was quite poor. This meant that the true effect of having a biased perspective on witness memory could have been obscured by a 'floor effect' (i.e., generally low scores) across the responses.

Second, participants were asked whether a representative from the flooring company viewed the machinery on the factory floor being moved around (the correct response was 'no'). 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 to this question. Specifically, 66% of the participants who imagined being the Managing Director of the flooring company responded (correctly) that the representative could not have observed the machinery moving around. This number increased to 78% for those participants who were further exposed to the confirming in-house memo. By comparison, only 43% of the participants who imagined being the Managing Director of the printing company stated that the flooring company representative could not have observed the

machinery being moved around, and this number dropped to just 29% for those participants who were further exposed to a misleading in-house memo.⁶⁸

This study provides the first demonstration of the malleability of witness memory in a commercial setting. The results were consistent with hundreds of witness memory experiments conducted in the criminal law context over the last 50 years,⁶⁹ and illustrate that, just like witness memory in the criminal context, witness memory in business settings is liable to error.

8. HOW TO IMPROVE THE ACCURACY OF WITNESS MEMORY IN INTERNATIONAL ARBITRATION

Alongside the large body of science illustrating the malleability of witness memory, there exists a substantial amount of research outlining how best to preserve or maximize the quantity and quality of witness memory. Below we describe a number of simple measures that can be adopted by participants in the arbitral process (arbitrators, outside counsel, in-house counsel and witnesses) when handling witness evidence.⁷⁰ We start by outlining measures that parties and tribunals might take during the first procedural meeting or case management conference. We then provide recommendations for in-house and external counsel related to the gathering and preparation of witness evidence. Many of these recommendations are research-led and mirror measures that have been put into practice in other contexts (e.g., criminal law) to improve the probative value of witness evidence. Other recommendations are unique to arbitral settings and build on original work by the second author (UCF)⁷¹ and on additional suggestions contained in the ICC Report on Witness Evidence. We finish by highlighting some of the challenges associated with compelling legal professionals to change their practice around gathering and preparing witness statements.

⁶⁸ It is easy to see how the suggestive influences in this study affected participants' responding on the memory test when the results of the control group — who were not affiliated to either company and did not receive a biased memo (misinformation) — are taken into account. In the control group, 50% correctly responded that the machinery could not be observed being moved around.

⁶⁹ For a recent review of the witness memory research conducted in the criminal law context see Neil Brewer & Amy Bradfield Douglass, Eds. *Psychological Science and the Law*, New York: The Guilford Press (2019).

⁷⁰ See also Ula Cartwright-Finch, *Human Memory and Witness Evidence in International Arbitration*, ch. 9 in Tony Cole, Ed. *The Roles of Psychology in Arbitration* Wolters Kluwer (2017) and the ICC Report on Witness Memory.

⁷¹ See Ula Cartwright-Finch, *Human Memory and Witness Evidence in International Arbitration*, ch. 9 in Tony Cole, Ed. *The Roles of Psychology in Arbitration*, Wolters Kluwer (2017).

8.1 PROCEDURAL MEASURES

In cases that are likely to feature conflicting witness accounts of significant factual matters, arbitrators and counsel may consider the following procedural steps to minimize the risk of distorting influences and to enable a better evaluation and assessment of the reliability of the testimony:

- (1) At the first procedural meeting or case management conference, parties and tribunals might discuss acceptable procedures around the gathering of evidence from fact witnesses, in order to set boundaries and expectations before the process progresses. As part of this discussion or as a separate enquiry, tribunals may also wish to ask parties about the steps they have taken already to gather witness testimony and how fact witnesses have been handled during that process — particularly on the claimant side, where case preparation is likely to be more advanced than the respondent side.
- (2) Tribunals may invite or require each fact witness statement to incorporate a brief explanation of its preparation process including, for instance, how many times the witness has been formally questioned, who attended witness meetings or interviews, who wrote the first draft of the witness statement, how many times the witness statement was revised and which case documents the witness read alongside the preparation of their statement.
- (3) In exceptional cases, where witness memory is determinative of critical facts and documents are not available to verify oral testimony, parties and tribunals may wish to consider providing expert evidence on memory. Expert psychological witnesses can offer information on various psychological principles that could assist fact-finders in their decision making (e.g., information about sleep and stress that may affect the reliability of witness evidence).⁷²
- (4) When agreeing procedures for the hearing, tribunals may discuss with parties the most appropriate approach to handling fact witnesses. In particular, where recollections are disputed, it may be preferable to isolate (sequester) fact witnesses until they have given their own oral testimony. In virtual hearings, where witnesses may already be physically

⁷² For a recent review on expert psychological testimony see Stephanie Marion et al., *Expert Testimony*, ch. 13 in Neil Brewer & Amy Bradfield Douglass, Eds. *Psychological Science and the Law*, Guilford Press (2019).

separate from others, additional reminders may be given about appropriate restrictions on communications with fact witnesses before they have testified.

(5) After a fact witness has been sworn in and before they begin their testimony, tribunals may also consider giving specific instructions in relation to reported recollections. For example, asking the witness to specify the source of their testimony, in particular whether they are reporting evidence they themselves personally remember or evidence which they learned about after the event. If there are concerns over the potential reliability of a fact witness's oral testimony, tribunals and opposing counsel may consider asking a witness for details about how their evidence was prepared, to the extent such inquiry does not encroach on attorney-client privilege.

8.2 GOOD PRACTICE ON GATHERING AND PREPARING WITNESS EVIDENCE

In-house and external counsel involved in interviewing witnesses and assisting in the preparation of witness statements may take the following steps to improve the reliability of witness memory.

