# Deception Detection

**Chapter** · January 2005

CITATION
1

READS
1,496

**2 authors:**

Pär Anders Granhag
University of Gothenburg
**294** PUBLICATIONS **10,273** CITATIONS
SEE PROFILE

Aldert Vrij
University of Portsmouth
**452** PUBLICATIONS **18,509** CITATIONS
SEE PROFILE

CHAPTER THREE

# Deception Detection

PÄR ANDERS GRANHAG
ALDERT VRIJ

Many people are fascinated by deception. Grand liars often become famous (e.g., Nick Leeson, who destroyed the 200-year-old Barings Bank), and a lie told by an already-famous person is often considered grand (e.g., Bill Clinton lying about his affair with Monica Lewinsky). Books with covers that promise some easy tricks to reveal liars may sell well, although the cover promises more than the authors can deliver. This general interest in deception is mirrored in the field of psychology and law, and intense research efforts over recent years have resulted in an impressive corpus of knowledge on deception and its detection (for recent overviews, see Granhag & Strömwall, 2004a; Vrij, 2000a). In this chapter we examine some of the latest research findings and explore what scientific psychology can tell us about the detection of deception. We focus mainly on research that has been conducted within the framework of "psychology and law" and pay less attention to related topics, such as deception in everyday life (DePaulo, Kashy, Kirkendol, Wyer, & Epstein, 1996), and deception in close relations (DePaulo & Bell, 1996).

The study of deception spans many of psychology's subdisciplines. For example, to understand why a liar's internal states might translate into certain nonverbal behaviors, it is necessary to study emotion and physiological psychology; to be able to argue why the verbal content of a true statement might differ from a false statement, we must study memory; in order to explain why people with a certain facial appearance are judged as liars more often than others, we must study social psychology. The full list is much longer, but the point is that a student of human deception needs to be acquainted with different domains within psychology.

Almost on a daily basis, people are forced to reflect and decide upon

questions of truth and deception. The outcome of these reflections and decisions may or may not be important. Most people accept white lies and might even confess to have uttered a few themselves, but will feel hurt or angry if lied to on serious matters. For professionals working within the field of law enforcement (e.g., police officers, judges), it is of paramount importance to assess veracity accurately. The consequences of failing to do so can be very severe.

We have structured the chapter as follows: First, we set the stage by defining deception and providing an overview of the different lines of research found within the field. Then we explore the underlying core beliefs that people hold about the cues to deception, mainly by examining the beliefs of presumed experts, and identify where these beliefs originate and where they might lead. In the next section we focus on people's ability to detect deception, both laypeople's and presumed experts'. We review research on the accuracy of the most commonly used lie detection methods (i.e., speech, physiological, and behavioral analysis), and take a closer look at how different factors, such as high-stake situations, repeated interrogations, and multiple suspects, affect people's ability to detect deception. We then turn to objective indicators of deception, differentiating the verbal and nonverbal cues that are, to some extent, diagnostic of deception from those that are not. In addition, we discuss liars' and truth tellers' strategies and how these might translate into verbal and nonverbal behavior. We end the section by arguing that human memory plays an important role in deception—for liars, truth tellers, and those trying to distinguish between them. Finally, we examine the attempts made to train people to detect deception and discuss the so-far promising results of the more indirect techniques (i.e., implicit lie detection), as well as a few new, promising, but not yet fully investigated ways to detect deceit. We close the chapter by summarizing the most important findings and highlighting some of the future challenges.

## DEFINING DECEPTION

To define *deception* is not an easy task, and many scholars have made more or less successful attempts to conceptualize the phenomenon. We use a definition formulated by Vrij (2000a), wherein deception is seen as "a successful or unsuccessful deliberate attempt, without forewarning, to create in another a belief which the communicator considers to be untrue" (p. 6). Note that a person who unintentionally misremembers is not lying, because lying requires an intentional act. Note also that someone should be called a liar only if he or she lies without prior warning about his or her intention, and that even an unsuccessful attempt to deceive is a lie.

There are many different types of lies. Basic distinctions can be made between falsifications, distortions, and concealments. *Falsifications* are total falsehoods, wherein everything communicated is contradictory to the truth (also called "outright lies"). *Distortions* are departures from the truth to fit the liar's

goal; *exaggerations* are classified in the distortion category. Finally, the truth can be *concealed*, in that a liar can say that he or she does not know (even if he or she does) or that he or she does not remember (although he or she does).

In this chapter we focus on the more serious lies, not the "social lies" (white lies) that most people tell on a daily basis in order to place themselves ("I never dream about anyone but you") or others ("I wouldn't call you fat") in a more positive light. Furthermore, we focus exclusively on lies told by adults; for a recent overview of studies on deception by children, see Vrij (2002).

## BELIEFS REGARDING CUES TO DECEPTION

To define *belief* is also a difficult task. For the present context, it suffices to say that a belief is a feeling that something is true or real. A belief can be strong or weak, correct or incorrect. The beliefs that a person holds are often reflected in his or her behavioral dispositions: that is, beliefs guide action. Hence, if we want to learn about deception detection, it is important to study people's beliefs about cues to deception.

Traditionally, two different methods have been used to investigate people's beliefs about cues to deception: surveys and controlled, laboratory-based studies. In the surveys, participants typically have been asked to rate the extent to which they believe that a particular behavior (e.g., gaze aversion and finger movements) on a list of prespecified verbal and nonverbal behaviors is indicative of deception. The basic idea is that the participants are asked to indicate how they think that liars behave.

The second source of information on how people believe liars behave is studies wherein participants watch videotapes of liars and truth tellers, then judge these "suspects" in terms of their veracity. One way to map the participants' beliefs is to ask them to justify their veracity judgments in writing; another way is to calculate correlations between the (objective) behaviors of the suspects and the types of judgments made by the participants (Zuckerman, DePaulo, & Rosenthal, 1981). None of these methods is perfect, however. In brief, the prespecified behaviors that participants are asked to rate in surveys might not be the behaviors they would observe and act upon if faced with a real-life situation. When analyzing self-reported cues to deception, we need to keep in mind that there is a large number of psychological studies showing that people are rather poor at pinpointing all (or sometimes even the most significant) factors that led to an impression, for example, that a person is lying (Yzerbyt, Dardenne, & Leyens, 1998). Investigating cues to perceived deception provides insight into which cues participants actually use to signify deception, but it is not certain whether they themselves are aware of which cues they act upon. Nevertheless, a brief summary of the research conducted on beliefs about cues to deception serves as an important platform for the later sections in this chapter.

## Surveys on Presumed Experts' Beliefs about Deception

The majority of the surveys investigating people's beliefs about cues to deception has been conducted with college students as participants. However, in this chapter we turn to the surveys conducted on professional "lie catchers," such as police officers, judges, and customs officers. To date, such studies have been conducted in the United Kingdom (Akehurst, Köhnken, Vrij, & Bull, 1996), Sweden (Strömwall & Granhag, 2003), The Netherlands (Vrij & Semin, 1996), and Spain (Garrido & Masip, 1999). Most surveys of experts' beliefs have contrasted the beliefs of police officers and students (Akehurst et al., 1996); students, prisoners, and professional lie catchers, such as police officers, customs officers and prison guards (Vrij & Semin, 1996); police officers, prosecutors, and judges (Strömwall & Granhag, 2003); and students and immigration officers handling asylum cases (Granhag, Strömwall, & Hartwig, in press).

These surveys show that the beliefs held by experts and laypeople (i.e., college students) are highly similar. In terms of nonverbal cues, the converging evidence is that both experts and laypeople consider nervous behaviors to indicate deception (Vrij, 2000a). For example, both presumed experts and laypeople believe that eye contact decreases when lying. However, research on objective cues to deception (reviewed later in the chapter) shows that this particular cue is an unreliable predictor of deception (DePaulo et al., 2003). Furthermore, both presumed experts and laypeople seem to believe that there is a strong link between deceptive behavior and an increase in body movements; research on objective cues shows that this belief also is incorrect (DePaulo et al., 2003). In terms of verbal indicators of deception, presumed experts and laypeople seem to believe that truthful accounts are more detailed than fabricated accounts; to some extent, research on objective cues to deception supports this belief. In addition, both groups express a strong belief that truthful consecutive statements are more consistent, over time, than are fabricated consecutive statements (Strömwall & Granhag, 2003). However, research on objective verbal cues questions this belief (Granhag & Strömwall, 1999). For a recent review on professionals' beliefs about deception, see Strömwall, Granhag, and Hartwig (2004). In sum, the results from these surveys on subjective cues to deception show that (1) the beliefs are highly similar for experts and laypeople, and (2) that these beliefs, to a large extent, are misconceptions of how liars actually behave.

## Self-Reported Cues to Deception

As mentioned earlier, an alternative way to elicit information on people's beliefs about cues to deception is to ask lie catchers to justify the veracity assessments they have made. Mann, Vrij, and Bull (2004) showed police officers fragments of videotaped real-life police interviews with suspects and asked them to try to detect deceit. In addition, the police officers were asked which

cues they had used to make their assessments. The results showed that the most commonly reported cue was "gaze," and the second was "movements." That is, they tended to go for nonverbal cues more than verbal. In contrast, in a study conducted by Hartwig, Granhag, Strömwall, and Vrij (2004b), experienced police officers reported relying on verbal cues (e.g., details and plausibility) and nonverbal cues (e.g., gaze and movements) to an equal extent, when assessing students who acted as suspects. The explanation for this inconsistency is probably very simple. In the study by Mann et al., the police officers watched videotapes—that is, they had no opportunity to ask questions, and they had no access to facts about the case. In the study by Hartwig et al., the police officers were given a brief case file and were free to conduct the interrogations with the suspects in whatever manner they found appropriate. In conclusion, the cues to deception that police officers report using are very much in line with the stereotypical cues that laypeople report. In the same study, Mann et al. (2004) also examined cues to perceived deception and found that the more gaze aversive the suspects were, the more likely they were to be judged deceptive. This finding suggests an overlap between beliefs about cues associated with deception and cues to perceived deception. It should be noted, however, that the distribution of the cues to deception reported is moderated by the situation in which the officers are tested (at least, to some extent).

Investigating a different aspect of subjective cues to deception, Granhag and Strömwall (2000) showed the same videotaped suspect, interrogated on three different occasions, to 125 undergraduate students. The students were asked to assess the suspect's veracity and to provide arguments in support of their assessment. In short, two types of interobserver disagreements were found. The first type of disagreement pertained to how a particular cue was perceived. For example, 40 observers perceived the suspect's three statements as being inconsistent over time, whereas an equal number of observers perceived the same three statements to be consistent over time. The second type of disagreement pertained to how a particular cue was used. For example, the cue "low confidence" was used about equally often to justify that the suspect was lying and to justify why he was telling the truth. Overall, the study showed that there was relatively more disagreement about how cues were to be perceived than about how they were to be used. Granhag and Strömwall (2000) argued that both types of disagreements contribute to the low averages of deception-detection accuracy commonly found for groups.

## Why Do We Have Such Misconceptions about Deceptive Behavior?

Several explanations have been proposed to elucidate why people hold such incorrect beliefs about how liars behave. One explanation highlights the importance of feedback. DePaulo, Stone, and Lassiter (1985b) suggested that feedback often is inadequate and unsystematic in occupations where lie detec-

tion is a central task. Consider, for example, the working environment of customs officers: From the travelers they decide not to search they get no feedback at all, and they will never know whether it was correct to let those travelers pass without visitation. They can only learn something from the travelers they do search, but the feedback they receive from this group may not be as valid as it might seem. If a customs officer decides to search a traveler and indeed finds smuggled goods, he or she may regard this as a validation of his or her beliefs about the relation between behavior and deception. However, it might be that the customs officer relied on the wrong cues but managed to catch the smuggler by chance. Furthermore, if a customs officer neglects to try to find systematic patterns in his or her "false alarms" (i.e., travelers he or she decides to search but who have not smuggled anything), he or she will learn little or nothing from these mistakes.

Critically, the working environment of customs officers, as well as many other groups within law enforcement, contains learning structures in which feedback is lacking or even misleading (Hogarth, 2001). Hence, such learning structures may lead to erroneous beliefs about deceptive behavior that are then cemented, rather than corrected, through experience. This line of reasoning suggests that the mere experience of judging veracity is not sufficient to learn the correct beliefs about deception or to fine-tune the beliefs already held (DePaulo & Pfeifer, 1986; Ekman & O'Sullivan, 1991; Vrij, 2000a; Vrij & Semin, 1996). Instead, the development of valid decision-making rules (in this case, beliefs about deceptive behavior) demands feedback that is frequent, reliable, and preferably immediate (Allwood & Granhag, 1999; Einhorn, 1982).

In line with Hogarth (2001), we argue that feedback is the key to learning the right lesson from experience. To find empirical support for the idea that feedback moderates beliefs about cues to deception, we need to investigate groups of persons that are provided with regular feedback. One such group may be experienced criminals. Speculatively, criminals live in a more deceptive environment than most other people—something that may make them aware of deceptive strategies that work. For example, being repeatedly interrogated by the police and thus receiving feedback on deception success and failure might increase a person's knowledge about which deceptive strategies are useful in convincing others. In addition, and importantly, survival in such a deceptive culture is also dependent on a general alertness in order not to be deceived by others.

The idea that criminals might have more accurate beliefs about deception was first tested in a study by Vrij and Semin (1996). Indeed, the results from this study showed that prison inmates had a better notion about the relationship between nonverbal behavior and deception than other presumed lie experts (in this study, customs officers, police detectives, patrol police officers, and prison guards). This finding was further supported in a study by Granhag, Andersson, Strömwall, and Hartwig (2004), which found that criminals' beliefs about verbal as well as nonverbal cues to deception were less stereotypical than the ones held by prison personnel and students.

Further support for the idea that feedback is important to achieve a certain degree of expertise in the deception area comes from the fact that criminals have been shown to detect lies significantly more accurately than chance (Hartwig, Granhag, Strömwall, & Andersson, 2004), and, on demand, and with little or no time for preparation, produce very convincing false confessions (Norwick, Kassin, Meissner, & Malpass, 2002). In addition, Bugental et al. (as cited in Ekman, 2001) showed that abused children living in an institutional environment were better at detecting lies from demeanor than were other children. In sum, these studies show that living in an environment that demands high alertness to possible betrayal and deceit can improve the individual's knowledge about cues to deception. One implication of these findings is that law enforcement personnel should avoid questionable interrogation tactics, such as lying and manipulation, for other than ethical reasons: Such deceptive tactics might simply be an easy "catch" for the "expert" sitting on the opposite side of the table.

It should be noted that the learning structures that characterize the working situation of many presumed deception-detection experts is but one of several possible explanations as to why they hold such stereotypical beliefs about deception. Reasonably, people's tendency to remember those instances that support their beliefs and forget those in conflict with their beliefs (i.e., selective memory and confirmation bias) may contribute to the perseverance of misconceptions. Vrij, Edward, and Bull (2001a) reported that people who lied in an interview and who later were asked to indicate how they thought they had behaved, incorrectly believed that they had behaved in a nervous manner (e.g., fidgeting). Such misconceptions about a person's own behavior during deception might add to the cementing of the stereotypical beliefs he or she has regarding other people's lying behavior. Yet another source of misconceptions about cues to deception is to be found in so-called police interrogation manuals.

## Cues to Deception in Police Interrogation Manuals

In many interrogation manuals, it is suggested that the interrogator should pay close attention to the suspects' behavioral responses, and that the suspects' nonverbal behavior provides important information regarding his or her truthfulness. For example, the most influential interrogation manual suggests that posture shifts, grooming gestures, and placing a hand over the mouth are reliable cues to deception (Inbau, Reid, & Buckley, 1986; Inbau, Reid, Buckley, & Jayne, 2001). In another influential manual, it is claimed that liars' movements are jerky, abrupt, and swift and that their hands are cold and clammy (Zulawski & Wicklander, 1993). In the same manual it is stated that liars are gaze aversive, that they stutter and mumble, and that they fidget and scratch themselves. As we outline later, there is no empirical support whatsoever for these claims. Instead, research suggests that the cues reported in police interrogation manuals often reflect *common misconceptions*

about the link between demeanor and deception. To trust the information that these manuals provide in terms of cues to deception might result in misinterpretations of the verbal and nonverbal behaviors that a suspect shows. Such misinterpretations might, in turn, fuel suspect-driven investigations that might ultimately result in miscarriages of justice.

