Preventing Future Crimes
Identifying Markers of True and False Intent

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Abstract. This review paper examines the growing body of research on the psycho-legal study of true and false intentions – a typically neglected area within the field of deception detection. The extant studies are thematically grouped into four main topics: (i) physiological measures; (ii) implicit measures; (iii) strategic interviewing; and (iv) studies examining episodic future thought (EFT) and mental images. The benefits and limitations, and underlying theory of the respective approaches are discussed. The paper also provides a note on relevant theory, specific for intention research, and recommendations for future research directions. Findings from experimental research are related to the applied context.

Keywords: true and false intent, deception detection, strategic interviewing, episodic future thought (EFT)

PreCrime in Washington, DC is a specialized police unit which apprehends criminals before executing their attacks. This highly successful unit acts on reports based on psychics’ foreknowledge of criminals’ intentions. This sounds too good to be true, and it is. Steven Spielberg’s sci-fi classic, Minority Report, is set in the year 2054 and until then (if not longer) we need to look in other directions for knowledge on how to stop crimes before they are committed.

Here we present a review of the empirical research which has examined the psycho-legal study of true and false intentions. True and false intentions have been addressed in related areas of research including economical modeling (Crawford, 2003) and military studies (Donald & Herbig, 1981). However, despite the popularity of deception detection in forensic research, it is only in recent years that focus has turned to statements concerning future, rather than past, events. This is quite remarkable considering the societal value of being able to distinguish between true and false intent. In brief, such capabilities offer a means of crime prevention not typically associated with deception research. Consider for example the “liquid bomb plot,” an extensive undercover operation in 2006 that resulted in the apprehension of over 20 men in and around London. The men were accused of having planned to use liquid bombs – hidden in soft drink bottles – to attack seven airliners bound from Heathrow Airport to cities in North America. Intent was at the core of this case: First, during the surveillance operation (e.g., which intentions could be predicted from the men’s planning activities?); and second, during the lengthy judicial process that followed the arrests (e.g., how to assess whether the intentions stated by the suspects in court were truthful or deceptive? Needless to say, the intentions stated by the suspects differed from the intentions claimed by the prosecuting team). This example clearly highlights potential areas where research on true and false intent is of crucial value. With that said, the question of how to approach this topic remains open, especially when one considers that a term like intentions has many definitions and many important relationships to legal contexts.

The first wave of studies on true and false intentions has largely followed the research guidelines set out by Granhag (2010). Granhag acknowledges the possible depth and breadth of a fully fledged research program on intentions, but recommends a more modest starting point. First, a definition of intent and its key variants bearing forensic relevance must be provided. Second, an initial delineation of the research agenda, in order to create a coherent manageable starting point, should be outlined.

Research in social psychology defines an intention as an actor’s mental state preceding a corresponding action (Malle, Moses, & Baldwin, 2001). Unlike desires, intentions are inherently accompanied by a commitment to perform the action and intended acts are often preceded by some degree of planning. Granhag (2010) further delineates this definition to account for situations when the what, where, and when has been decided upon. This of course is a strict definition of an intention, and forensically relevant intentions that are not accounted for by this definition can easily be thought of. Nonetheless, this stricter account still has considerable
relevance for security and intelligence purposes, and a stricter definition, it is argued, is warranted for the aforementioned coherent starting point for the project as a whole. In an interview context it can therefore be summarized that a true intention is a suspect statement about their own future actions which they truly intend to carry out. A false intention, in contrast, is a stated intention which the actor does not intend to carry out. In many instances of forensic relevance a false intention is synonymous with a “cover story,” often designed to conceal an actor’s real intention. Concealed intentions, which in this context are often of a criminal kind (i.e., criminal intentions) represent another area of interest in the psycho-legal study of intentions (see, e.g., Burgoon et al., 2009). This, however, will not be the focus of the current review.

This brings us to the second issue of delineation. Granhag suggested that the seminal research in this field should concern identifying markers of true and false intentions. Concealed intentions and criminal intentions were not a focus of the first wave because of difficulties associated with ground truth. That is, when examining true and false intent only the ground truth of the stated intention needs to be established. However, when examining concealed intentions, the ground truth of the stated intention and the concealed real intention both need to be established. An obvious shortcoming of this approach is that it will only be possible to judge the veracity of the stated intention. That is, if a statement is correctly classified as deceptive, the question of the individual’s true intention remains. The study of concealed and criminal intentions therefore marks a relevant area for future research.

A Note on Design

Two distinct experimental designs dominate the first wave of research on true and false intentions: the “Gothenburg design” and the “Portsmouth design” (for exceptions see Agosta, Castiello, Rigoni, Lionetti, & Sartori, 2011; Meijer, Verschuere, & Merckelbach, 2010; Meixner & Rosenfeld, 2011; Suchotzki, Verschuere, Crombez, & De Houwer, 2013; Vrij, Leal, Mann, & Granhag, 2011). The Gothenburg design, proposed by Granhag (2010) and fine-tuned, and first employed, by Granhag and Knieps (2011), divides participants into truth tellers and liars. Truth tellers are given a non-criminal activity to plan and perform (e.g., to buy a gift for a friend). Liars are given a mock crime to plan and perform. In addition, liars are told to prepare a cover story to be used in case they are apprehended when trying to carry out their task. The cover story, which is the liar’s false intention, is structurally similar to the task which truth tellers are given. All participants are then given time and relevant equipment to plan their respective tasks. After the planning phase, but before they can commence their tasks, participants are apprehended and interviewed. This means that in the interview all participants speak about the same future acts (i.e., buying a gift for a friend), differing only with regard to the veracity of the statement.