8.2.1 *Arranging Witness Interviews*

- (1) Identify potential fact witnesses in the dispute and interview those individuals at the earliest opportunity to capture the cleanest memory reports. In the first witness meeting, obtain as comprehensive a record of events and information as possible.
- (2) Interview potential fact witnesses individually, as far as possible. Avoid speaking to multiple witnesses at the same time about factual matters in the case.
- (3) Take a comprehensive contemporaneous record of the witness interview. If audio or video recording the witness meeting is inappropriate, nominate a member of the counsel team whose exclusive role is to take a detailed note of what is said.

8.2.2 *Conducting Witness Interviews*

- (4) At the start of the interview, provide the witness with appropriate instructions around memory and their reported recollections. For instance, explain to witnesses that a certain degree of forgetting is natural and expected, and that they should feel comfortable saying when they don't know or don't remember a particular fact. Spend time building

rapport with the witness as well, as this enhances both the quality and quantity of information they provide.

(5) Before moving to the substantive interview questions, ask the witness to identify who they have spoken to about the case, including previous interviews, and what they have read about the relevant factual matters. In relation to each source of potential contamination, identify when the witness was exposed to the relevant information.

(6) When posing questions to the witness, ensure that they are open-ended, unbiased and non-leading, and phrased using neutral language with respect to the relevant issue. Avoid presenting a ‘party line’ to the witness or nudging a witness with a suggested answer if they are struggling to respond. Avoid appearing to give any feedback on their responses as far as possible, including even simple verbal affirmations such as ‘Great, that matches what we’ve heard’.

(7) When discussing specific recollections, ask the witness about the source of their knowledge. In particular, ask the witness whether they are reporting facts from their own personal recollection or whether they have learned about those facts from someone or somewhere else. In relation to particularly critical events, enquire about the witness’s state of mind at the time, including their stress levels and/or intoxication where relevant and appropriate.

(8) Gather the witness’s unaided recollection on a particular fact before you present any documents or alternative evidence. Limit the information actively provided to a witness beyond their recollection. Show documents only when necessary, for example, to clarify an obvious inconsistency.

(9) At the end of the interview, ask the witness to refrain from communicating with other people about the factual matters in issue and to avoid exposure to other potentially contaminating sources as far as possible.

8.2.3 Preparing Witness Statements

(10) Witness statements should be prepared with as few iterations of drafts as possible. Where a witness does not feel sufficiently comfortable operating in the language of the arbitration, finalize the draft statement in the witness’s native language first, before preparing a careful translation.

(11) Consider whether the witness could prepare the first draft of their witness statement, with appropriate guard rails on the content provided by counsel. If counsel are drafting the witness statement, they should stay as close as possible to the witness's own words and highlight any changes so the witness can see what has been changed.

(12) Until the statement has been finalized, discourage the witness from reading other memorial documents, including written submissions and other witness statements.

8.2.4 Preparing Witnesses for Hearings

It is difficult to prescribe specific guidance on the preparation of witnesses ahead of hearings because of the significant divergence in permitted approaches across different jurisdictions. Regardless of the scope of any professional obligations however, arbitration counsel should be cognizant of the various ways in which their own words and behaviour can influence a witness's testimony during the course of any pre-hearing preparation sessions.

8.3 ISSUES IN ENCOURAGING ARBITRATION PRACTITIONERS TO CHANGE THEIR PRACTICE

When it comes to international arbitration procedure, formulating strict rules is usually seen as undesirable or inappropriate because 'one size does not fit all'. This is right to a degree.⁷³ But it is not impossible to identify simple practical guidelines deriving from scientific research which surely ought to be followed as best practice as far as possible whatever the arbitration context. Relatedly, there is a question over how realistic it is to expect arbitration counsel to change practices that are so widely-used and well-accepted. In the absence of strong, professional guidance, we anticipate some difficulty in changing these practices quickly.

When discussing this topic, questions often arise over whether counsel — who are aware of the true nature of memory — could, or indeed should, use that knowledge to further their client's case. The Peter Parker principle, 'With great power comes great responsibility', is instructive here. Arbitration counsel are bound by professional and ethical codes of conduct, including duties not to mislead arbitral tribunals. Deliberately influencing a witness's memory so that their evidence better matches a desired set of facts would breach those duties. To the contrary, taking steps to

⁷³ The English courts took the opposite approach, promulgating in 2021 mandatory (and not uncontentious) changes to the rules around the preparation of witness statements in civil cases, creating some concern among practitioners. See the new Practice Direction 57AC — Trial Witness Statements in the Business and Property Courts, supplementing the Civil Procedure Rules in England and Wales.

preserve accurate witness memory is part and parcel of a counsel's duty in verifying the accuracy of the case presented to the tribunal.

9. CONCLUSIONS

Witness evidence plays a pivotal role in international arbitrations — recollections of historical events may be fundamental to key issues in a dispute and witness evidence can present factual background to help set the scene. Yet the reliability of witness evidence in arbitral contexts has received little attention from legal practitioners. Over 50 years of scientific research illustrates the fragility of witness memory. There is growing awareness within the international arbitration community of the psychological research on witness memory and the many factors that can undermine witness evidence. Factors relating to the witness themselves, the event(s) they are tasked with recollecting, and the procedures used to elicit their memory and prepare their statement can all affect the probative value of witness evidence. Although legal professionals are increasingly alive to these issues, there is still a great deal to be done in educating arbitration practitioners on the nuances of witness evidence. There are numerous simple measures that parties, counsel and arbitrators can adopt to enhance the reliability of witness evidence in international arbitration settings. Unfortunately, these measures and the scientific findings on witness memory are not typically taught to arbitration practitioners either at law schools or in continuing professional development training. We predict that this will soon change. Whatever shape developments take in future, education is likely to be key to enhancing arbitration practice and, in turn, the probative value of witness evidence in arbitration proceedings.