Research by Kassin and Fong (1999) demonstrates this point. They trained students in the technique recommended by John E. Reid and his associates (Inbau et al., 2001). The researchers then compared the deception-detection performance of the trained group against the performance of an untrained group. They found that *the untrained group outperformed the trained group*. In support of this result, Mann et al. (2004) found, in a study of real-like police interviews, that the more the officers endorsed the views recommended by Inbau et al. (2001), the worse they became at distinguishing between truths and lies. In short, passing through a training program that teaches cues that are nondiagnostic of deception can impair people's ability to detect lies.

## THE ABILITY TO DETECT DECEPTION

In this section, we review research on the accuracy of the different deception-detection methods. First, however, a few words on experimental procedure, evaluation, and terminology are warranted.

### Ground Truth and Evaluation

The paradigmatic task for people participating in studies on deception detection is to view a number of video clips and after each clip, make a dichotomous judgment as to whether the person just viewed is lying or telling the truth. That is, the participants are asked to circle either "This person is lying" or "This person is telling the truth" (this dichotomous scale is sometimes complemented by a Likert scale running from, for example, 1—"No, definitely not lying"—to 7—"Yes, definitely lying"). Before showing the first video, the experimenter commonly informs the participants that exactly (or about) half of the people on the videotape are lying.

To be able to determine the accuracy of a judgment, it is necessary to have a criterion for comparison. Translated into studies on deception-detection performance, researchers need to ensure that some (often half) of the videotaped "suspects" really are lying, and that the others really are telling the truth (sometimes each "suspect" is asked to lie in one interview and to tell the truth in another). In controlled, laboratory-based studies, this requirement is seldom problematic. Liars are simply instructed to lie, and truth tellers are instructed to tell the truth about, for example, a mock theft from a wallet placed in a nearby room. Some "suspects" steal money from the wallet and then deny their action (i.e., they lie), whereas other "suspects" take no money and tell

the truth in the interview. The experimenter knows who is lying and who is not, because he or she knows to whom the money was given. However, in real-life situations it is often difficult to know whether a certain suspect is telling the truth or not. That is, studies using real-life material are often faced with problems in terms of "ground truth."

## Truth and Lie Biases

In most studies, deception-detection accuracy is captured by an overall measure: number of correct judgments in relation to the total of number of judgments made. Some researchers conduct separate computations for detecting accuracy of truthful and deceptive statements, with the former exceeding the latter (Levine, Sun Park, & McCornack, 1999). This "veracity effect" follows from the fact that subjects participating in a deception-detection task tend to go for "This statement is true" more often than "This statement is deceptive" (even though they are told that the set of video clips contains an equal number of liars and truth tellers). This "truth bias" is well documented within the deception-detection paradigm and has proven to be especially strong for laypeople (Vrij, 2000a). In studies testing police officers, however, the truth bias is often less pronounced and sometimes even lacking (Hartwig et al., 2004b; Porter, Woodworth, & Birt, 2000; Vrij, 2003). This finding is not surprising, given the fact that many police officers have considerable experience with interrogating suspects, presumably encounter a different base rate of liars, and thus have a different frame of mind when facing the task of assessing veracity (Kassin & Fong, 1999).

Hartwig, Granhag, Strömwall, and Andersson (2004) tested prison inmates' deception-detection ability and found that this group exhibited a very pronounced lie bias. That is, the inmates chose to circle "This statement is deceptive" much more often than "This statement is truthful." Consequently, the inmates had a very high accuracy in identifying statements that were, in fact, deceptive, but were less successful in identifying truthful statements. Hartwig et al. proposed two complementary explanations for this unusual lie bias. First, most prison inmates probably have extensive experience with lying and/or being lied to, which might create a "false consensus" bias (Ross, Greene, & House, 1977) that deception is as frequent in the lives of other people as it is in their own lives. Second, the consequences of being duped, or failing to dupe, are probably more severe in the criminal environment than in other contexts. This severity may lead to a more suspicious attitude toward others. (For a discussion on judgmental biases in deception-detection contexts, see also Meissner and Kassin, 2002.)

## Confidence

Some deception researchers have asked their participants not only to decide whether a suspect is lying or telling the truth, but also to reflect on the deci-

sion made with respect to the person's degree of certainty. To gain knowledge about how realistic people are about their own ability to detect deception is important, because the felt or expressed level of confidence can influence both their own and other people's actions.

Subjective estimates of confidence are typically elicited after a participant has seen a video clip and selected one of the two answer alternatives ("The suspect is lying" or "The suspect is telling the truth"). Then the participant is asked to rate his or her choice on a half-range confidence scale, where 50% means "guess" and 100% means "absolutely sure" that the chosen alternative is correct. Research on deception has found that there is a very weak relationship between accuracy and confidence and that people tend to be overconfident in their judgment. That is, they think they are more correct than, in fact, they are. The meta-analysis by DePaulo, Charlton, Cooper, Lindsay, and Muhlenbruck (1997) showed that the degree of confidence was correlated with type of veracity judgment made, with higher confidence for statements judged as truthful (independent of whether the veracity judgment made was correct or not).

Ekman and O'Sullivan (1991) used a somewhat different method to investigate the relationship between confidence and performance. Before taking the actual test of watching 10 videotaped interviews (five liars and five truth tellers), the lie catchers (e.g., Secret Service, FBI, and CIA agents) were asked to estimate their ability to tell when other people are lying. Computed over all tested occupational groups, these general predictions turned out to be nonsignificantly related to actual accuracy. In addition, immediately after taking the test the presumed experts were asked to indicate how well they thought they had done in detecting deceit. This correlation between estimated and actual performance also turned out to be nonsignificant. In sum, people's estimates about their own ability and performance seem to be unrelated to their actual lie-detection ability and performance.

## The Accuracy of Lie Detection Methods

There are, in principle, three ways to catch a liar: (1) by analyzing his or her speech, (2) by measuring his or her physiological responses, and (3) by observing his or her behavior. Psychologists have developed various lie- and truth-detection methods, and several of them—Statement Validity Analysis, Comparison Question Test, and Guilty Knowledge Test—are used in criminal investigations. These methods, and others, are discussed in this section.

### *Speech Analyses*

Statement Validity Analysis (SVA) is probably the most popular technique for assessing the veracity of verbal statements. The technique was developed in Germany to determine the credibility of children's testimony in trials for sexual offenses. It is perhaps not surprising that a technique has been developed

to verify whether sexual abuse has taken place with a child. It is usually difficult to determine the facts of a sexual abuse case, because often there is no medical or physical evidence. Frequently, the alleged victim and the defendant give contradictory testimonies, with no independent witnesses available to confirm or deny what happened. Therefore, the perceived credibility of the defendant and alleged victim are important. The alleged victims are in a disadvantageous position if they are children, because adults have a tendency to mistrust statements made by children (Ceci & Bruck, 1995). SVA results are accepted as evidence in criminal courts in several countries, including Germany, The Netherlands, and Sweden (Vrij, 2000a). According to Undeutsch (1967), a child's statement, derived from memory of an actual experience, differs in content and quality from a statement based on invention or fantasy. This is known as the "Undeutsch hypothesis" (Steller, 1989). Undeutsch (and others) has developed various content criteria which could be used to check the veracity of statements (Undeutsch, 1967, 1982).

Based on his work, Steller and Köhnken (1989) compiled a list of 19 criteria to be used in credibility assessment. The SVA consists of three stages (Vrij, 2000a). In the first stage, children are interviewed in a semistructured format wherein they provide their own account of the allegation, without any influence from the interviewer. Psychologists have designed special interview techniques, based on psychological principles, to obtain as much information as possible from children in a free-narrative style, unhindered by inappropriate prompts or suggestions (Davies, Westcott, & Horan, 2000; Memon, Vrij, & Bull, 2003; Milne & Bull, 1999; Sternberg, Lamb, Esplin, Orbach, & Hershkowitz, 2002). These interviews are audiotaped and then transcribed. In the second stage, using the written transcripts, a systematic assessment of the credibility of the statement given during the interview is conducted. This assessment, the Criteria-Based Content Analysis (CBCA), is based on the list of 19 criteria compiled and discussed by Steller and Köhnken (1989). (Several of these criteria are discussed in a later section on objective indicators of deception and truth.) Trained CBCA experts score the absence or presence of each of these 19 criteria in each statement—for example, on a 3-point scale, where *0* is assigned if the criterion is absent, *1* if the criterion is present, and *2* if the criterion is strongly present. The presence of each criterion enhances the quality of the statement and strengthens the hypothesis that the account is based on a genuine personal experience.

In the third stage, alternative explanations for the CBCA outcomes are considered, because CBCA scores might be affected by factors other than the veracity of the statement, such as the cognitive abilities of the interviewee (Buck, Warren, Betman, & Brigham, 2002) or the style and approach of the interviewer (Köhnken, Schimossek, Aschermann, & Höfer, 1995). For this purpose, a so-called Validity Checklist, consisting of issues that are thought to be relevant and so worth considering, has been developed (Raskin & Esplin, 1991; Steller, 1989).

The core of the SVA procedure is Stage 2, the CBCA, and most SVA re-

search has focused on this aspect of the instrument. Vrij (in press) has recently reviewed 37 CBCA studies, 16 of which have explicitly addressed the question of how many truths and lies could be correctly classified on the basis of CBCA scores. In most of these studies, truthful and deceptive statements of adults, rather than children, were assessed. This procedure might be problematic because CBCA was developed to assess the veracity of children's statements and, in criminal investigations, CBCA evaluations are only used for children's statements. However, several authors have argued that CBCA analyses could be used to evaluate the testimonies of adult suspects or witnesses who talk about issues other than sexual abuse (Köhnken et al., 1995; Ruby & Brigham, 1997; Steller & Köhnken, 1989), because, as they pointed out, the underlying Undeutsch hypothesis is not restricted to children, witnesses, victims, or to sexual abuse. In agreement with this argument, Vrij's (in press) review revealed that accuracy rates for children's statements did not seem to differ from accuracy rates for adults' statements.

In order to test whether CBCA actually works in discriminating between truthful and fabricated accounts, both laboratory studies and field studies have been conducted. In laboratory studies, statements of people who lied or told the truth about certain issues, for the sake of the experiment, are assessed. As discussed later, laboratory studies have inherent problems concerning ecological validity. In real life, CBCA assessments are made on statements that describe highly emotional events (e.g., sexual abuse). Obviously, in laboratory studies those type of experiences can never be simulated. In field studies, CBCA assessments in real sexual abuse cases are examined. The advantage of a field study is that it is realistic. However, the disadvantage is that in most criminal cases, it is virtually impossible to check "ground truth"—that is, to know, with certainty, which statements were truthful and which were fabricated. Ground truth (also called "basic reality") is often based on confessions: that is, on whether or not the person accused of sexual abuse by the child confessed to having committed the crime.

To base the ground truth on confessions, however, generates problems. As Steller and Köhnken (1989) pointed out, CBCA statements are usually obtained in cases where no other evidence is available. If a statement is judged as truthful under such conditions, the chances of the defendant obtaining an acquittal are decreased. If there is a reduced chance of the defendant avoiding a guilty verdict, it may be a beneficial strategy for the defendant to falsely confess to the crime, because confession may result in a considerably milder punishment. On the other hand, there is no reason for the guilty defendant to confess to the crime if the CBCA outcome suggests that the witness's statement is not about a genuinely experienced event. As a result, the defendant's decision to confess may be influenced by the outcome of the CBCA assessment. An attempt to validate CBCA assessments by confessions may therefore be circular, at least, partly.

This ground-truth issue makes conducting field studies difficult, and very few field studies have addressed this issue satisfactorily. As a result, no reliable

data on the accuracy of CBCA assessments in real-life cases are currently available (Vrij, in press). Vrij's (in press) review, based solely on laboratory studies, revealed a 73% average accuracy rate for detecting truths (i.e., correctly classifying a truthful statement as truthful) and a 72% average accuracy rate for detecting lies (i.e., correctly classifying a deceptive statement as deceptive). The overall accuracy rate (combined accuracy scores for detecting lies and truths) was 73% (see Table 3.1). These accuracy rates are above the 50% level of chance (guessing whether someone is lying or not has a 50% chance of being correct); however, they are not high enough to justify using CBCA evaluations as the main evidence in criminal courts. SVA experts argue that they use SVA rather than CBCA evaluations in criminal cases. However, there are several problems with using the Validity Checklist, the third stage of the SVA procedure, making it at least uncertain whether SVA evaluations are more accurate than CBCA evaluations (see Vrij, in press, for a discussion of this issue).

Recently, Reality Monitoring has been used as an alternative method to examine verbal differences between responses believed to be true and false (Alonso-Quecuty, 1992, 1996; Alonso-Quecuty, Hernandez-Fernaud, & Campos, 1997; Höfer, Akehurst, & Metzger, 1996; Manzanero & Diges, 1996; Roberts, Lamb, Zale, & Randall, 1998; Sporer, 1997; Strömwall, Bengtsson, Leander, & Granhag, 2004; Vrij, Edward, & Bull, 2001b; Vrij, Edward, Roberts, & Bull, 2000). At the core of Reality Monitoring is the premise that memories of experienced events differ in quality from memories of imagined (e.g., fabricated) events. Memories of real experiences are obtained through perceptual processes and are therefore likely to contain various types of information, including perceptual information (details of vision, audition, smell, taste, and touch), contextual information (spatial details about where the event took place and where objects and people were situated in relation to each other), and temporal information (details about the timing sequence of the events). Accounts of imagined events are derived from an internal source and are therefore likely to contain cognitive operations, such as thoughts and reasoning ("I must have had my coat on, because it was very cold that night"; Johnson, Hashtroudi, & Lindsay, 1993; Johnson & Raye, 1981, 1998). It might be argued that experienced events reflect truth telling whereas imagined events reflect deception. Therefore, differences between truth tellers and liars could be expected on the Reality Monitoring criteria. Table 3.1 presents all the Reality Monitoring studies that reported accuracy rates. These rates for detecting truths vary from a modest 61 to a high 88%, and for detecting lies, from 61 to 76%. Overall accuracy rates range from 66 to 81%. The average truth accuracy rate is somewhat higher (75%) than the average lie accuracy rate (70%). The average overall accuracy rate is 73%. These accuracy rates are comparable with the rates reported for CBCA evaluations (see Table 3.1). This finding is encouraging, because Reality Monitoring analyses are much easier to conduct than CBCA evaluations (Sporer, 1997). Unlike CBCA evaluations, however, Reality Monitoring assessments are not used in criminal investigations.

TABLE 3.1. Accuracy Rates for Lies and Truths Using Different Lie/Truth Detection Methods

| | Truth | Lie | Overall |
|---|---|---|---|
| CBCA (review) | | | |
| Vrij (in press) | 73% | 72% | 72% |
| Reality Monitoring (individual studies) | | | |
| Höfer et al. (1996) | 61% | 70% | 66% |
| Sporer (1997) | 75% | 68% | 72% |
| Vrij et al. (2000) | 71% | 65% | 67% |
| Vrij et al. (2004a)[a] | 81% | 73% | 77% |
| Vrij et al. (2004b) | 88% | 61% | 74% |
| Comparison Question Technique (reviews) | | | |
| Ben-Shakhar & Furedy (1990, $N$ = 9) | 72% | 84% | |
| Carroll (1991, $N$ = 3) | 53% | 83% | |
| Honts & Perry (1992, $N$ = 3) | 59% | 86% | |
| Iacono & Patrick (1997, $N$ = 3) | 56% | 84% | |
| OTA report (Saxe et al., 1985, $N$ = 10) | 78% | 88% | |
| Lykken (1998, $N$ = 4) | 61% | 86% | |
| Raskin & Honts (2002, $N$ = 4) | 59% | 89% | |
| Guilty Knowledge Technique (individual studies) | | | |
| Elaad (1990) | 98% | 42% | |
| Elaad et al. (1992) | 94% | 76% | |
| Behavioral analyses (reviews, individual study, and systematic analyses) | | | |
| Vrij (2000, review, laypersons) | 67% | 44% | 57% |
| Vrij & Mann (2003, review, professionals) | 55% | 55% | 55% |
| Mann, Vrij, & Bull (2004, individual study, professionals) | 64% | 66% | 65% |
| Ekman et al. (1991, systematic analysis) | | | 86% |
| Frank & Ekman (1997, systematic analysis) | | | 80% |
| Vrij et al. (2000, systematic analysis) | 71% | 85% | 78% |
| Vrij et al. (2004a, systematic analysis) | 65% | 77% | 71% |

[a] Adult participants only.