The Portsmouth design, first employed by Vrij, Granhag, Mann, and Leal (2011) is, in many ways, more straightforward. In brief, travelers (e.g., passengers at an airport) are asked to either lie or tell the truth about their upcoming trip. To establish ground truth all participants are first asked to answer truthfully some basic questions (e.g., where are you going to fly today?). In a subsequent interview participants are told to either lie or tell the truth to the posed questions.

The two designs have respective merits and shortcomings. The Gothenburg design, unlike the Portsmouth design, has no issues of ground truth as the tasks and their planning are experimentally controlled. The Gothenburg design also produces true and false statements which are directly comparable — since they are on the same theme. In contrast, the Portsmouth design is more easily employed and more ecologically valid with regard to the setting and the participant sample. Furthermore, truth tellers in the Portsmouth design are likely to be more realistic truth tellers, as their motivation for their intention comes from a more legitimate source. With that said, there are unlikely to be major differences in motivation for liars between the two designs, since, in both cases, they are explicitly instructed by an experimenter to lie. A further benefit of the Portsmouth design is that the degree of truth telling can easily be manipulated. For instance, participants can be readily instructed to give partially true statements (e.g., tell the truth about destination, but lie about purpose), which is more reflective of real-life circumstances. Although the Gothenburg design by no means prohibits the use of embedded lies it is perhaps more difficult to experimentally manipulate such a variable with this approach.

First Studies

The first empirical studies on true and false intentions examined differences in content on a range of basic measures including plausibility, length, detail, and how they compared to true and false statements about past events (Vrij, Granhag, et al., 2011; Vrij, Leal, et al., 2011). Both studies showed that statements about true intentions were more plausible than statements about false intentions. However, length and detail of statements about intentions were not influenced by veracity. Furthermore, both studies showed a discrimination accuracy of 70%. These latter findings show a possible difference between statements about intentions and statements about past events. For past events, lies are typically less detailed and shorter, and have an approximate discrimination accuracy of 54% (Bond & DePaulo, 2006). Such findings were replicated by Vrij, Leal, et al. (2011) where statements about past events were less detailed for liars, and showed a reduced discrimination accuracy of about 55%. This finding supports the need for an independent research agenda on true and false intentions, as it shows that they differ on some discernible level to statements about past activities.
With that said, this first round of studies offered little guidance with regard to theory or practical recommendations.

**Physiological Measures**

A number of studies have examined the use of physiological measurement techniques to distinguish between true and false intentions. The different techniques examined include thermal imaging (Warmelink et al., 2011), eye-tracking (Mann, Vrij, Leal, et al., 2012; Mann, Vrij, Nasholm, et al., 2012), skin conductance and ERP measures, the latter two methods being examined with an amended Concealed Information Test (CIT; e.g., Meijer, Smulders, & Merckelbach, 2010).

**Thermal Imaging**

Pavlidis, Eberhardt, and Levine (2002) proposed that thermal imaging could be an appropriate method for fast and reliable security screening of people’s intentions. This proposal was based on the claim that liars, due to a mediation of a fright/flight response, should show instantaneous warming around the eyes to a higher degree than truth tellers. Availing of the Portsmouth design, Warmelink et al. (2011) sought to empirically test this claim in an ecologically valid situation — namely through the screening of travelers at an airport. In line with the underlying assumption liars’ skin temperature increased significantly during the interview, while truth tellers’ did not. With that said, simple veracity judgments made by the interviewer outperformed the thermal imaging technique with regard to correct classification rates of both liars and truth tellers. Warmelink et al. concluded that due to the modest accuracy rates (64% for truth tellers; and 69% for liars; cf. Vrij, Granhag, et al., 2011; Vrij, Leal, et al. 2011) the thermal imaging technique, in its current form, is unlikely to be suitable for an applied setting.

**Eye Tracking**

Mann, Vrij, Nasholm, et al. (2012; Experiment 1), tested the popular belief derived from “neuro-linguistic programming” that liars eyes are drawn to the right, as the lie is created on this side of the brain. Again, the Portsmouth design was used to create true and false intentions. The results, in brief, found no support for the claim. Although, participants looked to the right significantly more when they were lying, the likelihood of looking in this direction was so low (only 6.5% of lying participants did so) that the technique is unlikely to be of any use on a case for case basis.

