Detecting Deception

Current Challenges and Cognitive Approaches

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Pär Anders Granhag, Aldert Vrij and Bruno Verschuere

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New Findings in Non-Verbal Lie Detection

CHARLES F. BOND, TIMOTHY R. LEVINE AND MARIA HARTWIG

Ours is far from being the first chapter written on non-verbal lie detection. The topic was of interest since ancient times, and it remains of interest today. Vrij (2008) offered a thorough treatment of non-verbal lie detection. We will not review Vrij's excellent discussion here. Instead, we offer a selective review of the most recent work on attempts at lie detection from behaviour in hope of providing new insights through meta-analysis. We consider failed attempts to detect lies, as well as lie detection successes. We mention, in passing, lie detection from certain aspects of speech, but will leave to others the consideration of speech-based lie detection systems (e.g. statement validity analysis).

To provide a background, we begin by recalling some of the classic theories of non-verbal lie detection. We then consider current work on cues to deception, determinants of deception judgement and the accuracy of non-verbal lie detection. Although parts of the chapter review work that was previously published, we offer several new contributions. In particular, we document a decline effect in non-verbal deception cues, isolate audible from visible components of apparent honesty

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showing that various cues to honesty are inter-correlated and present a meta-analytic comparison of explicit and implicit lie detection.

THEORETICAL HISTORY

There have been many theories of deception. Here we consider four of those formulations: leakage theory, four-factor theory, self-presentational theory and interpersonal deception theory. Three of the four predict observable differences in non-verbal behaviour between honest and deceptive communicators.

Non-Verbal Leakage

The first and perhaps the most influential theory of deception was initially described by Paul Ekman and Wallace Friesen in their classic 1969 article titled 'Nonverbal leakage and clues to deception'. In their paper, Ekman and Friesen made a distinction between deception clues and leakage. Deception clues signal that deception is in progress but are not informative about the information being concealed. Leakage, in contrast, gives away the concealed information. Expressed differently, the truth leaks out.

Ekman's theory focuses only on high-stakes lie, not inconsequential or white lies. According to this theory, deception must produce an emotional response in a liar that can be signalled behaviourally, and this is expected only for lies of consequence. In the original version of leakage, lies may be signalled in different parts of the body. The likelihood that deception will be signalled in a particular part of the body is a function of the non-verbal sending capacity of that body part and amount of feedback people receive about the body part. According to Ekman, the face has more non-verbal sending capacity than any other part of the body. However, people receive a lot of feedback about their facial expressions. Thus, people are aware of their face and exercise control over their facial expressions. Deception is unlikely to be signalled in the face except for fleeting signs of expressions that are being suppressed. These brief displays of suppressed emotion are called micro-expressions.

According to Ekman and Friesen (1969), the legs and feet 'are a primary source of both leakage and deception clues' (p. 99). 'Leakage in the legs/feet could include aggressive foot kicks, flirtatious leg displays, autoerotic or soothing leg squeezing, abortive restless flight movements. Deception clues can be seen in tense leg positions, frequent shift of leg posture, and in restless or repetitive leg and foot acts' (p. 99). This

is because although the legs have limited sending capacity, we are less aware of what our feet are doing.

This reasoning gave rise to Ekman's idea of leakage hierarchy. In brief, he suggested that the utility of leakage and deception clues is inversely related to sending capacity and feedback. In other words, the less aware we are of a behaviour, the more likely the behaviour is to signal a lie.

Subsequent scientific data have not been supportive of the original leakage theory, and subsequent work by Ekman and his colleagues shifted to focus more on the face and micro-expressions. Even with these modifications, however, leakage theory remains controversial (e.g. Weinberger, 2010).

Four-Factor Theory

Zuckerman, DePaulo, and Rosenthal (1981) introduced a framework that has since come to be known as 'four-factor theory'. According to this theory, deception is not directly associated with any particular verbal or non-verbal behaviour. Instead, deception is directly associated with four psychological factors: emotions, arousal, cognitive effort and attempted behavioural control. These factors, in turn, may give rise to behavioural differences that distinguish truths from lies.

According to Zuckerman and colleagues (1981), people have emotional responses to their lies. Liars feel guilty and fear detection. These emotions may be conveyed non-verbally. For example, liars might show negative facial expressions.

Second, Zuckerman and colleagues maintain that deception is physiologically arousing. It is this arousal, in fact, that a polygraph measures. Arousal is reflected in increased heart rate, blood pressure and skin conductance. Arousal as a function of deception may produce recognizable behaviours such as eye blinking, high-pitched speech and fidgeting.