## *Physiological Analyses*

Throughout history it has been assumed that lying is accompanied by physiological activity within the liar's body. For example, the Chinese used to force suspected liars to chew rice powder and then to spit it out. If the resultant powder was dry, then the person was judged to have been lying (Kleinmuntz & Szucko, 1984). The modern way of detecting physiological activity in liars is to use a polygraph (from two Greek words: *poly* = many; *grapho* = to write), a scientific measuring device that can display (via ink-pen motions on charts or a computer visual display unit) a direct and valid representation of

various types of bodily activity (Bull, 1988). The most commonly measured activities are sweating of the fingers, blood pressure, and respiration. Polygraph tests are currently used in criminal investigations in countries all over the world, including Belgium, Canada, Israel, Japan, Turkey, Mexico, Pakistan, the Philippines, Singapore, South Korea, Taiwan, Thailand, and the United States (Lykken, 1998; Vrij, 2000a). A polygraph is sometimes called a lie detector, but this term is misleading. A polygraph does not detect lies but, rather, the arousal that is assumed to accompany telling a lie. Polygraph examiners have no other option than to measure deception in such an indirect way, because a pattern of physiological activity directly related to lying does not exist (Saxe, 1991). Many different polygraph tests exist; we restrict our coverage to briefly describing only the Comparison Question Test (CQT) and the Guilty Knowledge Test (GKT). The CQT could be considered the standard polygraph test, and it is mostly used in criminal investigations. However, the test is also fiercely criticized by its opponents. The GKT is considerably less disputed among scientists (Iacono & Patrick, 1997; for more detailed descriptions and critical discussions of these two and other polygraph tests, see Kleiner, 2002; Lykken, 1998; Vrij, 2000a).

The CQT (sometimes called the Control Questions Test) compares responses to relevant questions with responses to control questions. Relevant questions are specific questions about the crime: for example, in a murder investigation, "On March 12, did you shoot Scott Fisbee?" (Iacono & Patrick, 1997, p. 254). Control questions deal with acts that are related to the crime under investigation, but do not relate specifically to the crime. They are general in nature, deliberately vague, and cover long periods of time. They are meant to embarrass the suspects (both guilty and innocent) and to evoke arousal. These goals are facilitated, on the one hand, by giving suspects no choice but to lie when answering the control questions, and, on the other hand, making it clear to suspects that the polygraph will detect these lies. Examiners formulate a control question for which, in their view, a denial is deceptive. The exact formulation of the question depends on the examinee's circumstances; a control question in an examination regarding a murder might be "Have you ever tried to hurt someone to get revenge?" (Iacono & Patrick, 1997, p. 255), in a case where the examiner believes that the examinee has indeed hurt someone at some point in his or her life. Under normal circumstances, some examinees might admit this wrongdoing. However, during a polygraph examination they are unlikely to do so, because the examiner tells the examinee that admitting to this behavior would cause the examiner to conclude that the examinee is the type of person who would commit the crime in question and is therefore likely to be considered guilty. The examinee feels that he or she has no other choice than to deny this earlier wrongdoing and thus give an untruthful answer to the control question.

The CQT is based on the assumption that control questions will generate more arousal than the relevant questions in the innocent suspect. The innocent examinee will become more concerned with regard to his or her an-

swers to the control questions because (1) the examiner puts so much emphasis on the control questions, and (2) the examinee knows he or she is lying in response to the control questions but answering the relevant questions truthfully. However, the same control questions are expected to elicit less arousal in guilty suspects than the relevant questions. A guilty suspect gives deceptive responses to both types of question, which, in principle, should produce similar physiological reactions to both types of question. However, because relevant questions represent the most immediate and serious threat to the examinee, they will lead to a stronger physiological response than the control questions.

The aim of the GKT is to ascertain whether examinees possess knowledge about a particular crime which they do not want to reveal. For example, suppose that the examinee is a man who killed somebody with a knife, left the knife at the murder scene, and tells the police that he is not involved in the crime in any way. The police might then use the Guilty Knowledge Test to determine if the suspect is telling the truth when he denies any involvement in the crime. In this test the examiner shows the suspect several types of knives, including the one used in the murder (assuming it has been recovered). For each knife, the examinee is asked whether he recognizes it as one he used. Both innocent and guilty examinees deny that they have used such a knife. A guilty examinee, however, recognizes the knife he has used. It is assumed that this so-called guilty knowledge will produce a heightened physiological response that will be detected by the polygraph. Lykken (1998) described how the GKT could have been used in the O.J. Simpson murder trial. Questions that could have been used in a GKT administered immediately after the body of Simpson's wife was found included the following:

> (1) "You know that Nicole has been found murdered, Mr. Simpson. How was she killed?—Was she drowned? Was she hit on the head with something? Was she shot? Was she beaten to death? Was she stabbed? Was she strangled?" and (2) "Where did we find her body? Was it—in the living room? In the driveway? By the side gate? In the kitchen? In the bedroom? By the pool?" (Lykken, 1998, p. 298)

Similar to testing the accuracy of CBCA assessments, the accuracy of polygraph tests has been tested both in laboratory and field studies. Laboratory studies in polygraph testing often use a "mock crime" paradigm, in which "guilty participants" are instructed to commit a mock crime and "innocent participants" are told that they are suspected of the crime. Both "innocent" and "guilty" participants are then given a polygraph test. These studies, which generally show favorable results for polygraph testing (for recent reviews of laboratory-based polygraph studies, see Ben-Shakhar & Elaad, 2003; MacLaren, 2001; Raskin & Honts, 2002; Vrij, 2000a), are fiercely attacked by polygraph opponents. One issue raised by opponents is that the "guilty" participants have little incentive to try to beat the test, and the "innocent"

participants are unlikely to be concerned about the relevant questions (Iacono & Patrick, 1997).

Numerous field studies have been published, but they are subject to debate. The problem is that the quality of polygraph field studies conducted or published is low (Committee to Review the Scientific Evidence on the Polygraph, 2003). Similar to CBCA field studies, one of the main issues is establishing the ground truth; that is, establishing with certainty whether the suspect is actually innocent or guilty. Ideally, this certainty would be established with corroborative and conclusive evidence (e.g., DNA evidence) that is gathered independent of the polygraph test. However, this type of evidence is typically not available in cases where polygraph tests are conducted. Typically, polygraph tests are conducted when no corroborative evidence is available. Therefore, in most field studies confessions are used to establish the ground truth. A suspect is considered guilty when he or she confesses to the crime under investigation, and innocent when another suspect confesses to the crime. The problem with confessions is that they are not independent of polygraph outcomes. For example, a guilty suspect who passes the test is unlikely to confess, because there is no further evidence against him or her. Since that suspect is the culprit, it is unlikely that anyone else will confess to that crime. In other words, in this case a confession will typically not occur, and the case will not be included in the field study, because only cases in which someone made a confession are included. The incorrect polygraph decision will therefore not be noted, and the result is that accuracy percentages reported in field studies that are based on confessions (almost all field studies) are likely to be inflated. (For a further discussion of this issue, see Fiedler, Schmid, and Stahl, 2002.)

Several reviews have been published regarding the accuracy of CQT (see Table 3.1). The outcomes differ because of different inclusion criteria. Perhaps the most lenient criteria were set by Saxe, Dougherty, and Cross (1985). Their review was initiated by the U.S. Congressional Office of Technology Assessment (OTA) to advise President Reagan about polygraph testing, and included 10 studies that met the OTA standards. As can be seen in Table 3.1, their review presented the most favorable outcomes for CQT polygraph testing. Taking all CQT reviews into account, Table 3.1 shows that there is reasonable agreement among the reviews regarding guilty suspects. Correct classifications were made in 83–89% of the cases. There is less agreement regarding innocent suspects, and findings are less positive than for guilty suspects: between 53 and 78% of innocent suspects were correctly classified. These relatively low accuracy rates for innocent suspects imply that, despite being innocent, they nevertheless might have experienced arousal when answering the relevant questions. For example, arousal may occur (1) when the relevant questions are generally arousal-evoking questions (e.g., when an innocent man, suspected of murdering his beloved wife, is asked questions about his wife in a polygraph test, and the memory of her triggers his strong feelings for her); and (2) when the innocent examinee experiences fear of detection, which may occur when

the person is afraid that his or her honest answers will not register as true on the polygraph.

Only two field studies regarding the accuracy of the GKT have been published (see Table 3.1), and their findings differed considerably. Both tests revealed very good results regarding the classification of innocent suspects (94% and 98% of innocent suspects were correctly classified) but rather poor results regarding the classification of guilty suspects (76% and 42% of guilty suspects were correctly classified). One explanation for these poor results on guilty suspects is a possible lack of "guilty knowledge." This situation occurs when the questions used in the GKT test are not carefully selected: These could be questions about minor details that the guilty suspect simply has forgotten or perhaps has never known. (e.g., The culprit stole the laptop from a room where a TV was also located. Where exactly was the TV located? Next to the door? Next to the window? Next to the bed?).

### *Behavioral Analyses*

Lie-detection tools based on analyses of nonverbal behavior are less developed than those based on verbal or physiological assessments. Police manuals typically emphasize the importance of examining nonverbal behavior and specify where to pay attention, but this information is never systematic and often inaccurate. In scientific studies concerning the detection of deception on the basis of nonverbal analyses, observers are typically given videotapes or audiotapes and asked to judge whether the people in the scenario are lying or telling the truth. (In fact, in those studies, observers could pay attention to a mixture of nonverbal behavior and speech content.) Statements from liars and truth tellers are usually taken from laboratory studies (i.e., liars and truth tellers produced statements for the sake of the experiment) and rarely from real-life situations. Vrij (2000a) examined the percentages of correct truth and lie detection across 37 studies. Included were studies in which observers were laypersons (typically, university students) who tried to detect lies and truths told by people they did not know. The overall accuracy rate was 57% (see also Table 3.1). The accuracy rate for detecting truths (67%) was higher than for detecting lies (44%), with the latter percentage falling below the level of chance. This high accuracy rate for detecting truths can partly be explained by the truth bias.

It could be argued that university students do not habitually detect deception. Perhaps professional lie catchers, such as police officers or customs officers, would obtain higher accuracy rates than laypersons. It might be that professional lie catchers' experiences with interviewing people have a positive influence on their skills to detect deceit. Vrij and Mann (2003) reviewed studies in which professional lie catchers participated as observers. The overall accuracy rate found in those studies was 55%, as were the accuracy rates for detecting lies and detecting truths, separately. However, some groups of lie detectors seem to be better than others. Ekman and O'Sullivan (1991) and

Ekman, O'Sullivan, and Frank (1999) found that Secret Service agents (64% overall accuracy rate), CIA agents (73% overall accuracy rate) and sheriffs (67% overall accuracy rate) were better lie detectors than personnel from other divisions of police officers. Due to the artificial nature of these lie detection studies, however, we might wonder whether they truly measured professional lie catchers' ability to distinguish between truths and lies.

In all the studies reviewed above, police officers' and other professional lie catchers' performances were investigated by the use of noninteractive designs; that is, the presumed experts watched video clips. Such designs do not mirror real-life situations very well. To remedy this mismatch, Hartwig et al. (2004b) placed experienced police officers in a face-to-face situation with a suspect and let the officers conduct the interrogations in whatever manner they found appropriate. This design was an attempt to investigate the lie-detection ability of experienced police officers in a more ecologically valid fashion. The suspects were undergraduates, half of whom had committed a mock crime and later denied it (liars), and half of whom had committed no such crime (truth tellers). The result was discouraging in terms of deception-detection performance, with experienced police officers unable to detect deception any better than expected by chance alone (overall accuracy rate 56.7%). Critically, almost every second time that police officers assessed a suspect as a liar, the suspect was actually innocent and had told the truth during the interrogation. The study by Hartwig et al. also highlighted the great extent to which interrogation styles differed, despite the fact that all police officers faced the same task. For example, the total number of questions asked by the police officers during the interrogation ranged from 17 to 69; the number of times the suspect was interrupted ranged from 0 to 11 times; and in half of the interrogations the police officer spoke more than the suspect. No covariation was found between lie-detection ability and interrogation characteristics (e.g., number and type of questions).

Another way to increase the ecological validity of this type of study is to examine police officers' skills when they attempt to detect truths and lies told by real suspects during police interviews. Mann et al. (2004) showed 99 police officers a total of 54 video clips of suspects who were lying and telling the truth during their police interviews. The suspects were all being interviewed in connection with serious crimes such as murder, rape, and arson. None of the sample of police officers belonged to the specific groups that were identified by Ekman and his colleagues as being superior lie detectors. The overall accuracy rate was 65%, with a 64% truth accuracy rate and a 66% lie accuracy rate.

Although these accuracy rates were higher than generally found in previous studies, incorrect classifications were still frequently made. One problem lie detectors face is that nonverbal differences between liars and truth tellers are typically small and therefore hard to spot (Vrij, 1994). Another factor that hampers lie detection is that people often have incorrect beliefs about how liars behave (Akehurst et al., 1996; Mann et al., 2004; Strömwall & Granhag,

2003; Strömwall, Granhag, & Hartwig, 2004; Taylor & Vrij, 2000; Vrij & Semin, 1996; Vrij & Taylor, 2003). This information suggests that people could become better lie detectors by conducting detailed analyses of diagnostic nonverbal cues displayed by liars and truth tellers. Research has supported this view. For example, Ekman, O'Sullivan, Friesen, and Scherer (1991) analyzed liars' and truth tellers' smiles and pitch of voice and correctly classified 86% of liars and truth tellers on the basis of these measurements (see also Table 3.1). Frank and Ekman (1997) examined signs of emotions that emerged via (micro) facial expressions and correctly classified around 80% of liars and truth tellers on the basis of these facial expressions. Vrij, Akehurst, Soukara, and Bull (2004) and Vrij et al. (2000) examined nonverbal cues that indicate cognitive demand (e.g., pauses in speech, decrease in subtle movements) and correctly classified between 71 and 78% of the truths and lies told.

## Further Factors Affecting Deception-Detection Performance and Strategy

### *Repeated Interrogations*

In real-life situations lie catchers rarely base their final assessment of veracity on one statement only. Instead, suspects often have to go through repeated interrogations. However, very few studies have focused on the effects of repeated interrogations. Granhag and Strömwall (2001a) conducted a study in which the suspects were interrogated three times over a period of 11 days (each interrogation was videotaped). The "suspects" were undergraduates who either lied or told the truth about a scenario in which a man was assaulted. In the next stage other undergraduates watched the videotapes and were asked to assess veracity. The main finding was that judges who assessed veracity after seeing only one interrogation (55.6% correct judgments) performed in line with judges who had seen all three interrogations (56.9% correct judgments). It was also found that judges who assessed veracity after seeing one interrogation (55.6% accuracy) and then, again, after seeing the additional two interrogations, significantly increased their performance (69.4% accuracy). This finding indicates that a step-by-step response mode (i.e., repeated assessments of veracity) may facilitate the use of a more effective information-processing strategy than an end-of-sequence response mode (i.e., one final assessment of veracity). However, much more research is needed on how lie catchers integrate this kind of sequential information.

Granhag and Strömwall (2002) also showed that when lie catchers assessed veracity after watching one interrogation only, the frequencies of the subjective cues reported were evenly distributed across a number of different categories (e.g., "details," "completeness"). But as the basis for assessing veracity was altered from one statement to three consecutive statements (i.e., three interrogations with the same "suspect"), the distribution of the reported subjective cues to deception changed dramatically. That is, a new category had

to be added to the list of categories: "consistency." This category turned out to be the most commonly used, irrespective of whether the suspect was assessed as a liar ("The statements are inconsistent over time, therefore he [or she] is lying") or as a truth teller ("The statements are consistent over time, therefore he [or she] is telling the truth"). In a later section we return to the consistency cue and explain why a stereotypical use of this heuristic may be problematic.