A different question was examined by Mann, Vrij, Leal, et al. (2012) in a second study on eye movements and intentions. The researchers again availed of the Portsmouth design and examined how much eye contact truth tellers and liars engaged in. The popular belief that liars will avoid eye contact has not received support in meta-analyses (e.g., DePaulo et al., 2003). Mann and colleagues, however, proposed that liars, in breach of this popular belief, would in fact engage in more and not less eye contact with an interviewer. Their hypothesis was built on the claim that liars, unlike truth tellers, do not take their credibility for granted. Liars would therefore monitor the interviewers more closely in order to assess whether they were being believed. Coders rated the degree of deliberate eye contact on a point-five scale (1 = does not occur at all; 5 = occurs very strongly). In line with the predictions liars engaged in significantly more deliberate eye contact than truth tellers. In agreement with previous research there was no significant difference between truth tellers and liars regarding gaze aversion (measured as the percentage of time looking away from the interviewer). For this study no measure of discrimination accuracy was included at the individual level: differences were only examined at a group level. It is therefore difficult to interpret how such results can be translated to the applied setting.

**Concealed Information Test and Intentions**

Meijer, Verschuer, and Merckelbach (2010; see also Meijer Smulders & Merckelbach, 2010; Noordraven & Verschuer, 2013) successfully extended the CTT (also known as the Guilty Knowledge Test; Lykken, 1959) to an intent situation. The CIT has a long history in the area of deception detection. Furthermore, of all the approaches covered in this article the CIT has had the largest impact on police practice (e.g., it is used on a daily basis by the Japanese police; Osuigi, 2011). The purpose of the CIT is to distinguish between the absence and presence of information in a suspects long term memory (see Verschuer & Meijer, 2014). In a typical CIT situation, a suspect is presented with a list of items (e.g., a list of possible murder weapons) but only one of those items is relevant to the specific case. Guilty suspects are expected to react differently to the relevant items compared to the irrelevant items. Specifically, they are expected to show an orienting response for relevant items, evidenced through heightened physiological arousal. In contrast, innocent suspects, as they have no knowledge of the crime (e.g., do not know the actual murder weapon) should show similar responses for all listed items. From a theoretical level the CIT is supported by research on the human orienting reflex (Sokolov, 1963). Such research shows that orienting responses are produced by stimuli which have significance for an individual (e.g., orienting responses are shown to our own names, Verschuer, Crombez, De Clercq, & Koster, 2004).

In their study, Meijer, Smulders, and Merckelbach (2010) compared individuals who committed a mock crime, individuals who intended to commit a mock crime, innocent individuals informed about the crime, and innocent individuals who were uninformed about the crime. Suspects were asked questions relating to the case (e.g., the type of safe that they had/had planned to open), and were given a
list of six possible answers with only one answer being correct. Skin conductance was the primary dependent variable. The results were promising: The intent group differed from the uninformed innocent group but did not differ from the guilty group. Caution, however, was warned as the informed innocent group did not differ from the intent group. Considering the unlikelihood of innocent informed suspects this finding may not be of major concern. Nonetheless it highlights that stringent measures must be taken to insure that innocent suspects could not have come across the critical information in other ways.

ERP-based CITs (Rosenfeld et al., 1988), known more specifically as P300 based CITs, have also been extended to intentions with promising results (Meixner & Rosenfeld, 2011). A perfect classification rate was found in this study with 12/12 guilty suspects being identified as possessing knowledge about a planned mock terrorist act, with no false alarms for the 12 innocent suspects. These results align closely with past research on P300 based CITs where the accuracy of correctly detecting guilty participants typically ranges from 80% to 95%, with a typical false positive rate of 0%—10% (Meixner & Rosenfeld, 2011; but see Mertens & Allen, 2008, who found guilty detection rates around 50%). To date equivocal results exist with regard to countermeasures. On this regard some studies highlight weaknesses of the P300 based CITs (e.g., Mertens & Allen, 2008; Rosenfeld, Soskins, Bosh, & Ryan, 2004), while others suggest P300 based CITs can be designed so as to increase their resistance to countermeasure (Meixner & Rosenfeld, 2010; Rosenfeld et al., 2008). Countermeasure studies in an explicit intentions scenario are of crucial value to allow for practical recommendations. From an applied perspective, a notable shortcoming of P300 based CITs is the considerable expense, time, and expertise required to conduct such tests. This limits its value in many applied contexts (e.g., border control or airport security, where fast conduct such tests. This limits its value in many applied contexts (e.g., border control or airport security, where fast and easy methods are more applicable in order to address the sheer volume of veracity judgments to be made).

Implicit Measures

Autobiographical Implicit Association Test (aIAT)

The aIAT is an amended version of the IAT focusing on memories of autobiographical events rather than on attitudes (Agosta, Castiello, et al., 2011). Research shows that the aIAT can successfully distinguish between two contrasting autobiographical statements, where one is true (e.g., I am innocent of crime X) and the other is false (e.g., I am guilty of crime X). The aIAT consists in pairing such unknown contrasting statements with known true or false statements. Faster response times (RTs) should be shown for congruent pairings (e.g., true known statement/true unknown statement), than for incongruent pairings (e.g., true known statement/false unknown statement). A series of forensically relevant experiments support this claim (Sartori, Agosta, Zogmaister, Ferrara, & Catillo, 2008). For instance in one experiment (Sartori et al., 2008, Experiment 2) guilty participants completed a mock crime where they entered a room and stole a CD with an exam on it. Innocent participants entered the room, but did not steal anything. In the subsequent aIAT guilty statements (e.g., “I stole the exam”) and innocent statements (e.g., “I did not steal the exam”) were paired with true and false known autobiographical statements. Based on the participants RTs all 15 guilty participants were correctly identified as guilty, and 13 of the 15 innocent participants were correctly identified as innocent.