Third, deception may be cognitively demanding. This could be true for several reasons. First, formulating a lie may itself be demanding (Vrij et al., 2009). Second, liars must ensure that their stories are internally consistent as well as consistent with external information. These information management considerations may contribute to cognitive load (Hartwig, Granhag, Strömwall, & Doering, 2010). Third, liars must suppress the truth, which may require mental effort. Theoretically, the cognitive effort of lying should lead to longer response latencies, more pauses, more speech errors and fewer gestures.

Fourth, Zuckerman and colleagues also suggested that deceivers may attempt to avoid behaviours that give their lie away and instead present behaviours that appear honest. The net result of this attempted

control can be behaviour that appears stiff, rehearsed or overly controlled or discrepancies between what one part of the body is doing and another.

In the theory by Zuckerman et al. (1981), these four factors provide the basis for predicting the sorts of behavioural difference that might be useful in lie detection. These factors help explain why non-verbal deception cues exist and provide a rationale for further research on the topic. As we will see in subsequent sections, like leakage theory, four-factor theory too has failed to receive strong and consistent support.

Self-Presentational Theory

DePaulo (1992; see also DePaulo et al., 2003) offered a very different take on non-verbal behaviour as related to deception. She shifted focus from uncontrollable behaviours to purposefully controlled actions. DePaulo regards non-verbal deception behaviours as forms of self-presentation, that is, as vehicles for managing the impressions people convey. These non-verbal behaviours can be strategic and goal directed. More generally, self-presentation can be, but need not be, deceptive. Rather than conveying impressions that are completely false, people more often edit their images in subtle ways.

From DePaulo's (1992) perspective, people try to manage their non-verbal behaviours. Thus, these behaviours are rarely unconscious expressions of an individual's internal states. Instead, they reflect self-presentation goals. People want others to believe what they say, and they want others to regard them favourably. People learn to do this over time, and adults typically have the skills needed to enact credible presentations. Even so, there are individual differences in skill at self-presentation and differences in individuals' concerns with the impressions they convey. As a rule, people play along with, and give the appearance of accepting others' self-presentations. But there are limits to the range of self-presentations that can be successfully conveyed and limits to what others will publicly accept.

In DePaulo's view, people usually see their lies as minor, and may experience little anxiety, guilt, regret or fear of detection while lying. Liars want to be believed, but so do truth-tellers. Everyone self-presents. Although some lies are not as convincing as truths, and sometimes liars' performances appear pre-packaged, rarely do a liar's behaviours constitute proof of deception. In sum, according to DePaulo's self-presentational theory, both liars and truth-tellers engage in strategic control of their behaviour in order to convey a truthful impression. Hence, DePaulo's theory of deception emphasizes similarities rather than difference between liars and truth-tellers. Although the

self-presentation theory of deception has fared better empirically than its predecessors, it, unfortunately, offers little guidance for improving deception detection in practice.

Interpersonal Deception Theory

Following Stiff and Miller (1986), Buller and Burgoon (1996) sought to understand deception as a dynamic, interactive process. According to Buller and Burgoon's interpersonal deception theory, deception and suspected deception are commonplace. The process begins when a sender's expectations, goals, prior knowledge, skill set and behavioural repertoire combine to produce a communication that is true or false. The communication is accompanied by an initial behavioural display. Deceptive messages include the core deceptive content plus strategic actions aimed at making the deception believable, as well as non-strategic behaviours that might betray the lie. Senders' initial behavioural displays are judged by receivers who exhibit initial behavioural displays of their own and who may be suspicious. Based on initial suspicion and an assessment of sender behaviour displays, receivers may adjust their behavioural displays strategically. Senders may respond. Senders and receivers actively monitor each other and make behavioural adjustments over time so as to achieve their desired communicative goals. However, senders may leak indications of deceit and receivers' indications of suspicion in a dynamic series of moves and countermoves. The outcome is a successful or unsuccessful deception.

Interpersonal deception theory offers 18 theoretical propositions. We will not enumerate them here. Theoretically, deception depends on interactivity in a communication context. Face-to-face communication is maximally interactive and other contexts for communication are constraining. According to this theory, some of the important factors in interpersonal deception are access to social cues, immediacy of communication, feelings of relational engagement, conversational demands and spontaneity. Like its predecessors, interpersonal deception theory has proven controversial (e.g. DePaulo, Ansfield, & Bell, 1996).