### *Partners in Crime*

In real-life cases, lie catchers often have to try to detect deceit on the basis of statements derived from multiple suspects, and sometimes those suspects have been interrogated repeatedly. Similar to the questions pertaining to repeated interrogations, questions regarding how to assess statements from multiple suspects have been overlooked. Strömwall, Granhag, and Jonsson (2003) conducted a study in which each member of 10 truth-telling and 10 lying pairs of "suspects" was interrogated twice about an alibi. In the next stage, the videotaped interrogations were shown to judges who tried to assess veracity. Again, both the suspects and the judges were undergraduates. The overall deception-detection performance was modest (from 58.3 to 62.5%). Furthermore, lie catchers given access to a larger number of statements did not outperform lie catchers given access to a lesser number of statements.

An analysis of the subjective cues reported to justify the assessments showed that the judges were very occupied with the extent to which the different statements were consistent or not. Specifically, the results showed that the judges paid more attention to whether the two suspects were consistent *between* themselves, than to whether each of them was consistent *within* him- or herself. The cue "consistency within pairs of suspects" was reported to be used more than twice as often as the cue "consistency within single suspects." Collapsed, these two types of consistency cues constituted no less than one-third of all cues reported.

In sum, research on the subjective cues to deception suggests that lie catchers faced with a single statement from a suspect will report a wide range of different subjective cues. But if faced with consecutive statements from a single suspect and/or statements from multiple suspects, the pattern of the reported cues becomes much less scattered, in that many judges tend to go for consistency (either within a suspect or between suspects).

### *Effects of Presentation Mode (Live vs. Video)*

The material on which lie catchers base their veracity assessments may come in different forms (presentation modes). A lie catcher may, for example, meet the suspect in a-face-to-face situation, watch a videotaped interrogation, listen to an audiotape, or read the protocol of a transcribed interrogation. Research shows that the type of presentation mode may affect both deception-detection

accuracy and judgmental biases. For the current context, we focus mainly on differences between live and video presentation modes. Strömwall and Granhag (2003) showed that police officers, prosecutors, and judges strongly believe that it is easier to detect deception during a face-to-face interrogation than when watching the very same interrogation on video. In contrast, research shows that those who observe an interrogation on video are more accurate (Buller, Strzyzewski, & Hunsaker, 1991; Feeley & deTurck, 1997; Granhag & Strömwall, 2001a) or as accurate (Hartwig et al., 2004b) in detecting lies as those who actually conduct the interrogation. This finding may be explained by the fact that an interrogator must spend cognitive effort on monitoring him- or herself and the suspect, posing the correct questions, and making the appropriate conversational extensions for different segments of the interrogation (Feeley & deTurck, 1997). In contrast, a lie catcher who watches the videotaped version of the same interrogation can allocate all resources to watching and listening to the suspect.

In terms of judgmental biases it has been found that interrogators exhibit more truth bias than do those who watch the same interrogations on video (Feeley & deTurck, 1997; Granhag & Strömwall, 2001b). It can be speculated that the physical appearance and the proximity of the suspect increases the difficulty of disbelieving him or her. It should be noted that this increased truth bias in the context of a live presentation mode seems to hold for laypeople but not for police officers (Hartwig et al., 2004b).

## Why Such Poor Deception Detection Performance?

It is intriguing to reflect upon why people perform so poorly in deception-detection tests, and many scholars have suggested many different explanations. O'Sullivan (2003) summarized much of what has been said on the topic and lists no less than 12 different reasons for the mediocre lie-detection ability found. All reasons listed are formulated from the perspective of the person trying to distinguish between truth and deception, and some reasons have more bearing than others on forensic contexts. Here we highlight six of these reasons. First, it might be that lie catchers underutilize the nonverbal behaviors involved in emotional and cognitive reactions to lying; that is, they do not know which nonverbal cues to attend to when trying to detect deceit (Ekman et al., 1991). Second, lie catchers may overrely on the content of the speech, instead of, for example, paying attention to *how* a suspect speaks (DePaulo, Rosenthal, Rosenkrantz, & Green, 1982). Third, the detection performance of lie catchers may be impeded by truth (Vrij, 2000a) or lie biases (Ekman, 2001; Hartwig et al., 2004b). Fourth, lie catchers might hold incorrect beliefs about cues to deception; for example, in many Western societies it is believed that eye-gaze aversion is a sign of deception (Vrij, 2000a). Fifth, research shows that lie catchers tend to misinterpret deviations from the norm as signs of deception (Bond, Omar, Pitre, & Lashley, 1992); hence, a baby-faced, extraverted, and "nonweird" person is likely to be judged as truthful. (For recent

findings supporting this idea, see Bull and Vine, 2003; for a recent review, see Bull, 2004.) Finally, O'Sullivan argues that it is reasonable to propose that lie-catching ability is moderated by social–emotional intelligence, which, in turn, varies among people (Riggio, Tucker, & Throckmorton, 1987).

In addition to the reasons listed in her paper, O'Sullivan (2003) offers yet another reason for why people are poor at detecting deception. Her point of departure is a well-established cognitive heuristic: the fundamental attribution error (Ross & Nisbett, 1991). This is the tendency, when forming impressions about others, to overestimate the importance of trait-dispositional factors (e.g., sociability) and to underestimate the importance of the situation in which the judged person is placed (e.g., a police interrogation). O'Sullivan shows that lie catchers who attributed positive trait characteristics (dispositional) to the person they were judging also tended to judge this person as truthful in a given situation (state). Conversely, persons who received negative ratings in terms of trait (trustworthiness) were often judged as liars. In sum, the fundamental attribution error was found to significantly undermine the lie-catcher's ability to detect truth and deception. For future research it might be fruitful to focus further on trait–state consistencies and inconsistencies.

## OBJECTIVE INDICATORS OF DECEPTION AND TRUTH

One of the reasons why accuracy rates in lie detection are never perfect (100%) is that no single behavioral pattern, verbal response, or physiological response is uniquely related to deception. In other words, there is no giveaway cue, like Pinocchio's growing nose. However, the accuracy scores are typically above the level of chance, implying that *something* noticeable must occur in liars that gives away their lies. Indeed, it has been found that some responses are more likely to occur during deception than others. This selection probably depends on three processes that a liar may experience: emotion, content complexity, and attempted control (DePaulo, Stone, & Lassiter, 1985a; Vrij, 2000a; Zuckerman et al., 1981). Each of these processes may influence a person's response (Vrij, 2000a). In other words, a liar's behavior, voice, or speech might be affected not because he or she is lying but because, for example, he or she experiences certain emotions when lying. Each process emphasizes a different aspect of deception and deceptive responses; however, the distinction between these aspects is artificial. Lies may well feature all three aspects, and the three processes should not be considered as exclusive camps. Zuckerman and colleagues (1981), who introduced these three factors, also included a fourth factor in their theoretical model: arousal. We do not include this factor because, in our view, it overlaps the emotion factor. Zuckerman et al. suggested this overlap by concluding their paragraph on the arousal factor with the following statement: "It is possible, however, that the general autonomic responsivity to deception reflects specific emotions. If so, cues to deception may be accounted for by the particular affects that are involved rather than by

general arousal" (p. 9). Other theoretical models for explaining nonverbal cues to deception are described in the deception literature (Buller & Burgoon, 1996; Ekman, 2001; Ekman & Friesen, 1969; for a description of each of these theoretical models, see DePaulo et al., 2003.)

## Three Processes That Influence Lying

The three most common types of emotion associated with deception are guilt, fear, and excitement (Ekman, 2001). A liar might feel guilty because he or she is lying, might be afraid of getting caught, or might be excited about having the opportunity to fool someone. The strength of these emotions depends on the personality of the liar and on the circumstances under which the lie takes place (Ekman, 2001).

Sometimes liars find it difficult to lie (content complexity), because they have to think of plausible answers, avoid contradicting themselves, and tell a lie that is consistent with everything the observer knows or might find out, while avoiding slips of the tongue. Moreover, liars have to remember what they have said so that they can say the same things again when asked to repeat their story (Burgoon, Buller, & Guerrero, 1995; Vrij, 2000a).

The process of attempted control refers to liars' attempts to suppress any cues that would reveal their lies; they engage in impression management in order to avoid getting caught (Buller & Burgoon, 1996; Krauss, 1981). This management requires liars to suppress their nervousness effectively, mask evidence that they have to think hard, know how they normally respond in order to convey an honest and convincing impression, and show only the responses they want to show. It may well be the case that when controlling their body language, liars may overcontrol their behavior, possibly exhibiting body language that appears planned, rehearsed—and lacking in all spontaneity. For example, liars may believe that movements will give away their lies (Hocking & Leathers, 1980; Vrij & Semin, 1996) and so move very deliberately, avoiding any movements that are not strictly essential. This attempt would result in an unusual degree of rigidity and inhibition, because people do normally make movements that are not essential (DePaulo & Kirkendol, 1989). Liars may also be reluctant to say certain things (e.g., they might be reluctant to spontaneously admit that what they said previously was incorrect) because they will fear that this retraction will make their stories appear less convincing. Another possible cue that may result from impression management is a "flat" performance due to a lack of spontaneous (*un*-premeditated) involvement (Burgoon & Buller, 1994; DePaulo et al., 2003). Charles Ingram, who was found guilty in the United Kingdom of trying to cheat his way to the top prize in the popular TV quiz *Who Wants to Be a Millionaire?* might have experienced this giveaway. Staff working for the TV program became suspicious when Ingram and his wife, after winning the top prize of £1,000,000, "had not appeared as jubilant as the newly rich might" (*The Independent*, 8 April 2003, p. 9).

All three processes may occur at the same time. That is, liars could be

nervous, having to think hard, and trying to control themselves all simultaneously. Which of these processes is most prevalent depends on the type of lie. Liars are more nervous when the stakes (i.e., negative consequences of getting caught and positive consequences of succeeding) are high; hence, nervous responses are more likely to accompany high-stake lies. Liars have to think harder when the lie is complicated; therefore, indicators of increased cognitive load are more likely to occur with complicated lies than easy lies. Liars who are motivated to avoid getting caught may try harder to make an honest impression than those who are less motivated. Therefore, attempts to control behavior, voice, and speech may be more likely to occur in motivated liars.

Before discussing the outcomes of reviews about how liars respond, it should be emphasized that the approaches only suggest that the presence of signs of emotions, content complexity, and impression management may be indicative of deception. None of these approaches claims that the presence of these signs *necessarily* indicates deception. Truth tellers might experience exactly the same processes. For example, innocent (truthful) suspects might also be anxious if they worry that they will not be believed by a police officer (Ofshe & Leo, 1997). Because of that fear, they may show the same nervous reactions as guilty liars who are afraid of being caught (Bond & Fahey, 1987). This crossover of cues puts the lie detector in a difficult position. Should the signs of fear be interpreted as indicators of guilt or of innocence? The behavior does not provide the answer. Ekman (2001) labeled the false accusation of a truth teller on the basis of the emotional reactions he or she displays the "Othello error," after Shakespeare's character. Othello falsely accuses Desdemona (his wife) of betrayal. He tells her that she may as well confess, because he is going to kill her for her treachery. Desdemona asks Cassio (her alleged lover) to be called so that he can testify to her innocence. Othello tells her that he has already murdered Cassio. Realizing that she cannot prove her innocence, Desdemona reacts with an emotional outburst. Othello misinterprets this outburst as a sign of her infidelity.

## Diagnostic Cues to Deception

Here we briefly summarize the main findings of several reviews of verbal and nonverbal cues to deception (DePaulo et al., 2003; Vrij, 2000a, in press). An overview of these cues is also presented in Table 3.2. Several of these cues are part of the CBCA and Reality Monitoring instruments (indicated in Table 3.2). Not included in the present review are the cues listed by DePaulo et al. (2003, Appendix B), which were based on a small number of estimates (with the exception of the facial micro-expressions that we discuss later). In addition to the cues mentioned in the present section, DePaulo et al.'s (2003) review discussed additional cues that cannot be easily classified as verbal or nonverbal behaviors, for example, pressed lips, facial pleasantness, and nervous appearance.

Liars tend to speak with a higher-pitched voice that might be the result of

TABLE 3.2. Overview of Diagnostic Verbal and Nonverbal Cues of Deception

| Nonverbal cues | | Verbal cues | |
|---|---|---|---|
| High-pitched voice | > | Story sounds plausible | < |
| Voice sounds tense | > | Person sounds ambivalent | > |
| Speech errors | </> | Unstructured production (CBCA) | < |
| Speech hesitations | </> | Speech length | < |
| Illustrators | < | Number of details (CBCA) | < |
| Hand and finger movements | < | Visual details (Reality Monitoring) | < |
| | | Auditory details (Reality Monitoring) | < |
| | | Quotes (CBCA) | < |
| | | Spatial details (Reality Monitoring) | < |
| | | Temporal details (Reality Monitoring)[a] | < |
| | | Person sounds expressive | < |
| | | Person sounds passive | > |
| | | Person sounds uncertain | > |
| | | Person sounds involved | < |
| | | Person is cooperative | < |
| | | Negative statements | > |

*Note.* >, more during deception; <, less during deception.

[a]Contextual embeddings (a CBCA criterion) is a combination of auditory and temporal details.

arousal (Ekman, Friesen, & Scherer, 1976). However, differences in pitch between liars and truth tellers are usually very small and only detectable with sophisticated equipment. Also, sometimes liars' voices sound tenser than truth tellers' voices—another concomitant of arousal. The results concerning speech errors (e.g., word or sentence repetition, sentence change, sentence incompletions, slips of the tongue) and speech hesitations (e.g., use of speech fillers such as "ah," "um," "er") show a conflicting pattern. In most studies an increase in such errors (particularly word and phrase repetitions) and in hesitations during deception have been found. These behaviors might have been the result of the need for the liars to think hard about their answers. Alternatively, the increased behaviors might be the result of nervousness. In some studies, however, a decrease in speech errors and hesitations occurred. There is some evidence that variations in lie complexity are responsible for these conflicting findings (Vrij & Heaven, 1999). Lies that are difficult to tell are associated with in an increase in speech errors and hesitations (in line with the content complexity explanation), whereas lies that are easy to tell are associated with a decrease in speech hesitations and speech errors (in line with the attempted control explanation).

Liars tend to make fewer illustrators (i.e., hand and arm gestures designed to modify, emphasize, or supplement what is being said verbally) and fewer hand and finger movements (nonfunctional movements of hands and fingers that do not involve arm movements) than truth tellers. The decrease in these movements might be the result of lie complexity, the increased cognitive load of which results in a neglect of body language, thereby reducing overall animation (Ekman & Friesen, 1972). The decrease in movements might also

be the result of an overcontrol of behavior. Finally, the decrease in movements might be the result of a lack of emotional involvement analogous to the Charles Ingram example mentioned above.

Compared to stories told by truth tellers, liars' stories sound less plausible and more ambivalent—possibly the result of the difficulties liars face when they tell their stories. Another verbal indicator of lies is structured production: Liars tend to tell their stories in chronological order (this happened first, and then this, and then that, and so on), whereas truth tellers sometimes tend to give their account in unstructured ways, particularly when they talk about emotional events. When a person is clearly upset, he or she may report what has happened in a chaotic and incomprehensible way. In fact, the story can be so incomprehensible that the listener has to ask the person to sit down for a while, to calm down, and repeat exactly what has happened, beginning with the start of the event. This unstructured production effect disappears when the person has already told the story a couple of times or frequently thought about the event, rehearsing it in his or her head, because this repetition produces a more chronological order in the story telling (Vrij, 2000a). Liars tend to tell their stories in a logical time sequence (Zaparniuk, Yuille, & Taylor, 1995), perhaps because this is easier to do.

Truth tellers tend to speak for longer time periods than liars do, probably because they include more details in their statements than liars (Vrij, in press). In particular, truth tellers include more visual details (they describe things they saw) and more auditory details (they describe things they heard) into their accounts. They also tend to literally repeat what has been said more frequently (e.g., "Then he asked, 'Could you please pass me the salt?' " whereas liars would be more inclined to say, "Then he asked me to give him the salt"). Moreover, truth tellers mention more spatial details (e.g., "He walked behind us," "The chair was under the window," "We were in his bedroom") and more temporal details (e.g., "He let the cat out before he put the kettle on," "Approximately 15 minutes later the phone rang again," "He stayed with me for about 3 hours"). There are several reasons for these differences between liars and truth tellers (Vrij, 2000a). Liars sometimes do not have enough imagination to invent such details, or the details may be too difficult to fabricate. Moreover, liars may not want to provide many different details, because they are afraid that they will forget what they have said and will not be able to repeat these details when asked to do so. Finally, differences might occur because memories of *experienced* events differ in quality from memories of *imagined* events (Johnson & Raye, 1981, 1998). Unlike memories of imagined events, memories of real experiences are obtained through perceptual processes and are therefore more likely to contain perceptual information when relayed (i.e., information about what someone saw, heard, said, and so on).