Agosta, Castiello, et al. (2011) extended the aIAT to the field of intentions rather than past actions. The design was identical to the typical aIAT except that the unknown contrasting statements concerned future rather than past actions. One of the unknown statements was true (e.g., I plan to sleep in Padua tonight), and the other was false (e.g., I plan to sleep in Milan tonight), and can therefore be seen as participants’ true or false intentions. Again, the unknown statements were paired with either known true statements (e.g., I am in front of a computer) or known false statements (e.g., I am at the beach). As predicted, RTs were faster in congruent (vs. incongruent) trials. Based on RTs all of the participant intentions were correctly identified in Experiment 1 (22/22) and 18 of 25 intentions were correctly identified in Experiment 3. In addition, through the use of event-related potentials Agosta, Castiello, et al. (Experiment 3) demonstrated the neural basis of intention related aIATs.

Although the studies on aIATs and intentions lack a direct forensic element (cf. Sartori et al., 2008), it is possible to envisage potential applications of this approach. The authors mention its possible utility in cases where issues of mens rea are of concern: That is, in cases where the intentionality of a person’s actions is undetermined. In such situations it may be possible to pair unknown true/false statements of intent (e.g., I intended/did not intend to do commit the crime) with known true/false statements of intent (e.g., I intend/do not intend to eat lunch), in order to determine the intentionality of the act. Future research should investigate whether the aIAT can be translated to such forensically relevant situations.

An important qualifier comes from research on faking IATs. Early research suggested that the IAT (the basis of the aIAT) was quite resistant to faking, at least when people were uninformed about the basic principles of the test (Banse, Seise, & Zerbes, 2001; Egloff & Schmukle, 2002). However, more recent studies, cast doubt on the universality of these initial findings, showing that simple instructions are sufficient to allow for successful faking (Fiedler & Bluemke, 2005; Wallaert, Ward, & Mann, 2010). For instance, Fiedler and Bluemke found that 9 out of 19 participants successfully faked their responses to the IAT when following the simple instruction “Please reflect ahead of each block on how to influence your reaction times to avoid the inference that you are prejudiced.” Importantly, similar findings have also been demonstrated for the aIAT, showing that informed fakers are capable of speeding up their responses to incongruent pairs (Hu, Rosenfeld, & Bodenhausen, 2012) and slowing down their
responses to congruent pairs (Verschueren, Prati, & De Houwer, 2009). Mitigating these results, Agosta, Ghirardi, Zogmaister, Castiello, and Sartori (2011) found that, in situations when fakers were successful in manipulating the aLAT in a desired direction, simple algorithms – based on fakers response patterns – could be developed to distinguish fakers from non-fakers (a ROC analysis yielded an area under the curve of 0.87, significantly better than chance at 0.50). As of yet, no study has directly assessed faking with regard to aLATs designed for intentions, limiting the confidence with which we can speak of practical recommendations.

**Evaluative Priming Tasks and Goal-Directed Behavior**

Goals influence how we engage and interact with our environment (Ferguson & Porter, 2009; Moskowitz, 2002; Rothermund, 2003). Many of these influences are distinct from non-motivational constructs. Of note, for the current purposes, is that objects are automatically evaluated based on their utility for an active goal ( Förster, Liberman, & Friedman, 2007). That is, goals create a propensity to automatically evaluate goal-facilitative stimuli as positive and goal-inhibiting stimuli as negative (Custers, 2009). This has been demonstrated with implicit evaluation measures such as the evaluative priming task, where only those with an active goal evaluated the – otherwise neutral stimuli – in a goal-consistent manner (e.g., Ferguson & Bargh, 2004; Fishbach, Zhang, & Trope, 2010).

Linking intentions and goals, Ask, Granhag, Juhlin, and Vrij (2013) developed a novel approach to the study of true and false intentions based on the aforementioned research on goal-directed behavior. They explain that since a true intention involves the desire and commitment to perform a future action (see above; Malle et al., 2001), a true intention involves the activation of a behavioral goal. False intentions, however, are not genuinely meant to be carried out. There is no commitment to perform the future action. Therefore no behavioral goal should be created. Consequently, individuals with a true intention should evaluate objects based on the behavioral goal activated by the stated intention. Liars’ evaluations, in contrast, should not be influenced by their stated intentions (semantic and/or exposure effects notwithstanding).

Based on this reasoning an experiment using the Gothenburg design was conducted. Participants performed an evaluative priming task where the prime words were positively related to the participants’ stated intentions. In line with predictions, truth tellers showed a positive implicit evaluation of the prime words. Liars’ on the other hand showed no priming effects (i.e., a neutral implicit evaluation of the prime words). With that said, in its current form this approach is unlikely to provide a reliable tool to distinguish between truth tellers and liars. First, the results of the ROC analysis were, though significant, quite modest, yielding an area under the curve of 0.67 (where chance is 0.50). Second, EPTs are vulnerable to faking, with a number of studies demonstrating the controllability of such tests (Degner, 2009; Klauer & Teige-Mocigemba, 2007; Teige-Mocigemba & Klauer, 2008; but see Bar-Anan, 2010). The value of the study, however, lies not in the test of a specific deception detection tool but in turning our focus to goals and the many consequences of goal-directed behavior. In other words, the value of the study lies in highlighting a novel direction for research on true and false intent.