EMPIRICAL EVIDENCE FOR NON-VERBAL CUES TO DECEPTION

Having reviewed classic theories on cues to deception, let us turn to empirical work on behavioural cues to deception. Recall that three of the theories predict differences in non-verbal behaviours while one (self-presentation) predicts few substantial differences. Do people

behave in systematically different ways when they are lying compared to when they are telling the truth? Researchers have studied an extensive list of behaviours for their utility as deception cues. Their typical research method is to solicit deceptive statements from participants in laboratory studies (e.g. by asking them to deliberately distort their opinions, attitudes or emotions or to provide false descriptions of events) and to compare the behaviour of these liars to that of participants who have been instructed to tell the truth. Researchers have also studied cues to deception in real-life statements, for example, during police interrogations in which suspects truthfully or deceptively denied involvement in a crime (e.g. Mann, Vrij, & Bull, 2002; for an alternative approach see Ten Brinke & Porter, 2012).

Meta-Analytic Summary

In the most comprehensive synthesis of the literature on cues to deception to date, DePaulo and colleagues (2003) conducted a meta-analysis of 1,338 estimates of 158 behaviours. The analysis included both verbal and non-verbal behaviours. Overall, the results showed that behavioural signs of deception are weak and inconsistent. Many behaviours that people believe to be indicative of lying were not in fact reliably linked to deception. For example, people express the belief that liars' avert their gaze – in contrast, the meta-analysis showed that gaze aversion is not related to lying. Also, despite widespread beliefs (Strömwall, Granhag, & Hartwig, 2004), liars are not prone to fidgeting, nor do they display frequent posture shifts or self-grooming behaviours. Although some behaviours are statistically linked to deception, the links are not strong and the results vary from study to study.

A Decline Effect

Having studied the DePaulo et al. (2003) meta-analysis on cues to deception, we noticed an unexpected trend. For each of 158 distinct behaviours, DePaulo and colleagues reported two things: the number of times the behaviour had been studied as a possible deception cue and the relationship of that behaviour to deception. They measured the relationship of a behaviour to deception as a weighted standardized mean difference. Here we take the absolute value of each weighted mean d from tables in DePaulo et al. to assess the strength of each deception cue (irrespective of its direction). We wondered if the strength of a deception cue might be related to the number of times it had been studied, imagining that deception researchers might focus their investigative efforts on the strongest cues.

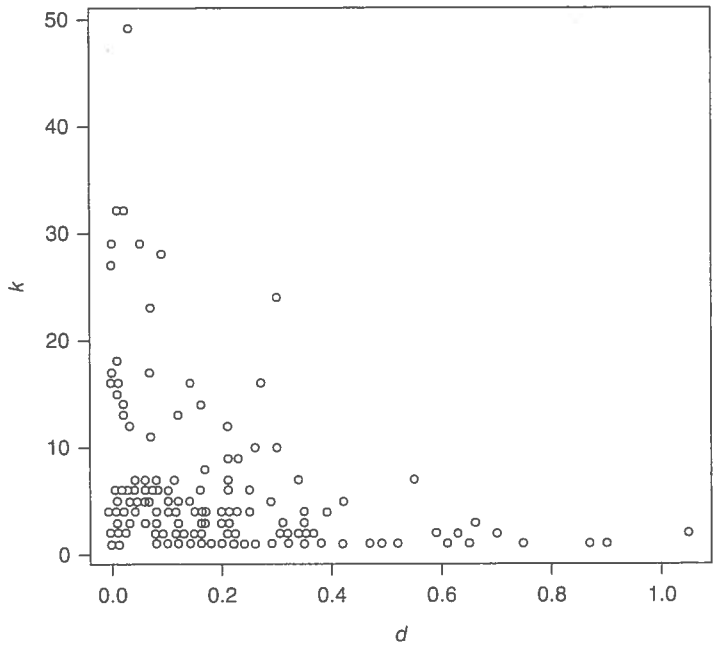

Figure 2.1 A decline effect in cues to deception. The scatterplot depicts a decline effect in cues to deception. Each data point represents one of the 158 cues in the DePaulo et al. meta-analysis. The horizontal axis of the plot is the number of times a cue had been studied at the time of the DePaulo et al. meta-analysis (k). On the y-axis is the absolute strength of the cue (as an absolute weighted mean d). As the scatterplot shows, the strongest cues to deception have rarely been studied, and that the most widely studied cues are weak.

For a relevant scatterplot, see Figure 2.1. There are 158 data points in the figure, one for each of the cues in the DePaulo et al. meta-analysis. On the horizontal axis of the plot is the number of times a cue had been studied at the time of DePaulo et al. meta-analysis (k). On the y-axis is the absolute strength of the cue (as an absolute weighted mean d).

An inspection of the graph suggests that the strongest cues to deception have rarely been studied, and that the most widely studied cues are weak. Response length, for example, has been studied more often than any other cue ($k = 49$). It has a very small relationship to deception ($d = 0.03$). Response latency and eye contact have each been studied 32 times, and they too have very small relationships to deception ($d = 0.02$ and 0.01, respectively). By contrast, the strongest cues to deception are foot movement changes, pupillary changes and issue-related reporting

($d = 1.05$, 0.90 and 0.87, respectively). These have rarely been studied ($k = 2$, 1 and 1, respectively).