Compared to truth tellers, liars tend to sound less vocally expressive, more passive, and more uncertain. These characteristics might be the result of an attempt to overcontrol behavior. Liars also sound less involved, come

across as less cooperative, and tend to make more negative statements (which might be caused by a negative emotion felt by the liar).

Perhaps the most remarkable outcome of the literature reviews is that several signs of nervousness, such as gaze aversion and fidgeting, are *unrelated* to deception. Many people (both laypersons and professional lie catchers) believe that those behaviors are associated with deception (Akehurst et al., 1996; Mann et al., 2004; Strömwall & Granhag, 2003; Strömwall, Granhag, & Hartwig, 2004; Taylor & Vrij, 2000; Vrij & Semin, 1996; Vrij & Taylor, 2003). One reason why cues of nervousness do not seem to be related to deception is that truth tellers also may be nervous (see the Othello error above). Secondly, the absence of cues of nervousness might be the result of an artifact. As discussed before, most deception studies are conducted in a laboratory, in which people are requested to lie or tell the truth for the sake of the experiment. In such studies liars might not be worried enough to show cues of nervousness. Different outcomes may therefore emerge when researchers investigate the reactions of liars in high-stake situations.

Vrij and Mann (2001) and Mann, Vrij, and Bull (2002) are among the very few researchers who have investigated liars' behavioral responses in high-stake situations. For example, Mann et al. (2002) examined the behavioral responses of 16 suspects during their police interviews. The police interviews were videotaped and the tapes were made available to the researchers for detailed scoring of the suspects' behavioral responses. All interviews were clear high-stake situations. The suspects were interviewed in connection with serious crimes such as murder, rape and arson, and were facing long prison sentences if found guilty. Results revealed that the suspects in these high-stake situations did not show the nervous behaviors typically believed to be associated with lying, such as gaze aversion and fidgeting. In fact, they exhibited an increase in pauses, a decrease in eye blinks, and (male suspects) a decrease in finger, hand, and arm movements. These characteristics are more in line with the content complexity and attempted control explanations than with the emotional explanations. The strongest evidence that content complexity affected suspects' behavior more than nervousness was the finding that liars made fewer eye blinks. Research has shown that nervousness results in an increase in eye blinking (Harrigan & O'Connell, 1996), whereas increased cognitive load results in a decrease in eye blinking (Wallbott & Scherer, 1991).

The apparent predominance of cognitive processes compared to emotional processes in those suspects is perhaps not surprising. Many of the suspects included in Mann et al.'s (2002) study have had regular contact with the police. Therefore, they were probably familiar with police interviews—a familiarity that might decrease their nervousness. However, suspects in police interviews are often less intelligent than the average person (Gudjonsson, 1992), and there is evidence that less intelligent people have more difficulty in inventing plausible and convincing stories (Ekman & Frank, 1993).

The review revealed more verbal cues to deception than nonverbal cues. This finding contradicts the information found in most police manuals, which

typically emphasizes nonverbal cues to deception. Researchers have concentrated on nonverbal cues to deception up until the late 1980s (DePaulo & Kirkendol, 1989; Ekman, 2001). Ekman's work (2001) has revealed that observing emotional micro-expressions in the face might reveal valuable information about deception. Strongly felt emotions almost automatically activate muscle actions in the face. Anger, for example, results in a narrowing of the lips and lowering of the eyebrows. Eyebrows that are simultaneously raised and pulled together; a raised upper eyelid and tensed lower eyelid typically denote fear. If a person denies an emotional state that is actually being felt, he or she will have to suppress these facial expressions to be credible. Thus, a scared person claiming to be unafraid has to suppress the facial micro-expressions that typically indicate fear. This suppression is difficult to manage, especially because these emotions may arise unexpectedly and autonomically. For instance, people do not usually deliberately choose to become frightened; this response happens automatically, in response to a particular event that took place or a particular thought. The moment fright occurs, a fearful facial expression may appear that gives away the lie. People are usually able to suppress these expressions within $\frac{1}{25}$ of a second after they begin to appear (Ekman, 2001).

The opposite can occur as well. A person can pretend to experience a particular emotion, whereas in fact this emotion is not felt. A person can pretend to be angry, whereas in reality he or she is not angry at all. In order to be convincing, the liar should produce an angry facial expression; that is, he or she should try to narrow the lips and so on. However, these muscle actions are very difficult for most people to make voluntarily (Ekman, 2001). It is also difficult to fake an emotion other than the one that is actually felt. For example, a potential hijacker may become scared during a conversation with security personnel when he realizes that they might discover his plans. He can decide to mask this emotional state by pretending to be angry with the security personnel because they are checking on him so thoroughly and apparently do not trust him. In order to be convincing, he has to suppress his fearful facial expression and replace it with an angry facial expression. This switch is difficult to achieve: He has to lower his eyebrows (sign of anger), whereas his eyebrows tend to raise (sign of fear; Ekman, 2001).

Ekman's observations could well be of value. For example, in one of our studies (Vrij & Mann, 2001) we included a person who held a televized press conference to ask for information about his missing girlfriend. Later it turned out that he himself had killed his girlfriend. A detailed analysis of the video clip revealed that he showed a micro-expression of a (suppressed) smile during that press conference. His smile was interesting, given the context. Why did the man smile? And why did he attempt to suppress that smile? Although his smiling at a press conference cannot be interpreted as a definite indication of deceit, at least, it made the man appear suspicious. Unfortunately, no empirical test of the frequency of emotional micro-expressions during lying and truth telling has been published in peer-reviewed journals—which is also the

reason why these micro-expressions did not emerge as cues to deception in the literature reviews we cited.

Ekman and colleagues also discovered that smiles are related to deception only when a distinction is made between felt and false smiles (Ekman, Friesen, & O'Sullivan, 1988). They found that truth tellers showed more felt smiles and liars more false smiles. Felt smiles include all smiles in which the person actually experiences a positive emotion and presumably would report that positive emotion. False smiles are deliberately made to convince another person that a positive emotion is felt, whereas, in fact, it is not. Felt and false smiles produce slightly different facial muscular actions, and the skilled observer is able to spot these differences (Ekman, 2001).

We believe that one explanation for an emphasis on nonverbal cues to deception has been that researchers did not know to which verbal cues they should attend. The introduction of CBCA in the late 1980s and Reality Monitoring in the 1990s provided researchers with a framework to use in analyzing speech content. Several of the cues included in these instruments have been found to discriminate between truths and lies.

## LIARS' AND TRUTH TELLERS' STRATEGIES

In contrast to extensively researched topics such as nonverbal cues to deception and deception-detection abilities, liars' and truth tellers' strategies have been investigated to a very limited extent (DePaulo et al., 2003). This paucity is unfortunate, because reflecting on strategies and their consequences might help us understand both the (apparent lack of) differences between liars' and truth tellers' nonverbal behavior and the poor deception-detection performance commonly found. Just as lie catchers' beliefs guide their deception-detection strategies, it is reasonable to believe that suspects' strategies will guide their behavior, irrespective of whether they are telling the truth or lying. In the few instances where strategies have been highlighted, there is a tendency to overlook the fact that truth tellers employ strategies to convince the people to whom they are talking (DePaulo et al., 2003). DePaulo et al. (2003) suggested that both liars' and truth tellers' behaviors can be seen from a self-presentational perspective, in which all self-presentations (even truthful ones) are edited.

At the most basic level, distinctions can be made between strategies pertaining to (1) the theme of the statement (e.g., story line, plausibility), (2) how the statement should be presented (e.g., level of details, order of events), and (3) how to act in terms of nonverbal behavior (e.g., eye contact, body language). First we briefly touch upon the issue of credible stories, then close in on verbal and nonverbal strategies as the stakes rise, and lastly, address verbal strategies and their consequences when suspects are interrogated repeatedly. Because systematic knowledge on this topic is meager, in addition to studies on liars' and truth tellers' self-reported strategies, we need to learn from stud-

ies that have examined what people believe characterizes credible stories, as well as offer some speculations on how liars and truth tellers may reason in terms of strategies.

## The Hallmarks of a Credible Story

What constitutes a plausible story? Several researchers have suggested rules to which plausible stories must conform: so-called story grammars (e.g., Robinson, 1981). Bennett and Feldman (1981) imported this line of reasoning into a forensic context by asking students to tell true and false stories. In the next phase, they found that those asked to assess these stories had a difficult time, but that stories assessed as truthful shared some properties that stories assessed as deceptive lacked. Stories assessed as truthful were characterized by a clear-cut central action to which all other elements connected, and a context that explained the different actors' behavior. Importantly, a credible story is free from ambiguities, such as contradictions and missing elements. For a more detailed discussion of story plausibility and construction, see the work by Pennington and Hastie (1986) and the theory of anchored narratives by Wagenaar, van Koppen, and Crombag (1993).

There is a link between what people think constitutes a plausible story and the strategies that liars use. In one of the very few studies on liars' strategies, Malone et al. (1997, as cited in DePaulo et al., 2003) asked liars about how they created their lies; as many as half of them said that they based their lies on experiences from their own lives, but altered critical details. In line with this finding, Granhag, Strömwall, and Jonsson (2003) speculate that placing oneself in a familiar environment and performing highly scripted activities is probably a wise route to choose when, for example, fabricating an alibi. In addition, preliminary data from a study by Strömwall, Granhag, and Landström (2004) indicate that children (ages 11–13), when asked to deceive, placed themselves in a scenario that they had heard about but not actually participated in, as one of their major deceptive strategies. In brief, it seems that skillful liars use real episodes as raw material for their lies.

## Suspects' Strategies as the Stakes Rise

In a study by Strömwall, Granhag, and Hartwig (in press), 30 students were interrogated by experienced police officers about a mock crime (half lied and half told the truth). After the interrogations the suspects were asked about the strategies they had used to make (1) a credible impression (nonverbal strategies), and (2) their statements appear reliable (verbal strategies). The most common nonverbal strategy cited by both truth tellers and liars was to refrain from making any excess movements (about 50% of the liars and truth tellers reported using this strategy); the second most common strategy was to try to maintain eye contact (approximately 25% of the liars and the truth tellers reported using this strategy). In sum, both liars and truth tellers decided on a

plan of attempted control, and the results showed that they managed to follow this plan to the same extent (i.e., there were no significant differences between liars and truth tellers in terms of nonverbal behavior).

The most common verbal strategy for truth tellers was to "keep it real" (about 50% of the truth tellers reported using this strategy), whereas the most common verbal strategy for liars was to "keep it simple" (about 40% of the liars reported using this strategy). The finding that the liars decided to keep their story simple and to not add details is supported in previous research (Granhag & Strömwall, 2002). Interestingly, as many as 30% of the truth tellers reported that they had lacked a verbal strategy, whereas the corresponding figure for liars was only about 10%.

Strömwall et al. (in press) speculate that their findings might speak against the idea that a more realistic setting (e.g., as the stakes get higher) will produce more salient differences between liars' and truth tellers' nonverbal behavior (which, in turn, would facilitate the detection of lies). Strömwall et al. raise three arguments in support of their skepticism. First, in high-stake situations the pressure increases for both liars and truth tellers. Second, as the pressure increases, both liars and truth tellers will try harder to appear credible; thus, their awareness of self-presentational strategies will increase, as will their effort in adhering to these strategies. Finally, because the nonverbal strategies used by liars and truth tellers seem to be very similar, guilty and innocent suspects will be very difficult to separate in terms of their nonverbal behavior. However, these conclusions do not rule out that there is *something* that gives away lies, particularly when the stakes are higher. In a series of experiments in which the stakes were manipulated (although the stakes were never really high), it was found that high-stakes lies were easier to detect than low-stakes lies (DePaulo, Kirkendol, Tang, & O'Brien, 1988; DePaulo, Lanier, & Davis, 1983; DePaulo, LeMay, & Epstein, 1991; DePaulo et al., 1985b; Lane & DePaulo, 1999; Vrij, 2000b; Vrij, Harden, Terry, Edward, & Bull, 2001).

## Suspects' Strategies When Interrogated Repeatedly

In order to explain the processes at play during repeated interrogations, Granhag and Strömwall (1999) formulated a "repeat-versus-reconstruct" hypothesis that rests on two premises. First, liars know that in order to avoid detection, they must remember what they have stated in previous interrogations. Second, it is a well-established finding that human memory is malleable in its nature (Baddeley, 1990), and that truth tellers therefore can be expected to both gain, lose, and change information over time. In brief, liars will try to repeat what they have said in previous interrogations, whereas truth tellers will try to reconstruct what they have experienced and be less concerned with what they have said in previous interrogations. Granhag and Strömwall (1999) argue that the strategy of repetition used by liars will promote consis-

tency, whereas the truth tellers' more recollective memory processes may, undermine consistency, to some extent.

If the repeat-versus-reconstruct hypothesis holds, what are the consequences in terms of liars' and truth tellers' consecutive statements? Analyzing consistency within single suspects who had been interrogated twice, Granhag et al. (2003) found no significant differences between truthful and deceptive statements in terms of repeated themes, omissions, and contradictions. However, during the second interrogation session, truth tellers were found to add significantly more new themes to their initial story than did liars. That is, there was a stronger reminiscence effect for truthful than for deceptive statements. This finding supports the idea that asking a person to elaborate on a previously reported story is less likely to result in the addition of information if the story is fabricated than if the story is truthful (e.g., Soppe, 1995 as cited in Vrij, 2000a). Shuy (1998) argued, without any qualifications, that a memory that improves over time belongs to a liar. Empirical data suggest that this idea is wrong.

We are not suggesting that lie catchers would be better off ignoring whether consecutive statements are consistent or inconsistent. A suspect who flagrantly contradicts him- or herself should obviously evoke suspicion and merit further investigation. What we are suggesting, however, is that lie catchers should be careful interpreting what could be "natural inconsistency" (e.g., omission and commission errors) as an indication of deception, and to be equally careful in crediting consecutive statements that are "over the top" in terms of consistency.

In this section we stress the strong need for more research on liars' and truth tellers' strategies. The meager amount of research conducted shows that there are some similarities between liars' and truth tellers' strategies (e.g., regarding some nonverbal behaviors), but that differences also exist (e.g., regarding some verbal behaviors). By carefully examining liars' and truth tellers' strategies and the factors that moderate them, we will increase our understanding of deceptive behaviors and perhaps avoid some of the pitfalls that impede the deception-detection process.

## MEMORY AS A FACTOR IN DECEPTION

Memory is an important but probably underestimated factor in deception. For example, there is a very close link between memory and the formation of beliefs about cues to deception; theories and research on human memory are the basis for reliability assessment techniques such as the SVA and Reality Monitoring; and human memory holds the raw material of which lies are made. Furthermore, individuals' notions of memory performance and failure are frequently translated into explicit lie-detection strategies, and, as is discussed below, turning lie catchers' attention to whether or not suspects have to think

hard in order to remember might work as an implicit lie-detection technique. Here we discuss two additional areas in which research on memory and deception overlap: simulated amnesia, and why deceptive and truthful statements are remembered differently.

## The Detection of Simulated Amnesia

In order to avoid punishment, some guilty suspects claim to be amnesic. They conceal the truth (i.e., they lie) by claiming that they cannot remember what took place ("malingered amnesia"). According to different surveys, it is far from rare that suspects claim to be amnesic (e.g., Christianson, Bylin, & Holmberg, 2003; Gudjonsson, Petursson, Skulason, & Sigurdardottir, 1989); indeed, a rule of thumb suggested by Christanson and Merkelbach (2004) is that 20–30% of the perpetrators of violent crimes claim amnesia. In some of these cases the amnesia is real, caused, for example, by neurological defects (Kopelman, 1995), but in other cases there are reasons to believe that the amnesia is feigned.