**Sheffield Lie Test**

A final study availing of an RT-based implicit approach extended the Sheffield Lie Test (SLT; Spence et al., 2001) to the field of intentions (Suchotzki et al., 2013). Like most RT-based implicit measures the SLT involves a manipulation of stimulus-response compatibility, where compatible trials result in faster RTs and incompatible trials result in slower RTs. Suchotzki et al.’s primary aim was to compare the efficacy of the test when the incompatibility was produced either by a task-relevant feature (a feature that needs to be processed in order to perform the task) or a task-irrelevant feature (a feature that does not need to be processed in order to perform the task). In deception detection studies a manipulation related to truth telling or lying can be regarded as task-relevant, while a task-irrelevant feature can be any unrelated feature that does not need to be processed (e.g., color discrimination).

In their study participants first planned and performed a mock crime (past act). Following this, they planned for a second mock crime but were apprehended before they were able to execute it (intended act). Participants subsequently performed a task-relevant SLT and a task-irrelevant SLT, both of which were tailored to the two mock crimes. The SLTs consisted in presenting yes/no questions related to the crime (e.g., will you steal a USB stick) in two different colors. The presentation color informs participants on how to answer. Answers were given by hitting the designated yes/no keys on a keyboard. RTs and error rates were the primary dependent variable.

In the task-relevant SLT the presentation color of the question determined whether the participants’ response should be true or false (Experiments 1 and 2). In compatible trials participants answered truthfully (i.e., responded yes to true statements and no to false statements). In incompatible trials participants gave false responses (i.e., responded yes to false questions and no to true questions). Two task-irrelevant versions of the SLT were used. In the first (Experiment 1) the color presentation of the question directly determined whether the participant should press the yes or the no key (i.e., gray = yes; purple = no). In the second version (Experiment 2) questions that included a person required a yes response and questions that included a room required a no response. Two task-irrelevant SLTs compatible trials were when the participant responded truthfully (i.e., responded yes when the true answer was yes) and incompatible trials were when the participant lied (i.e., responded no when the true answer was yes).
Results showed that task-relevant SLTs consistently produced larger compatibility effects than the task-irrelevant SLTs. Of particular interest, compatibility effects were produced for both the past crime and the intended crime, in fact, compatibility effects were stronger for questions on the intended crime (possibly due to the strict and detailed instructions given for the intended act). With that said, a clear limitation is that no separate innocent condition was included making it difficult to determine whether the approach can be used to reliably distinguish between guilty and innocent suspects. Taken together, although it is too early to make any practical recommendations, the results imply that task-relevant compatibility effect tests are a promising direction for future research on true and false intentions.

Strategic Interviewing

Strategic interviewing provides a viable alternative to the physiological and implicit measures discussed so far. Arguments in favor of strategic interviewing build on the growing body of empirical support highlighting the difficulties associated with behavioral approaches (e.g., DePaulo et al., 2003; Hartwig & Bond, 2011). The emerging consensus from such meta-analyses is that behavioral cues are faint and largely unreliable indicators of deception. Researchers have therefore proposed more active interviewing or strategic methods: Here the goal is to strengthen the otherwise weak cues to deception or to elicit new cues to deception (Hartwig & Bond, 2011; Vrij, 2014; Vrij & Granhag, 2012). Existing research, focusing on past actions, speaks to the merits of strategic interviewing as an approach to lie detection (e.g., Hartwig, Granhag, Strömmwall, & Kronkvist, 2006; for a review see Vrij, 2014). In recent years strategic interviewing methods have also been applied to true and false intentions with promising results. To date, two methods have been assessed: the Strategic Use of Evidence (SUE) technique; and the unanticipated questions approach.

The Strategic Use of Evidence (SUE) Technique and Intentions

The SUE-technique builds on suspects’ counter-interrogation strategies. Specifically, truth tellers will be forthcoming during an interview while liars will be more cautious, choosing more evasive strategies such as withholding information. Based on these empirically supported assumptions (e.g., Hartwig, Granhag, & Strömmwall, 2007; Granhag, Mac Giolla, Strömmwall, & Rangmar, 2013; Strömmwall, Hartwig, & Granhag, 2006) the SUE approach advocates strategic disclosure of evidence throughout an interview (e.g., in its simplest form, a late, rather than an early disclosure of evidence, can cause liars, due to their tendency to withhold information, to produce statements which are inconsistent with the available evidence, i.e., statement-evidence inconsistencies) (Granhag & Hartwig, 2008; for more sophisticated forms of evidence disclosure see Granhag, Strömmwall, Willén, & Hartwig, 2013). For a recent systematic review of the empirical findings on the SUE-technique, including the first meta-analysis of the technique see Hartwig, Granhag, and Luke (2014), and for a conceptualization of the SUE-technique see Granhag and Hartwig (in press).

