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Extending the Scope of Concealed Information Detection
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Tina and Tyrone Urquhart were just seven and eight years old when they were gruesomely murdered in 1985. The children – severely tortured and sexually assaulted – were found in the basement of their apartment complex in Plainfield, New Jersey. The investigation zeroed in on the boyfriend of the children's mother, 24-year old Byron Halsey, who failed a polygraph examination, confessed to the murders, and was subsequently sentenced to life in prison. In 2007 improved DNA technology provided a match between the semen sample and the true perpetrator: next-door neighbor Clifton Hall, who committed multiple sexual assaults while Halsey was falsely incarcerated. This raises the question how it is possible that a polygraph test falsely implicated an innocent man. Moreover, why did Byron Halsey confess to a brutal crime he did not commit? To evaluate whether a suspect was actually involved in a crime, one could verify whether the individual remembers specific details from the crime scene. Memory detection tests are designed to achieve this goal and extensive laboratory research has revealed high validity estimates for such tests (e.g., Meijer, klein Selle, Elber, & Ben-Shakhar, 2014; Suchotzki, Verschuere, van Bockstaele, Ben-Shakhar, & Crombez, 2017). This dissertation investigated the external validity of memory detection research by examining the impact of several factors differentiating the artificial laboratory setting from realistic forensic investigations. Could memory detection tests be expected to accurately distinguish guilty from innocent suspects and prevent errors such as in the Plainfield murders?

The use of traditional polygraph tests (labeled Control Question Test or CQT; Reid, 1945) such as the one administered to Byron Halsey has been severely criticized by the majority of the relevant scientific community (e.g., Ben-Shakhar, 2002; Iacono & Lykken, 2002; Lykken, 1974; National Research Council, 2003). The CQT is based on the notion that fear or stress responses upon relevant, crime-related questions (e.g., 'Did you murder the two kids?') in comparison to non-specific control questions (e.g., 'Have you ever tried to hurt someone?') reveal deception (e.g., Ben-Shakhar, 2002; Iacono & Patrick, 1997). However, no single bodily response has been established to be uniquely related to lying (Vrij, 2008) and it is common for innocent examinees to

experience increased stress and enhanced bodily responses when facing a lie detection test.

In contrast, memory detection focuses on detecting recognition of intimate crime details rather than deception per se. The purpose of the Concealed Information Test (CIT; first introduced as the Guilty Knowledge Test by Lykken, 1959, 1960) is to verify whether the suspect is aware of key crime-related details. The method requires that the examiner identifies a number of established facts from the investigation which only the true culprit will be able to recognize. Then, the examiner creates a CIT resembling a multiple-choice test with several questions, such that each question is comprised of one crime-detail (e.g., the victim was strangled), and several neutral control items (e.g., the victim was shot or stabbed).

The current dissertation is focused on investigating several questions regarding the detection accuracy of the CIT under more realistic circumstances. First, the external validity of memory detection experiments was explored by extending the traditional research paradigm involving explicitly instructed deception to a new, ecologically more valid alternative. While most studies investigating the validity of the CIT use mock-crime scenarios in which participants are explicitly instructed to commit a crime for the sake of the study, true deception is self-initiated (see also Sip, Roepstorff, McGregor, & Frith, 2008; Vrij 2004). To overcome this problem, we developed a cheating paradigm for the studies reported in **Chapter 2** and **Chapter 3**. Participants were administered a ten-item trivia quiz and promised an incentive for correctly answering all questions. However, unbeknownst to the participants we constructed the questions in a way that it would be almost impossible to solve the final two questions without external help. Participants were randomly allocated to a condition in which they were instructed to look up the correct answers on Google, or to a condition in which they had to solve the questions on their own, but had the opportunity to cheat. This design formed three groups: instructed cheaters, self-initiated cheaters, and fair players. In two studies it was indicated that the CIT was similarly effective in detecting knowledge of instructed and self-initiated cheating

using both psychophysiological and behavioral measures, demonstrating the validity of the CIT beyond artificial laboratory circumstances.

Second, the CIT has been found effective to evaluate perpetrators knowledge. However, the important underlying assumption that only guilty suspects possess critical crime knowledge may not take the complexity of real-life cases into account, where critical information may be leaked to innocent suspects. In the case of the Plainfield child murders, Byron Halsey – later proven factually innocent – might have known that the children were found in the basement. This would render him at risk of being falsely indicated as knowledgeable if questioned about the location of the victims' bodies. In such cases, a possible solution was suggested by CIT examiners in Japan, the only country where the CIT is routinely administered in criminal cases. Specifically, CIT items should be presented at a more specific level, which may minimize the risks of leakage (Osugi, 2011; 2014; 2018). The studies presented in **Chapter 4** and **Chapter 5** therefore investigated the effectiveness of exemplar-level items and whether this may reduce false-positive outcomes expected after information leakage. On the other hand, it may not be reasonable to expect that the true perpetrator remembers all details from the crime (e.g., the nightgown the victim was wearing) and could distinguish the critical item from the neutral alternatives. As this may lead to false negatives, these studies investigated the sensitivity and specificity of the CIT. Current results indicate that highly detailed questions may provide a safeguard for contaminated innocents, while knowledgeable participants could be detected equally well as when categorical questions are asked. Contrary to our expectations, no diminished CIT-effects were found when administering the test after a 1-week interval. Further research is therefore required to investigate whether the proposed use of highly detailed questions remains valid after naturalistic memory deterioration over time.

Third, Byron Halsey is unfortunately not the first innocent confessing to a crime he did not commit. Since the first DNA-exoneration in 1989, hundreds of wrongful convictions have been overturned in which eyewitness identifications were found to

be mistaken and confessions unreliable. Not surprisingly, certain dispositional risk factors (i.e., suspect characteristics such as learning disabilities; Drizin & Leo, 2004; Gudjonsson, 2003) and situational factors (e.g., confrontational interrogation tactics, lengthy interrogation, and sleep deprivation; Kassin, 2015) such as present in the case of Byron Halsey, have been often found to decrease the diagnostic value of a suspect's confession. Yet, even trained investigators find it difficult to distinguish true and false confessions (Kassin, Meissner, & Norwick, 2005). Therefore, in **Chapter 6**, I investigated whether memory detection can be used to accurately differentiate between truthful admissions of guilt and false confessions. Participants were paired with a confederate and tempted to break the experimental rules by cheating on a trivia quiz. Independent of actual guilt, all participants were accused of cheating and interrogated using confrontational interrogation techniques (Inbau, Reid, Buckley, & Jayne, 2013). Results indicated that true confessors, but not false confessors, displayed physiological changes associated with recognition of intimate knowledge obtained by cheating on a trivia quiz. Initial evidence therefore highlights the potential of the CIT to verify confessions. Yet, important considerations regarding information contamination during the interrogation are raised (see also Chapter 4 and Chapter 5).

The studies reported in this dissertation directly aimed to answer questions regarding important applied implications of the CIT. We tackled these issues by manipulating relevant factors in a controlled laboratory setting, yet important differences remain with circumstances expected to occur in the field (e.g., the quality of crime memory, and attempts to fake the test). The current findings highlight the potential of memory detection and may pave the way for further field implementation of the CIT beyond Japan.