To distinguish between simulated and genuine amnesia is far from an easy task. A good starting point, though, might be to match the characteristics typical for non-crime-related amnesia (data from clinical settings) against the characteristics typical for crime-related amnesia (Christianson & Merkelbach, 2004). First, victims of non-crime-related amnesia tend to have fragments or islands of memories from the amnesic part of the event, whereas crime-related amnesia tends to be characterized by a total memory loss (e.g., "Everything is black"). Second, in contrast to non-crime-related amnesia, crime-related amnesia typically tends to be described as having a distinct and sharp beginning and end (e.g., "From the moment I arrived at her mobile home to when I woke up the morning after, everything is lost"). Third, those claiming crime-related amnesia tend to be more dogmatic about their amnesia ("Ask me as much as you want, I will *never* remember"), whereas victims of non-crime-related amnesia are more willing to try different memory-enhancing techniques.

In their state-of-the-art paper, Christianson and Merkelbach (2004) suggest that mental health professionals and others who appear as expert witnesses in cases on crime-related amnesia should avoid giving testimony solely on the basis of interviews. They argue that a valid diagnostic differentiation between different types of amnesia demands knowledge about typical malingering behavior as well as knowledge about how to administer and evaluate tests designed to detect malingering. Boldly, Christianson and Merkelbach state that most suspects who claim amnesia are, in fact, liars.

## Memory of Deceptive and Truthful Statements

In a study by Landström, Granhag, and Hartwig (2004), undergraduate students witnessed a staged car–bicycle accident caused by the driver of the car.

Half of the witnesses were asked to lie about the event (i.e., they blamed the cyclist), and the other half were asked to tell the truth (i.e., they blamed the driver of the car). Later these witnesses were interviewed in a mock-trial setting, and their testimonies were assessed by a large number of judges (law students). In line with the findings from previous research, the judges had a difficult time distinguishing between liars and truth tellers (their accuracy was not far from chance level). In addition to assessing veracity, each judge was asked to try to remember the statement he or she had heard "in court" (each judge only saw and assessed one witness).

The results of the memory test showed that the judges who had observed truthful witnesses showed a significantly better memory performance compared to those judges who had observed lying witnesses (i.e., they reported more correct and less incorrect details). To explain this finding, it is important to recall that the meta-analysis on objective cues to deception conducted by DePaulo et al. (2003) showed that deceptive statements tend to be less plausible, less structured in a logical and sensible way, and more internally discrepant, compared to truthful statements. In brief, liars' stories seem to make less sense than truth tellers' stories. The fact that memory performance is dependent on the organization and structure of the material (Baddeley, 1990) and the schemas and scripts formed for events, persons, and objects (Schank & Abelson, 1977) may explain why memory for truthful statements was found to be better than memory for deceptive statements. In sum, in order to gain valid information about the actual veracity of the witnesses, we would, for the Landström et al. (2004) study, be better off analyzing the judges' memory performance than their explicit assessments of veracity (for which they used a dichotomous scale). This result is pertinent to the issue of implicit lie detection, which is discussed in a subsequent section.

## IMPROVING THE ABILITY TO DETECT DECEPTION

In this section we first briefly review different attempts made to train people to detect deception based on nonverbal cues, then give examples of different types of training programs and their effectiveness, and conclude by focusing on some new and promising techniques for detecting deception.

### Training to Detect Deception

In one of the first training studies, Zuckerman, Koestner, and Alton (1984) investigated the effect of feedback on lie-detection accuracy and showed that the more information the participants received about the veracity of the targets, the more accurate they were in detecting deception in these targets. However, this increase in accuracy did not generalize to other targets, indicating that a target-specific lie-detection ability had evolved due to the provision of feedback.

In 1989 Ray Bull wrote one of the first chapters on deception-detection training. After reviewing both the advice found in police manuals and the results of the few scientific training studies that had been conducted in the 1980s, he concluded that "until a number of publications in refereed journals appear demonstrating that training enhances the detection of deception, it seems that some police recruitment advertisements and police training books are deceiving their readers" (p. 97).

Fifteen years later, Bull (2004) presents a new chapter on the same topic, and reviews a number of studies conducted in the 1990s. The results from these studies are somewhat mixed. For example, a study by DeTurck, Harszlak, Bodhorn, & Texter (1990) found that student observers who received training involving practice and feedback with regard to six visual and vocal cues (adaptors, hand gestures, pauses, response latency, speech errors, and message duration) were able to slightly improve their deception-detection accuracy. This result was supported by the findings of DeTurck (1991) and DeTurck and Miller (1990). In addition, DeTurck, Feeley, and Roman (1997) reported that observers who were trained in detecting both vocal cues (speech errors, pauses, response latency, message duration) and visual cues (adaptors, hand gestures, head movements, hand shaking) or visual cues alone, performed better than those observers who received no training or training involving only vocal cues. In the same vein, Fiedler and Walka (1993) found better deception-detection performance for those observers who had been informed about the seven most frequent concomitants of lying, compared to a control group to which no such information was given. In a study by Vrij (1994), the participants were instructed to focus on the suspect's hand movements. Specifically, he informed police detectives that research tells us that that deception is associated with a decrease in subtle hand and finger movements. He found that deception-detection performance was significantly improved for those detectives who received this information and who saw videotapes in which the suspect's hands were visible but the sound was turned off.

More recently, a test of the effect of feedback and cue information on parole officers' deception-detection ability was conducted by Porter et al. (2000). Results from this study showed that receiving immediate and reliable outcome feedback had a positive effect on lie-detection accuracy, even if no information about reliable cues to deception was available. A possible interpretation of this finding is that even though no information about valid cues to deception was provided, feedback helped the lie catchers gradually learn reliable cues to deception.

Frank and Feeley (2003) presented a meta-analysis on the effects of lie-detection training. The analysis was based on 20 paired comparisons (training vs. no training) extracted from 11 published studies. Frank and Feeley highlighted two conclusions: First, a small but significant gain in detection accuracy (4%) was found with training; second, the positive effects found might, in fact, be an underestimation of the true effects of training. The latter conclusion was drawn because the methodology used in the studies included in their

meta-analysis did not meet the suggested standards for deception-detection research (e.g., high-stake situations and proper training).

## Techniques to Enhance Lie Detection

We believe it is fair to say that the different attempts made to train observers in the detection of nonverbal cues to improve their deception-detection ability have shown some, but rather limited, success. The studies showing an improvement usually report a small degree of it. Nevertheless, we are not without hope for the future. Below we discuss three alternative ways to detect deceit. First we review research on the effects of combining verbal and nonverbal cues. We then turn to the thought-provoking topic of implicit lie detection. We close the section with a brief discussion on the relation between deception detection and strategic disclosure of evidence.

### *Combining Verbal and Nonverbal Cues*

When reviewing the deception-detection research a striking observation is that this type of research is very much divided into camps. Some researchers examine nonverbal responses, others, verbal responses, and a third group focuses on physiological responses (Vrij, 2000a). Research that combines these approaches is rare. Recently it was argued, and demonstrated, that examining verbal and nonverbal cues simultaneously results in more accurate truth and lie classifications than examining verbal and nonverbal responses separately (Vrij & Mann, 2004; Vrij et al., 2000, 2004a). The accuracy rates (up to 88%) obtained in these studies by considering a combination of verbal and nonverbal cues were among the highest ever reported in deception research.

### *Implicit Lie Detection*

Another possible way to improve the ability to detect deceit is by using implicit or indirect lie-detection methods. Here we take a closer look at such methods. In a novel study Hurd and Noller (1988) asked their participants to think aloud as they made their veracity judgments. In line with previous findings, the participants' deception-detection accuracy was modest. However, a closer analysis of the transcribed think-aloud protocols revealed something interesting: When the participants had heard a deceptive statement, they were more open to the possibility that the message was a lie than when they had just heard a truthful statement. That is, they were heading for the correct assessment. But when it was time to commit to the actual veracity assessment, they did not always listen to their own intuitions—intuitions that turned out to be more correct than their explicit assessments of veracity.

In several preceding studies on the same theme, participants, after watching a truthful or deceptive story, were asked to detect deception both in an explicit way (e.g., "Is the person lying?") and in an implicit way (e.g., "Does the

speaker sincerely like the person [he or she] just described?"). All studies found greater accuracy with use of the implicit measures, and the observers in some studies were able to detect deception above the level of chance only via the implicit method (for reviews of implicit lie-detection studies, see DePaulo, 1994; Vrij, 2001). This finding may be the result of conversation rules that regulate polite behavior. Observers are often unsure as to whether someone is lying to them. In such instances it would be impolite, or for other reasons undesirable, to accuse someone of being a liar, but it might be possible to challenge the words of a speaker more subtly. In other words, it is more difficult to say "I do not believe you!" than to say "Do you really like so and so that much?" Alternatively, people might consider more diagnostic cues when detecting lies implicitly.

In a study by Vrij et al. (2001a), police officers watched videotapes of truth tellers and liars. Some participants were asked whether each of the people was lying (direct lie-detection method), and others were asked to indicate whether each person "had to think hard" (indirect lie-detection method; they were not informed that some people were actually lying). The police officers' responses distinguished between truths and lies, but only when using the indirect method. When detecting deceit directly, police officers' judgments about deceit were significantly correlated with increases in gaze aversion and movements shown by the people on the videotape. In the indirect method, however, police officers' decisions were significantly correlated with a decrease in hand and finger movements. A decrease in hand and finger movements is a more diagnostic cue to deception than, for example, gaze aversion (DePaulo et al., 2003; Vrij, 2000a).

In the same vein, Vrij, Evans, Akehurst, and Mann (2004) taught observers (college students with no previous training in lie detection) how to make rapid (instant) assessments of the frequency of occurrence of several verbal and nonverbal cues, which had been identified as diagnostic cues to deception in previous research. Participants were then shown videotaped clips of liars and truth tellers and asked to estimate the frequency of occurrence of each of these diagnostic cues, and to write down these estimates. Lastly, they were asked to indicate whether or not each person was lying on the basis of their estimates. An overall accuracy rate of 74% was found, considerably higher than the 57% typically found in lie-detection research.

Finally, the previously discussed meta-analysis on the relation between subjective confidence and deception-detection accuracy (DePaulo et al., 1997) offers an interesting finding that is relevant to the issue of implicit lie detection: namely, people tend to express higher confidence levels when assessing a truthful statement than when assessing a deceptive statement, independently of whether they are assessing the statement as truthful or deceptive. This finding shows that the judges' subjective feelings of confidence can sometimes distinguish the lies from the truths, even when the explicit assessments of veracity are not discriminating.

*Strategic Disclosure of Evidence*

Most real-life police investigations, and other forensic investigations, generate case-specific facts. Such facts and evidence can, if used properly by the interrogators, be of great importance in assessing the veracity of suspects. However, the scientifically based literature offers no explicit guidelines on the strategic disclosure of facts and evidence. What we do know from archival analysis is that police officers often start the interrogation by confronting the suspect (Leo, 1996, 2001), a tactic that often also includes disclosure of evidence.

Hartwig, Granhag, Strömwall, and Vrij (2004a) investigated the link between strategic disclosure of evidence and deception-detection performance. The "suspects" in the study were 58 undergraduates, half of whom had committed a mock crime (stealing a wallet from a briefcase in a shop) and later denied this (liars), and half of whom had committed no such crime but who had touched the briefcase while visiting the same shop (truth tellers). For half of the liars and half of the truth tellers, the interrogators began by confronting them with the case-specific evidence against them (two witness testimonies and the fact that their fingerprints had been found on the briefcase). The remaining two halves had the same case-specific evidence presented to them at the end of the interrogation session. All interrogations were videotaped. In the next phase these interrogations were shown to 112 observers (again, undergraduates) who were asked to assess veracity. The results showed that those observers who were shown videotapes in which the case-specific evidence against the suspect was disclosed late in the interrogation achieved a significantly higher deception-detection accuracy (61.7%) compared to observers who were shown videotapes in which the (exact same) evidence was disclosed early in the interrogation (42.8%). Furthermore, the observers in the late-evidence condition reported having relied more on verbal cues when assessing veracity, compared to the observers in the early-evidence condition.

The fact that this rather crude manipulation—in terms of disclosure of evidence (early vs. late)—had a significant effect on deception-detection accuracy demonstrates that it might be meaningful to investigate how more sophisticated ways of disclosing evidence (e.g., different "drip-feeding" procedures) may moderate deception-detection performance.

We believe that all three techniques discussed above have clear potential for lie detection. Although the results are promising, however, much more research is needed on each of these techniques.

## SUMMARY AND FUTURE CHALLENGES

In the present chapter we have explored what scientific psychology can tell us about deception detection in forensic contexts. Here we summarize the most important findings and highlight future challenges. Our investigation departed

from the finding that both presumed experts and laypeople tend to hold wrongful beliefs about how liars actually behave: That is, both groups seem to advocate reliance on cues that are indicative of nervousness. We highlighted one major reason for this misconception: When feedback about deception-detection success and failure is lacking (and in field situations, it often is), people will have a difficult time learning the right lesson from each of their detection experiences. We also warned about some of the claims regarding deceptive behavior found in police interrogation manuals. Many of these claims lack empirical support, and researchers within the deception-detection domain have an important job of debunking the nonsense found in such manuals.

We then reviewed the accuracy of different lie-detection methods used in criminal investigations. A closer look at the SVA, the most popular technique for analyzing speech, showed an accuracy rate that is clearly above chance, but also revealed that reliable data regarding the accuracy of the technique when applied to real-life cases is lacking. We also acknowledged the encouraging results for an alternative technique of analyzing speech content, the Reality Monitoring technique. However, in line with Davies (2001), we want to stress that although the techniques focusing on the verbal content of a testimony are widely used (particularly, SVA), the scientific evaluation of these techniques is still in an initial stage. In addition, the scientific evaluation of polygraph testing is far from perfect; there are very few well-conducted polygraph studies using real-life cases. Research concerning the most popular polygraph test, the CQT, suggests that incorrect judgments are made particularly in regard to innocent suspects. Reviews of CQT testing showed that between 53 and 78% of innocent suspects were incorrectly classified as guilty. Furthermore, research shows that deception detection on the basis of nonverbal behavior is a very difficult task. Specifically, the studies conducted show an average "hit rate" just above the level of chance, both for laypersons and presumed experts. Although our review also included a few studies that reported a somewhat higher hit rate, such results are exceptions. Many explanations for the poor levels of deception-detection accuracy have been suggested, and we listed six such explanations that are relevant in forensic contexts.

Turning to objective indicators of deception and truth, we first acknowledged the ideas presented on the three major emotional states that are associated with deception (guilt, fear, and excitement) and noted how these internal states might translate into certain verbal and nonverbal behaviors. A review of the literature on diagnostic cues to deception shows that there is no single behavioral, verbal, or physiological response that is uniquely related to deception. In fact, a careful look at the research literature shows that very few objective cues are systematically related to deception. In terms of nonverbal behavior, it has been found that liars tend to speak with a higher-pitched voice and make fewer illustrators and hand and finger movements. The list of diagnostic verbal cues is somewhat longer: For example, liars' stories tend to sound less plausible, and the lies tend to include less details (particularly visual, auditory, spatial, and temporal details) than truthful stories. In essence,

very few behaviors are systematically related to deception, and when such a systematic link is found, it is usually rather weak. We also need to keep in mind (1) that the behaviors that indicate deception do so only probabilistically, and (2) that these cues also can be indicative of states and processes other than deception. In an attempt to learn more about why there exists so few and such small behavioral differences between liars and truth tellers, we summarized the scarce research conducted on liars' and truth tellers' strategies.

We also discussed ways of improving the ability to detect deception. A review of the literature shows that the attempts made to train people to detect deception based on nonverbal behavior have been met with limited success. We closed this section on a somewhat more positive note, however, by discussing the encouraging results found for three new avenues for detecting deception: (1) combining verbal and nonverbal cues, (2) using implicit lie-detection methods, and (3) disclosing evidence in a strategic manner. These techniques for detecting deception are promising, though still in a very early stage in terms of scientific evaluation.