Clemens, Granhag, and Strömmwall (2011) extended the SUE-technique to the study of true and false intentions. The study used an amended version of the Gothenburg design where certain bits of information (i.e., evidence) were made available to the interviewers. Two versions of the SUE-technique were compared to a control condition (where evidence was disclosed at the outset of the interview). Results showed that the SUE-techniques produced more inconsistent statements from liars compared to the control interview.

Classification measures were not included in this study making it difficult to estimate a case specific efficacy rate for the SUE-technique on intentions. However, previous studies on the SUE-technique have favorable discrimination accuracies (e.g., 85%; Hartwig et al., 2006), and based on the results of Clemens et al. (2011), no reason can be thought of why this finding would not generalize to intentions. With that said, the SUE-technique has certain practical limitations. The most pertinent of these is that the interviewer needs some evidence against the suspect (on the other hand, for most suspect interviews there is typically some evidence pointing in the direction of the suspect). The unanticipated questions approach describes an interviewing technique where prior evidence is not required.

Unanticipated Questions Approach

Liars often prepare for expected questions in upcoming interviews. This finding has been suggested as a possible reason for liars’ ability to perform well in interviews. The unanticipated questions approach is designed to ask questions which an interviewee is unlikely to have planned for. More specifically, such questions are designed so that truth tellers can rely on their memory to simply recall an answer, while liars need to fabricate answers on-the-spot (Vrij et al., 2009; Sooam, Granhag, Knieps, & Vrij, 2013; Vrij, 2014). The goal is to increase the cognitive demand for liars (but not for truth tellers), which it is hoped, will enhance differences between truth tellers and liars statements. The approach of asking unanticipated questions has received empirical support when used on statements concerning past events (e.g., Lancaster, Vrij, Hope, & Waller, 2012; Sooam, Granhag, Knieps, & Vrij, 2013; Vrij et al., 2009). Clemens, Granhag, and Strömmwall (2012) examined suspect’s counter-interrogation strategies to questions about their intentions. They found that a common strategy for liars was to “stick to a cover story.” Taking this result into account the unanticipated questions approach, when applied to intentions, is designed to ask...
questions whose answers will not typically be addressed by a cover story.

A primary focus of the completed studies has been the theme of planning. As noted, planning is an inherent part of many intentions (Malle et al., 2001). It is therefore assumed that individuals with true intentions will have engaged in some degree of planning for their stated intention. In contrast, it is less likely that liars’ cover stories will be detailed enough to cover a planning phase. It follows that truth tellers will be able to draw on their memory and simply recall answers to questions about planning, while liars will be forced to think of answers on the spot.

Using the Gothenburg design this hypothesis was empirically tested on both individual suspects (Sooniste, Granhag, Knieps, & Vrij, 2013) and groups of suspects (Sooniste, Granhag, Strömwall, & Vrij, 2013). Results showed that liars were as capable as truth tellers at answering the anticipated questions on intentions. In contrast, for the unanticipated questions on planning truth tellers provided both longer and more detailed answers. Similarly, in the study on groups of suspects, between suspect consistency was comparable for both truth tellers and liars for the anticipated questions. For the unanticipated questions, however, truth tellers’ statements were significantly more consistent than liars’. With that said, no classification measure was used, limiting the possibility to provide practical recommendations.

Availing of an amended version of the Portsmouth design Warmelink, Vrij, Mann, Jundi, and Granhag (2012) compared the effectiveness of a number of different unanticipated questions. In this study suspects were asked general questions about an upcoming trip (anticipated), and three different unanticipated questions: on the core event of the trip; the transportation that would be used during the trip; and on the planning of the trip. Results provided general support for the unanticipated questions approach. However, though trends were shown, only the questions on transportation provided significant differences between truth tellers and liars. Another unexpected finding was that for the anticipated questions liars provided more detail than truth tellers. Taking these results together Warmelink and colleagues concluded that if an interviewer wishes to avail of the intuitive “less detail indicates deceit” decision rule, it is better to assess answers given to unanticipated questions.

Subtle Prompts

Though only in its infancy, an interesting addition to the strategic interviewing methods consists in the use of subtle prompts. Such prompts are strategically phrased questions that are designed to encourage tendencies which are more inherent for truth tellers than liars. For example, based on research demonstrating that truthful statements contain more temporal information (e.g., Masip, Sporer, Garrido, & Herrero, 2005), Warmelink, Vrij, Mann, and Granhag (2013, Experiment 2; see also Vrij, Mann, Jundi, Hope, & Leal, 2012, who examined how undercover interviewing can be employed to distinguish between true and false intentions) analyzed if a subtle prompt designed to bring focus on specific times would encourage truth tellers, more so than liars, to mention these. The prompt “Please describe in as much detail as possible what your time-table is for today at your destination?” was compared to the control question “Please describe in as much detail what you are going to do today at your destination?” For the prompt, but not the control question, truth tellers mentioned significantly more specific times than liars. In addition, discrimination accuracy based on specific times for the prompt condition at 61.9% was significantly better than chance, while accuracy for the control condition at 54.8% was not better than chance. Although this discrimination ability is quite low, it should be noted that the analysis was made solely on the brief statements given to a single question, and that the manipulation employed was ostensibly quite trivial. Considering the ease in which subtle prompts can be initiated they can readily be incorporated within other interview techniques. In this sense, subtle prompts may be better thought of as a complement to a more developed interviewing technique rather than as a fully fledged technique in itself.

Episodic Future Thought and Mental Images

According to the concept of the “prospective brain,” stored information in the brain can be used to imagine, simulate, and predict possible future events (Schacter, Addis, & Buckner, 2007). This is thought to be an important functional attribute of the brain, allowing, for instance, for better adaption to future situations. Episodic future thought (EFT), a closely related, yet distinct, concept, refers to our ability to mentally simulate hypothetical future scenarios, with a strong focus on the accompanying mental images (Szpunar, 2010). Just as with the prospective brain, it is thought that EFTs are primarily constructed by units of information taken from episodic memory, a claim supported by self-report (Szpunar & McDermott, 2009) and neuroimaging studies (Addis, Wong, & Schacter, 2007).

Importantly, EFT is closely linked to intentions (Schacter, Addis, & Buckner 2008). EFTs are thought to be a typical concomitant of planning – specifically the planning of future events to be carried out by oneself – and planning, as noted above, is considered an inherent part of many (true) intentions. Granhag and Knieps (2011) therefore proposed that the formation of true intentions should be accompanied to a greater extent by EFTs compared to the formation of false intentions.

To date four full studies have been carried out on the topic of EFT and true and false intentions (Granhag & Knieps, 2011; Knieps, Granhag, & Vrij, 2013a, 2013b, in press). Using the Gothenburg design, these studies largely supported the hypothesis of the project. The primary focus was on the extent that mental images were activated
during the planning phase of a true intention compared to the planning of a cover story (a false intention). Results focused on (1) truth tellers’ and liars’ (honest) subjective ratings relating to mental images formed during the planning phase, and (2) on participants’ answers to questions during a police styled interview about their mental image. The former measure was intended to give a deeper understanding of how EFTs relate to true and false intentions. The latter measure was an assessment of the practical possibilities of this approach.

Subjective measures showed that truth tellers were more likely to have a mental image of their intention than liars. This was reflected during the interview where truth tellers (96%–100%) reported having a mental image more often than liars (66%–83%). Furthermore, truth tellers generally had a clearer and stronger mental image, especially for spatial details. These findings, however, did not consistently result in measurable differences based on statements obtained during the interview, with the exception of truth tellers generally producing longer descriptions of their images (Gran Hag & Knieps, 2011; Knieps et al., 2013a). This result questions the applied value of asking about EFTs during an interview. The authors maintained, however, that finer measures could likely be developed to capture the evident differences in the subjective ratings, in the interview setting (cf. D’Argembeau & Mathy, 2011).

Warmelink et al. (2013) provide some support for this claim. Their study, which used an amended Portsmouth design, examined mental images through the use of specified follow up questions. That is, once it was established that suspects had a mental image of their trip, rather than simply ask a general question more specific questions were deployed (e.g., In your picture, where are you?; Who else is there?; Please tell me in as much detail as possible what you can see, hear, smell, taste, and feel?). With this approach Warmelink et al. obtained more spatial and temporal details from truth tellers than liars, something that Knieps et al. (2013a, in press), who examined statements to more general questions, were unable to show.

As with a number of the newer approaches discussed in this article, the research conducted on EFT is best seen as basic research on the topic of true and false intent. That is, it is not investigating the efficacy of a specific technique, but rather exploring avenues where applied techniques may one day be developed.

Theory Building

The review of the extant psycho-legal research on true and false intentions shows an array of approaches distinguishable at a theoretical level. A greater understanding at this level is of utmost importance for both the development of new topics of research and for eventual implementation procedures. Of course, of specific interest are theoretical perspectives distinct for the study of true and false intentions (rather than past actions). At least three such perspectives are addressed in the review above: goal-directed behavior, planning, and EFT. All of these topics represent active research fields in their own right. Our aim here is to examine where and how these topics might overlap with regard to the specific field of true and false intentions.

Consider planning, where research has focused on, among other things, what makes good or bad plans (for a review see Mumford, Schultz, & Van Doorn, 2001). Making the reasonable claim that those with a true, compared to a false, intention make better plans for the stated intention, it follows that research on successful planning behavior can offer new insights into true and false intentions. For example, successful planners attend more to possible contingencies or restrictions, and develop alternative plans to account for these. Therefore, those with a true intention may focus on possible restrictions to a higher degree than liars. Preliminary support already exists for this claim: In one study, truth tellers were more likely than liars to speak of potential problems that may emerge (Mac Giolla, Gran Hag, & Liu-Jönsson, 2013), in another truth tellers were more likely than liars to answer that they had made a “Plan B” to use if their primary plan fell through (Gran Hag, Soontoise, Strömwall, & Liu-Jönsson, 2012). Planning can also be linked to other topics mentioned. It is during the planning phase that one spontaneously engages in EFT and forms mental images of intentions. Indeed, degree of planning is likely to moderate the degree of engagement in EFT.