In spite of the increased interest in deception and the growing body of research literature on this topic, significant future challenges remain. Much of the research within the field has been focused on determining how accurate people are at detecting deception. The studies conducted on deception-detection performance differ in many aspects: for example, the lie catcher's background and motivation, the length of the interrogation, the number of interrogations conducted with the same suspect, the number of suspects, and the suspect's motivation. However, the studies have one important feature in common: The lie catcher is placed in a situation in which his or her action is restricted to a belief-driven processing of the information presented (Strömwall, Granhag, & Hartwig, 2004). For example, in many studies the lie catcher is forced to match his or her beliefs about nonverbal cues to deception against perceptions of the suspect's nonverbal behavior. The lie catcher has no background information about the suspect, no case-specific evidence, and no opportunity to affect how the suspect is questioned. It is reasonable to argue that this limitation has particular relevance to studies that investigate presumed experts. Placing an expert in an unusual context (e.g., where he or she must resort to a belief-driven strategy in order to assess veracity) might conceal structures with which the expert is actually quite familiar (e.g., strategic disclosure of case-specific evidence). In brief, for a better understanding of presumed experts' lie-detection performance, tests must be conducted in contexts that allow for both knowledge-driven and belief-driven information processing. To test lie catchers in situations that allow for—and even encourage—knowledge-driven information processing might be an important step toward the creation of a more ecologically valid research agenda.

In the same vein, it is currently possible to note a shift in research focus from studies mapping people's ability to detect deception to studies investigating how people's deception-detection performance can be enhanced. We pre-

dict that future research within the field will pay much more attention to how different interrogation strategies and techniques affect deception-detection performance. Hopefully, such a paradigmatic shift in research focus might contribute to the cultivation of different interrogation techniques.

Finally, research on deception is dominated by practical perspectives and driven by theory to a rather low extent (Granhag & Strömwall, 2004b). For future work, a much more developed theoretical framework is needed in order to be able to generalize the existing body of knowledge to situations and conditions not yet addressed.

## REFERENCES

Akehurst, L., Köhnken, G., Vrij, A., & Bull, R. (1996). Lay persons' and police officers' beliefs regarding deceptive behaviour. *Applied Cognitive Psychology, 10*, 461–473.

Allwood, C. M., & Granhag, P. A. (1999). Feelings of confidence and the realism of confidence judgments in everyday life. In P. Juslin & H. Montgomery (Eds.), *Judgment and decision making: Neo-Brunswikian and process-tracing approaches* (pp. 123–146). Mahwah, NJ: Erlbaum.

Alonso-Quecuty, M. L. (1992). Deception detection and Reality Monitoring: A new answer to an old question? In F. Lösel, D. Bender, & T. Bliesener (Eds.), *Psychology and law: International perspectives* (pp. 328–332). Berlin: de Gruyter.

Alonso-Quecuty, M. L., Hernandez-Fernaud, E., & Campos, L. (1997). Child witnesses: Lying about something heard. In S. Redondo, V. Garrido, J. Perez, & R. Barbaret (Eds.), *Advances in psychology and law* (pp. 129–135). Berlin: de Gruyter.

Baddeley, A. (1990). *Human memory: Theory and practice*. Hove, UK: Erlbaum.

Bennett, W. L., & Feldman, M. S. (1981). *Reconstructing reality in the courtroom*. London: Tavistock.

Ben-Shakhar, G., & Elaad, E. (2003). The validity of psychophysiological detection of information with the Guilty Knowledge Test: A meta-analytic review. *Journal of Applied Psychology, 88*, 131–151.

Bond, C. F., & Fahey, W. E. (1987). False suspicion and the misperception of deceit. *British Journal of Social Psychology, 26*, 41–46.

Bond, C. F., Omar, A., Pitre, U., & Lashley, B. R. (1992). Fishy-looking liars: Deception judgment from expectancy violation. *Journal of Personality and Social Psychology, 63*, 969–977.

Buck, J. A., Warren, A. R., Betman, S., & Brigham, J. C. (2002). Age differences in Criteria-Based Content Analysis scores in typical child sexual abuse interviews. *Applied Developmental Psychology, 23*, 267–283.

Bull, R. (1988). What is the lie-detection test? In A. Gale (Ed.), *The polygraph test: Lies, truth and science* (pp. 10–19). London: Sage.

Bull, R. (1989). Can training enhance the detection of deception? In J. Yuille (Ed.), *Credibility assessment* (pp. 83–100). Deventer, The Netherlands: Kluwer.

Bull, R. (2004). Training to detect deception from behavioural cues: Attempts and problems. In P. A. Granhag & L. A. Strömwall (Eds.), *The detection of deception in forensic contexts* (pp. 251–268). Cambridge, UK: Cambridge University Press.

Bull, R., & Vine, M. (2003, July). *Attractive people tell the truth: Can you believe it?*

Poster presented at the annual conference of the European Association of Psychology and Law, Edinburgh.

Buller, D. B., & Burgoon, J. K. (1996). Interpersonal deception theory. *Communication Theory, 6*, 203–242.

Buller, D. B., Strzyzewski, K. D., & Hunsaker, F. G. (1991). Interpersonal deception: II. The inferiority of conversational partners as deception detectors. *Communication Monographs, 58*, 25–40.

Burgoon, J. K., & Buller, D. B. (1994). Interpersonal deception: III. Effects of deceit on perceived communication and nonverbal behavior dynamics. *Journal of Nonverbal Behavior, 18*, 155–184.

Burgoon, J. K., Buller, D. B., & Guerrero, L. K. (1995). Interpersonal deception IX: Effects of social skill and nonverbal communication on deception success and detection accuracy. *Journal of Language and Social Psychology, 14*, 289–311.

Ceci, S. J., & Bruck, M. (1995). *Jeopardy in the courtroom*. Washington, DC: American Psychological Association.

Christianson, S. Å., Bylin, S., & Holmberg, U. (2003). *Homicide and sexual offenders' view of crime-related amnesia*. Manuscript in preparation.

Christianson, S. Å., & Merckelbach, H. (2004). Crime related amnesia as a form of deception. In P. A. Granhag & L. A. Strömwall (Eds.), *The detection of deception in forensic contexts* (pp. 195–225). Cambridge, UK: Cambridge University Press.

Committee to Review the Scientific Evidence on the Polygraph. (2003). *The polygraph and lie detection*. Washington, DC: National Academic Press.

Davies, G. M. (2001). Is it possible to discriminate true from false memories? In G. M. Davies & T. Dalgleish (Eds.), *Recovered memories: Seeking the middle ground* (pp. 153–176). Chichester, UK: John Wiley.

Davies, G. M., Westcott, H. L., & Horan, N. (2000). The impact of questioning style on the content of investigative interviews with suspected child sexual abuse victims. *Psychology, Crime, and Law, 6*, 81–97.

DePaulo, B. M. (1994). Spotting lies: Can humans learn to do better? *Current Directions in Psychological Science, 3*, 83–86.

DePaulo, B. M., & Bell, K. L. (1996). Truth and investment: Lies are told to those who care. *Journal of Personality and Social Psychology, 71*, 703–716.

DePaulo, B. M., Charlton, K., Cooper, H., Lindsay, J. L., & Muhlenbruck, L. (1997). The accuracy–confidence relation in the detection of deception. *Personality and Social Psychology Review, 1*, 346–357.

DePaulo, B. M., Kashy, D. A., Kirkendol, S. E., Wyer, M. M., & Epstein, J. A. (1996). Lying in everyday life. *Journal of Personality and Social Psychology, 70*, 979–995.

DePaulo, B. M., & Kirkendol, S. E. (1989). The motivational impairment effect in the communication of deception. In J. C. Yuille (Ed.), *Credibility assessment* (pp. 51–70). Dordrecht, The Netherlands: Kluwer.

DePaulo, B. M., Kirkendol, S. E., Tang, J., & O'Brien, T. P. (1988). The motivational impairment effect in the communication of deception: Replications and extensions. *Journal of Nonverbal Behavior, 12*, 177–201.

DePaulo, B. M., Lanier, K., & Davis, T. (1983). Detecting the deceit of the motivated liar. *Journal of Personality and Social Psychology, 45*, 1096–1103.

DePaulo, B. M., LeMay, C. S., & Epstein, J. A. (1991). Effects of importance of success and expectations for success on effectiveness at deceiving. *Personality and Social Psychology Bulletin, 17*, 14–24.

DePaulo, B. M., Lindsay, J. J., Malone, B. E., Muhlenbruck, L., Charlton, K., & Cooper, H. (2003). Cues to deception. *Psychological Bulletin, 129*, 74–118.

DePaulo, B. M., & Pfeifer, R. L. (1986). On-the-job experience and skill at detecting deception. *Journal of Applied Social Psychology, 16*, 249–267.

DePaulo, B. M., Rosenthal, R., Rosenkrantz, J., & Green, C. R. (1982). Actual and perceived cues to deception: A closer look at speech. *Basic and Applied Social Psychology, 19*, 1552–1577.

DePaulo, B. M., Stone, J. L., & Lassiter, G. D. (1985a). Deceiving and detecting deceit. In B. R. Schenkler (Ed.), *The self and social life* (pp. 323–370). New York: McGraw-Hill.

DePaulo, B. M., Stone, J. I., & Lassiter, G. D. (1985b). Telling ingratiating lies: Effects of target sex and target attractiveness on verbal and nonverbal deceptive success. *Journal of Personality and Social Psychology, 48*, 1191–1203.

DeTurck, M. (1991). Training observers to detect spontaneous deception: Effects of gender. *Communication Reports, 4*, 81–89.

DeTurck, M., Feeley, T., & Roman, L. (1997). Vocal and visual training in behavioral lie detection. *Communication Research Reports, 14*, 249–259.

DeTurck, M., Harszlak, J., Bodhorn, D., & Texter, L. (1990). The effects of training social perceivers to detect deception from behavioral cues. *Communication Quarterly, 38*, 189–199.

DeTurck, M., & Miller, G. (1990). Training observers to detect deception: Effects of self-monitoring and rehearsal. *Human Communication Research, 16*, 603–620.

Einhorn, H. J. (1982). Learning from experience and suboptimal rules in decision making. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 268–283). Cambridge, UK: Cambridge University Press.

Ekman, P. (2001). *Telling lies*. New York: Norton.

Ekman, P., & Frank, M. G. (1993). Lies that fail. In M. Lewis & C. Saarni (Eds.), *Lying and deception in everyday life* (pp. 184–201). New York: Guilford Press.

Ekman, P., & Friesen, W. V. (1969). Nonverbal leakage and clues to deception. *Psychiatry, 32*, 88–106.

Ekman, P., & Friesen, W. V. (1972). Hand movements. *Journal of Communication, 22*, 353–374.

Ekman, P., Friesen, W. V., & O'Sullivan, M. (1988). Smiles when lying. *Journal of Personality and Social Psychology, 54*, 414–420.

Ekman, P., Friesen, W. V., & Scherer, K. R. (1976). Body movement and voice pitch in deceptive interaction. *Semiotica, 16*, 23–27.

Ekman, P., & O'Sullivan, M. (1991). Who can catch a liar? *American Psychologist, 46*, 913–920.

Ekman, P., O'Sullivan, M., & Frank, M. G. (1999). A few can catch a liar. *Psychological Science, 10*, 263–266.

Ekman, P., O'Sullivan, M., Friesen, W. V., & Scherer, K. (1991). Face, voice, and body in detecting deceit. *Journal of Nonverbal Behavior, 15*, 125–135.

Feeley, T. H., & deTurck, M. A. (1997). *Perceptions of communications as seen by the actor and as seen by the observer: The case of lie detection*. Paper presented at the International Communication Association annual conference, Montreal.

Fiedler, K., Schmid, J., & Stahl, T. (2002). What is the current truth about polygraph lie detection? *Basic and Applied Social Psychology, 24*, 313–324.

Fiedler, K., & Walka, I. (1993). Training lie detectors to use nonverbal cues instead of global heuristics. *Human Communication Research, 20*, 199–223.

Frank, M. G., & Ekman, P. (1997). The ability to detect deceit generalizes across different types of high-stake lies. *Journal of Personality and Social Psychology, 72*, 1429–1439.

Frank, M. G., & Feeley, T. H. (2003). To catch a liar: Challenges for research in lie detection training. *Journal of Applied Communication Research, 31*, 58–75.

Garrido, E., & Masip, J. (1999). How good are police officers at spotting lies? *Forensic Update, 58*, 14–21.

Granhag, P. A., Andersson, L. O., Strömwall, L. A., & Hartwig, M. (2004). Imprisoned knowledge: Criminals' beliefs about deception. *Legal and Criminological Psychology, 9*, 103–119.

Granhag, P. A., & Strömwall, L. A. (1999). Repeated interrogations: Stretching the deception detection paradigm. *Expert Evidence: The International Journal of Behavioural Sciences in Legal Context, 7*, 163–174.

Granhag, P. A., & Strömwall, L. A. (2000). The effects of preconceptions on deception detection and new answers to why lie-catchers often fail. *Psychology, Crime, and Law, 6*, 197–218.

Granhag, P. A., & Strömwall, L. A. (2001a). Deception detection based on repeated interrogations. *Legal and Criminological Psychology, 6*, 85–101.

Granhag, P. A., & Strömwall, L. A. (2001b). Deception detection: Interrogators' and observers' decoding of repeated interrogations. *Journal of Psychology: Interdisciplinary and Applied, 6*, 603–620.

Granhag, P. A., & Strömwall, L. A. (2002). Repeated interrogations: Verbal and nonverbal cues to deception. *Applied Cognitive Psychology, 16*, 243–257.

Granhag, P. A., & Strömwall, L. A. (Eds.). (2004a). *The detection of deception in forensic contexts*. Cambridge, UK: Cambridge University Press.

Granhag, P. A., & Strömwall, L. A. (2004b). Deception detection in forensic contexts: Intersections and future challenges. In P. A. Granhag & L. A. Strömwall (Eds.), *The detection of deception in forensic contexts* (pp. 317–330). Cambridge, UK: Cambridge University Press.

Granhag, P. A., Strömwall, L. A., & Hartwig, M. (in press). Granting asylum or not?: Migration Board personnel's beliefs on deception. *Journal of Ethnic and Migration Studies*.

Granhag, P. A., Strömwall, L. A., & Jonsson, A.C. (2003). Partners in crime: How liars in collusion betray themselves. *Journal of Applied Social Psychology, 4*, 848–867.

Gudjonsson, G. H. (1992). *The psychology of interrogations, confessions and testimony*. Chichester, UK: Wiley.

Gudjonsson, G. H., Petursson, H., Skulason, S., & Sigurdardottir, H. (1989). Psychiatric evidence: A study of psychological issues. *Acta Psychiatrica Scandinavia, 80*, 165–169.

Harrigan, J. A., & O'Connell, D. M. (1996). Facial movements during anxiety states. *Personality and Individual Differences, 21*, 205–212.

Hartwig, M., Granhag, P. A., Strömwall, L. A., & Andersson, L. O. (2004). Suspicious minds: Criminals' ability to detect deception. *Psychology, Crime, and Law, 10*, 83–95.

Hartwig, M., Granhag, P. A., Strömwall, L. A., & Vrij, A. (2004a). *Deception detection via strategic disclosure of evidence*. Manuscript submitted for publication.

Hartwig, M., Granhag, P. A., Strömwall, L. A., & Vrij, A. (2004b). Police officers' lie detection accuracy: Interrogating freely versus observing video. *Police Quarterly, 7*, 429–456.

Hocking, J. E., & Leathers, D. G. (1980). Nonverbal indicators of deception: A new theoretical perspective. *Communication Monographs, 47*, 119–131.

Höfer, E., Akehurst, L., & Metzger, G. (1996, August). *Reality Monitoring: A chance for further development of CBCA?* Paper presented at the annual meeting of the European Association on Psychology and Law, Siena, Italy.

Hogarth, R. M. (2001). *Educating intuition*. Chicago: University of Chicago Press.

Hurd, K., & Noller, P. (1988). Decoding deception: A look at the process. *Journal of Nonverbal Behavior, 12*, 217–233.

Iacono, W. G., & Patrick, C. J. (1997). Polygraphy and integrity testing. In R. Rogers (Eds.), *Clinical assessment of malingering and deception* (pp. 252–281). New York: Guilford Press.

Inbau, F. E., Reid, J. E., & Buckley, J. P. (1986). *Criminal interrogation and confessions*. Baltimore: Williams & Wilkins.

Inbau, F. E., Reid, J. E., Buckley, J. P., & Jayne, B. C. (2001). *Criminal interrogation and confessions*. Gaithersburg, MD: Aspen Publishers.

Johnson, M. K., Hashtroudi, S., & Lindsay, D. S. (1993). Source monitoring. *Psychological Bulletin, 114*, 3–29.

Johnson, M. K., & Raye, C. L. (1981). Reality Monitoring. *Psychological Review, 88*, 67–85.

Johnson, M. K., & Raye, C. L. (1998). False memories and confabulation. *Trends in Cognitive Sciences, 2*, 137–145.

Kassin, S. M., & Fong, C. T. (1999). "I'm innocent": Effects of training on judgments of truth and deception in the interrogation room. *Law and Human Behavior, 23*, 499–516.

Kleiner, M. (Ed.). (2002). *Handbook of polygraph testing*. London, UK: Academic Press.

Kleinmuntz, B., & Szucko, J. J. (1984). Lie detection in ancient and modern times: A call for contemporary scientific study. *American Psychologist, 39*, 766–776.

Köhnken, G., Schimossek, E., Aschermann, E., & Höfer, E. (1995). The cognitive interview and the assessment of the credibility of adult's statements. *Journal of Applied Psychology, 80*, 671–684.

Kopelman, M. D. (1995). The assessment of psychogenic amnesia. In A. D. Baddeley, B. A. Wilson, & F. N. Watts (Eds.), *Handbook of memory disorders* (pp. 427–448). New York: Wiley.

Krauss, R. M. (1981). Impression formation, impression management, and nonverbal behaviors. In E. T. Higgins, C. P. Herman, & M. P. Zanna (Eds.), *Social cognition: The Ontario Symposium* (Vol. 1, pp. 323–341). Hillsdale, NJ: Erlbaum.

Landström, S., Granhag, P. A., & Hartwig, M. (2004). *Witnesses appearing live vs. on video: How presentation format affects observers' perception, assessment and memory.* Manuscript submitted for publication.

Lane, J. D., & DePaulo, B. M. (1999). Completing Coyne's cycle: Dysphorics' ability to detect deception. *Journal of Research in Personality, 33*, 311–329.

Leo, R. A. (1996). Inside the interrogation room. *Journal of Criminal Law and Criminology, 86*, 266–303.

Leo, R. A. (2001). False confessions: Causes, consequences, and solutions. In S. D. Westervelt & J. A. Humphrey (Eds.), *Wrongly convicted: Perspectives on failed justice* (pp. 36–54). New Brunswick, NJ: Rutgers University Press.

Levine, T. R., Sun Park, H., & McCornack, S. A. (1999). Accuracy in detecting truths and lies: Documenting the "Veracity Effect." *Communication Monographs, 66*, 125–144.

Lykken, D. T. (1998). *A tremor in the blood: Uses and abuses of the lie detector.* New York: Plenum Press.

MacLaren, V. V. (2001). A qualitative review of the Guilty Knowledge Test. *Journal of Applied Psychology, 86,* 674–683.

Mann, S., Vrij, A., & Bull, R. (2002). Suspects, lies and videotape: An analysis of authentic high-stakes liars. *Law and Human Behavior, 26,* 365–376.

Mann, S., Vrij, A., & Bull, R. (2004). Detecting true lies: Police officers' ability to detect deceit. *Journal of Applied Psychology, 89,* 137–149.

Manzanero, A. L., & Diges, M. (1996). Effects of preparation on internal and external memories. In G. Davies, S. Lloyd-Bostock, M. McMurran, & C. Wilson (Eds.), *Psychology, law, and criminal justice: International developments in research and practice* (pp. 56–63). Berlin: de Gruyter.

Meissner, C. A., & Kassin, S. M. (2002). "He's guilty!": Investigator bias in judgments of truth and deception. *Law and Human Behavior, 26,* 469–480.

Memon, A., Vrij, A., & Bull, R. (2003). *Psychology and law: Truthfulness, accuracy and credibility* (2nd ed.). Chichester, UK: Wiley.

Milne, R., & Bull, R. (1999). *Investigative interviewing: Psychology and practice.* Chichester, UK: Wiley.

Norwick, R. J., Kassin, S. M., Meissner, C. A., & Malpass, R. A. (2002, March). *"I'd know a false confession if I saw one": A comparative study of college students and police investigators.* Paper presented at the biennial meeting of the American Psychology–Law Society, Austin, TX.

Ofshe, R. J., & Leo, R. A. (1997). The decision to confess falsely: Rational choice and irrational action. *Denver University Law Review, 74,* 979–1112.

O'Sullivan, M. (2003). The fundamental attribution error in detecting deception: The boy-who-cried-wolf effect. *Personality and Social Psychology Bulletin, 29,* 1316–1326.

Pennington, N., & Hastie, R. (1986). Evidence evaluation in complex decision making. *Journal of Personality and Social Psychology, 51,* 242–258.

Porter, S., Woodworth, M., & Birt, A. R. (2000). Truth, lies and videotape: An investigation of the ability of federal parole officers to detect deception. *Law and Human Behavior, 24,* 643–658.

Raskin, D. C., & Esplin, P. W. (1991). Statement Validity Assessment: Interview procedures and content analysis of children's statements of sexual abuse. *Behavioral Assessment, 13,* 265–291.

Raskin, D. C., & Honts, C. R. (2002). The Comparison Question Test. In M. Kleiner (Ed.), *Handbook of polygraph testing* (pp. 1–48). London: Academic Press.

Riggio, R. E., Tucker, J., & Throckmorton, B. (1987). Social skills and deception ability. *Personality and Social Psychology Bulletin, 13,* 568–577.

Roberts, K. P., Lamb, M. E., Zale, J. L., & Randall, D. W. (1998, March). *Qualitative differences in children's accounts of confirmed and unconfirmed incidents of sexual abuse.* Paper presented at the biennial meeting of the American Psychology–Law Society, Redondo Beach, CA.

Robinson, J. A. (1981). Personal narratives reconsidered. *Journal of American Folklore, 94,* 58–85.

Ross, L., Greene, D., House, P. (1977). The false consensus phenomenon: An attributional bias in self-perception and social-perception processes. *Journal of Experimental Social Psychology, 13,* 279–301.

Ross, L., & Nisbett, R. E. (1991). *The person and the situation: Perspectives of social psychology.* New York: McGraw-Hill.

Ruby, C. L., & Brigham, J. C. (1997). The usefulness of the criteria-based content analysis technique in distinguishing between truthful and fabricated allegations. *Psychology, Public Policy, and Law, 3*, 705–737.

Saxe, L. (1991). Science and the GKT polygraph: A theoretical critique. *Integrative Physiological and Behavioral Science, 26*, 223–231.

Saxe, L., Dougherty, D., & Cross, T. (1985). The validity of polygraph testing: Scientific analysis and public controversy. *American Psychologist, 40*, 355–366.

Schank, R. C., & Abelson, R. (1977). *Scripts, plans, goals, and understanding*. Hillsdale, NJ: Erlbaum.

Shuy, R. W. (1998). *The language of confession, interrogation, and deception*. Thousand Oaks, CA: Sage.

Sporer, S. L. (1997). The less travelled road to truth: Verbal cues in deception detection in accounts of fabricated and self-experienced events. *Applied Cognitive Psychology, 11*, 373–397.

Steller, M. (1989). Recent developments in statement analysis. In J. C. Yuille (Ed.), *Credibility assessment* (pp. 135–154). Deventer, The Netherlands: Kluwer.

Steller, M., & Köhnken, G. (1989). Criteria-Based Content Analysis. In D. C. Raskin (Ed.), *Psychological methods in criminal investigation and evidence* (pp. 217–245). New York: Springer-Verlag.

Sternberg, K. J., Lamb, M. E., Esplin, P. W., Orbach, Y., & Hershkowitz, I. (2002). Using a structured interview protocol to improve the quality of investigative interviews. In M. L. Eisen, J. A. Quas, & G. S. Goodman (Eds.), *Memory and suggestibility in the forensic interview* (pp. 409–436). Mahwah, NJ: Erlbaum.

Strömwall, L. A., Bengtsson, L., Leander, L., & Granhag, P. A. (2004). Assessing children's statements: The impact of a repeated experience on CBCA and RM ratings. *Applied Cognitive Psychology, 18*, 653–668.

Strömwall, L. A., & Granhag, P. A. (2003). How to detect deception? Arresting the beliefs of police officers, prosecutors and judges. *Psychology, Crime, and Law, 9*, 19–36.

Strömwall, L. A., Granhag, P. A., & Hartwig, M. (in press). To act truthfully: Nonverbal behaviour and strategies during a police interrogation. *Psychology, Crime, and Law.*

Strömwall, L. A., Granhag, P. A., & Hartwig, M. (2004). Professionals' beliefs about deception. In P. A. Granhag & L. A. Strömwall (Eds.), *The detection of deception in forensic contexts* (pp. 229–250). Cambridge, UK: Cambridge University Press.

Strömwall, L. A., Granhag, P. A., & Jonsson, A. C. (2003). Deception among pairs: "Let's say we had lunch and hope they swallow it!" *Psychology, Crime, and Law, 9*, 109–124.

Strömwall, L., Granhag, P. A., & Landström, S. (2004). *Deception in children: Adult's ability to discriminate between lies and truths*. Manuscript in preparation.

Taylor, R., & Vrij, A. (2000). The effects of varying stake and cognitive complexity on beliefs about the cues to deception. *International Journal of Police Science and Management, 3*, 111–124.

Undeutsch, U. (1967). *Beurteilung der Glaubhaftigkeit von Aussagen* [*Credibility judgements on the basis of verbal statements*]. In U. Undeutsch (Ed.), *Handbuch der Psychologie: Forensische Psychologie* (Vol. 11, pp. 26–181). Göttingen, Germany: Hogrefe.

Undeutsch, U. (1982). Statement reality analysis. In A. Trankell (Ed.), *Reconstructing the past: The role of psychologists in criminal trials* (pp. 27–56). Deventer, The Netherlands: Kluwer.

Vrij, A. (1994). The impact of information and setting on detection of deception by police detectives. *Journal of Nonverbal Behavior, 18*, 117–137.

Vrij, A. (2000a). *Detecting lies and deceit: The psychology of lying and the implications for professional practice*. Chichester, UK: Wiley.

Vrij, A. (2000b). Telling and detecting lies as a function of raising the stakes. In C. M. Breur, M. M. Kommer, J. F. Nijboer, & J. M. Reintjes (Eds.), *New trends in criminal investigation and evidence* (Vol. 2, pp. 699–709). Antwerpen, Belgium: Intersentia.

Vrij, A. (2001). Detecting the liars. *Psychologist, 14*, 596–598.

Vrij, A. (2002). Deception in children: A literature review and implications for children's testimony. In H. L. Westcott, G. M. Davies, & R. H. C. Bull (Eds.), *Children's testimony* (pp. 175–194). Chichester, UK: Wiley.

Vrij, A. (2003). "We will protect your wife and child, but only if you confess." In P. J. van Koppen & S. D. Penrod (Eds.), *Adversarial versus inquisitorial justice: Psychological perspectives on criminal justice systems* (pp. 55–79). New York: Kluwer Academic.

Vrij, A. (in press). Criteria-Based Content Analysis: The first 37 studies. *Psychology, Public Policy, and Law.*

Vrij, A., Akehurst, L., Soukara, S., & Bull, R. (2004a). Detecting deceit via analyses of verbal and nonverbal behavior in children and adults. *Human Communication Research, 30*, 8–41.

Vrij, A., Akehurst, L., Soukara, S., & Bull, R. (2004b). "Let me inform you how to tell a convincing story": CBCA and reality monitoring scores as a function of age, coaching, and deception. *Canadian Journal of Behavioural Science, 36*, 113–126.

Vrij, A., Edward, K., & Bull, R. (2001a). Police officers' ability to detect deceit: The benefit of indirect deception measures. *Legal and Criminological Psychology, 6*, 185–196.

Vrij, A., Edward, K., & Bull, R. (2001b). Stereotypical verbal and nonverbal responses while deceiving others. *Personality and Social Psychology Bulletin, 27*, 899–909.

Vrij, A., Edward, K., Roberts, K. P., & Bull, R. (2000). Detecting deceit via analysis of verbal and nonverbal behavior. *Journal of Nonverbal Behavior, 24*, 239–263.

Vrij, A., Evans, H., Akehurst, L., & Mann, S. (2004). Rapid judgements in assessing verbal and nonverbal cues: Their potential for deception researchers and lie detection. *Applied Cognitive Psychology, 18*, 283–296.

Vrij, A., Harden, F., Terry, J., Edward, K., & Bull, R. (2001). The influence of personal characteristics, stakes and lie complexity on the accuracy and confidence to detect deceit. In R. Roesch, R. R. Corrado, & R. J. Dempster (Eds.), *Psychology in the courts: International advances in knowledge* (pp. 289–304). London: Routledge.

Vrij, A., & Heaven, S. (1999). Vocal and verbal indicators of deception as a function of lie complexity. *Psychology, Crime, and Law, 4*, 401–413.

Vrij, A., & Mann, S. (2001). Telling and detecting lies in a high-stake situation: The case of a convicted murderer. *Applied Cognitive Psychology, 15*, 187–203.

Vrij, A., & Mann, S. (2003). Deceptive responses and detecting deceit. In P. W. Halligan, C. Bass, & D. Oakley (Eds.), *Malingering and illness deception: Clinical and theoretical perspectives* (pp. 347–361). Oxford, UK: Oxford University Press.

Vrij, A., & Mann, S. (2004). Detecting deception: The benefit of looking at a combination of behavioral, auditory and speech content related cues in a systematic manner. *Group Decision and Negotiations, 13*, 61–79.

Vrij, A., & Semin, G. R. (1996). Lie experts' beliefs about nonverbal indicators of deception. *Journal of Nonverbal Behavior, 20*, 65–80.

Vrij, A., & Taylor, R. (2003). Police officers' and students' beliefs about telling and detecting little and serious lies. *International Journal of Police Science and Management*, *5*, 1–9.

Wagenaar, W. A., van Koppen, P. J., & Crombag, H. F. M. (1993). *Anchored narratives: The psychology of criminal evidence*. New York: Harvester Wheatsheaf.

Wallbott, H. G., & Scherer, K. R. (1991). Stress specifics: Differential effects of coping style, gender, and type of stressor on automatic arousal, facial expression, and subjective feeling. *Journal of Personality and Social Psychology*, *61*, 147–156.

Yzerbyt, V. Y., Dardenne, B., & Leyens, J. P. (1998). Social judgeability concerns in impression formation. In V. Y. Yzerbyt, G. Lories, & B. Dardenne (Eds.), *Metacognition: Cognitive and social dimensions* (pp. 126–156). London: Sage.

Zaparniuk, J., Yuille, J. C., & Taylor, S. (1995). Assessing the credibility of true and false statements. *International Journal of Law and Psychiatry*, *18*, 343–352.

Zuckerman, M., DePaulo, B. M., & Rosenthal, R. (1981). Verbal and nonverbal communication of deception. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 14, pp. 1–57). New York: Academic Press.

Zuckerman, M., Koestner, R., & Alton, A. (1984). Learning to detect deception. *Journal of Personality and Social Psychology*, *46*, 519–528.

Zulawski, D. E., & Wicklander, D. E. (1993). *Practical aspects of interview and interrogation*. Boca Raton, FL: CRC Press.

# PSYCHOLOGY AND LAW

## *An Empirical Perspective*

Edited by

NEIL BREWER
KIPLING D. WILLIAMS

THE GUILFORD PRESS
New York London

A Division of Guilford Publications, Inc.
72 Spring Street, New York, NY 10012
www.guilford.com



Printed in the United States of America

This book is printed on acid-free paper.

Last digit is print number: 9 8 7 6 5 4 3 2 1

Library of Congress Cataloging-in-Publication Data

Psychology and law : an empirical perspective / edited by Neil Brewer, Kipling D. Williams.
p. cm.
Includes bibliographical references and index.
ISBN 1-59385-122-7 (hardcover : alk. paper)
1. Forensic psychology. 2. Forensic psychiatry. I. Brewer, Neil. II. Williams, Kipling D.
RA1148.P78 2005
614'.1—dc22

2004029585