Research on goals provides at least two directions for studies on intentions. The first, discussed above, concerns the distinct markers of goal-directed behavior and how intentions activate behavioral goals (e.g., Ask et al., 2013). The second approach concerns research on goal attainment that has focused on the so called intention-behavior gap. Gollwitzer makes the distinction between “goal intentions” and “implementation intentions” (Gollwitzer, 1999). Goal intentions are general intentions referring to a desired end point: Goal intentions concern the what. Implementation intentions are more specific, usually containing an if-then plan where the when, where, and how of goal attainment is specified. Research has demonstrated that implementation intentions increase the likelihood of goal attainment. To this end implementation intentions can also be seen as more detailed plans which are associated with better planning behavior – making a direct link between the theme of goals and the aforementioned theme of planning.

A current line of study gives an apt example for how theory development can aid research in true and false intentions. The starting point was the finding that implementation intentions are less likely to be formed when one has no relating goal intention (Sheeran, Milne, Webb, & Gollwitzer, 2005). This lead Sooniste, Gran Hag, Strömwall, and Vrij (2013) to examine whether the existence of implementation intentions could be used as a marker of veracity: that is, as only truth tellers have a goal intention, they should be more likely than liars to form implementation intentions. To this end, the authors proposed that truth tellers’ statements would be marked, more so than liars, by implementation intention related utterings. In the study by Sooniste and colleagues, participants’ instructions include the what, where and when of their respective true intentions or cover stories. For this reason it was thought
that implementation intention related utterances would be marked by how statements (i.e., how the stated intention is to be achieved). Their results show that truth tellers had a significantly higher proportion of how related utterings compared to the statements of liars (these findings have since been replicated; see Mac Giolla et al., 2013). This new direction of research demonstrates how a deeper understanding at the theoretical level can shed light on new directions for future research.

**Future Directions**

To date, the primary focus of research within this new strand has been to find ways to discriminate between (a) statements truthfully describing a noncriminal future activity and (b) statements describing a lawful activity masking a future criminal action. That is, for Table 1, to compare cell C and cell D. Importantly, much of the work carried out by security services around the world relates to assessing explicit threats or warning signals (Meyly & Hoffman, 2014). Here the task often boils down to deciding if an expressed threat (or warning signal) should be taken seriously or not. Differently put, the task is to assess if the threat is based on a genuine intention, a so-called true threat, or if it is unfounded (a bluff). That is, the task is to compare cell A and cell B in Table 1.

Future work in this domain might profit from examining to what extent the knowledge gained on statements belonging to cell C and D, can be used for separating genuine and unfounded threats. That is, to examine (i) to what extent the trademarks of statements expressing true lawful intentions (e.g., utterances related to how) hold for threats intended to be carried out, and (ii) to what extent the trademarks of statements expressing false intentions (e.g., utterances related to why) hold for unfounded threats.

**Conclusions**

The current review demonstrates the array of research being conducted on true and false intentions. With that said, with only a few years of systematized research, the field is still in its infancy and we therefore feel it inappropriate to make any concrete recommendations for practitioners.

The fact that the empirical corpus is meager has not hindered the launching of several programs aimed at detecting false intent (malintent) in security screening settings, such as airports (Wallace, 2013). For example, the American-based Transportation Security Administration’s (TSA) Screening Passengers through Observational Techniques (SPOT) program, a security system based on human observation of suspicious behaviors (US Department of Homeland Security, 2008). SPOT is now present in 100+ airports, and the many SPOT officers seek to identify passengers who hold criminal intentions (e.g., to engage in acts of terrorism). SPOT relies on an emotional approach, assuming that criminally inclined individuals will experience emotions related to the planned action (Ekman & O’Sullivan, 2006). In brief, fear and anxiety will “leak” via various nonverbal channels. To date, however, there is no published research supporting this claim; a claim upon which SPOT rests (US Government Accountability Office, 2013; Wallace, 2013).

Our view is to move a bit slower and a bit more thoughtfully, but we also believe that certain issues can be clarified already at this early stage. We envisage that the main area of application of the current body of work is at an early phase of the legal system. Specifically, we believe the research findings can be useful both in the pre-investigative screening phase (e.g., to orient investigators’ attentions and resources), as well in the investigative phase (e.g., for building theoretically sound and effective interview protocols). It might also be that some of the reviewed methods could be combined in a step-wise fashion. For example, a “hit” from an initial CIT test, could be followed up by investigative efforts that might produce critical background information (e.g., on planning activities). This information could in turn be used strategically in a SUE-inspired interview (see above).

It is important to note that the research on true and false intent is unlikely to lead to diagnostic tools with perfect discrimination abilities. Rather, the goal is to produce evidence-based methods which can be incorporated into relevant practical settings. A relevant example can be taken from a study by Warmelink et al. (2012). In the concluding lines of the article the authors reminisce about their own experience of traveling through airport security. The authors note that they are typically solely asked direct questions about their respective intentions: questions which, on their own, their study suggests have limited value for deception cues. The purpose of this example is twofold: first, it demonstrates how the current line of research can highlight limitations of accepted procedure; second, it can suggest, albeit only cautiously at this early stage, evidence-based alternatives or complements to accepted procedure. This more modest approach for the application of research is unlikely to produce techniques for making unequivocal veracity judgments, but it can increase the likelihood of making correct assessments. This in turn should increase the overall quality of security operations with significant long term benefits.

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