Statistically speaking, the pattern in the plot involves an inverse correlation between k and d, Pearson's $r = -.26$. By a conventional significance test with cue as the unit of analysis, this relationship is significant, $p < .005$. Because the relationship may not be linear, the Pearson r may be an underestimate of the decline effect.

A more complete description of the scatterplot is possible. Note that cues of varying strength are studied once or twice. Some weak cues are studied once or twice, and some strong cues are studied once or twice. However, the only cues to be studied often are weak cues. Thus, the inverse relationship in Figure 2.1 shows a pattern of non-constant variance – at low levels of k, d is highly variable. At high levels of k, it is less variable. By the Breusch and Pagan test with cue as the unit of analysis, this heteroskedasticity is statistically significant, $\chi^2\,(1) = 12.92$, $p < .001$.

Why do the most widely studied cues show a weak relationship to deception? Why have investigators rarely studied the cues that show the strongest relationship to deception? Or, perhaps the question should be: why do the cues that are researched most appear weaker over time? We suspect that as a deception cue is studied repeatedly, the cumulative estimate of its strength declines. To assess this hypothesis, we used data graciously provided by Bella DePaulo. These are the raw meta-analytic data from which the DePaulo et al. (2003) tables were constructed. For each effect-size estimate entering into the DePaulo et al. results, we noted which cue the effect concerned, the date of the effect-size, the effect-size itself and a meta-analytic weight. DePaulo provided us with data on 158 cues to deception. However, 43 of those cues had been studied only once. These were omitted from the analyses below because these could not change over time.

Our goal was to determine whether the cumulative estimate of the strength of a deception cue declines as the cue is studied more often. To assess this hypothesis, we grouped the effect size estimates for a given cue by year. We noted, for each cue in each year, the weighted mean for all effect sizes observed prior to and including that year. We took the absolute value of this cumulative effect size estimate. We then predicted this estimate of cue strength from the number of years the cue had been studied (e.g. from 4, if it was an estimate of cue strength from all effect sizes observed in the first 4 years the cue was studied). We used data from the 115 cues in the DePaulo et al. (2003) meta-analysis that had been studied more than once, entering all of the data into a single linear regression equation that included 114 dummy variables to control for cue. Results showed that, in fact, cumulative estimates of cue strength are smaller the more years a cue has been studied.

The standardized partial regression coefficient for the cumulative cue strength estimate on years of study is $-.27$, $t(526) = -5.84$, $p < .001$.

To illuminate this longitudinal trend, we noted two estimates of cue strength for each of the 115 cues in our regression equation: (1) an estimate of absolute cue strength for all effects observed in the first year for which DePaulo et al. have data and (2) an estimate of absolute cue strength for all effects observed in the final year for which the meta-analysts have data. Results show that estimates of cue strength were stronger the first year the cue was studied than the final year the cue was studied (absolute weighted mean $d = 0.34$ vs. 0.23; for the difference, $t(114) = 2.49$, $p < .01$, by a conventional test with cue as the unit of analysis).

Deception cues become weaker the longer they are studied. This may reflect a more general phenomenon. The so-called *decline effect* is a tendency for scientific findings to decrease in strength over time. Such effects have been observed in medicine and biology (McMahon, Holly, Harrington, Roberts, & Green, 2008; Ozonoff, 2011), and here we seem to be observing a decline effect in non-verbal behaviour cues. There is currently no generally agreed-upon explanation for the decline effect. Schooler (2011) notes some prosaic explanations for the effect, such as regression to the mean (i.e. self-correction from extreme values over time) or publication bias, meaning that the publication of novel findings may be more likely if these effects are large, whereas follow-up studies on an established phenomenon may pass the bar of peer review even if the effects are smaller. We are not able to test any of these explanations using our data; however, we point the reader to Lehrer (2010) for a popular discussion of the effect, and to Ioannidis (2005) for statistical explanations.

In sum, research on non-verbal cues that distinguish truths from lies finds that such cues tend to be weak and inconsistent and, to the extent there is empirical support for such cues, that support systematically diminishes as research accumulates. Consequently, classic theories such as leakage, four-factor theory and interpersonal deception theory which predict behavioural displays linked, albeit indirectly, to the act of lying lack convincing empirical support. Fortunately, more recent research has moved in different directions.

CONTEMPORARY RESEARCH

Having reviewed past theory and research on deception cues, let us note a few emphases in current research. There is a continuing quest for deception cues. Cognizant that cues to deception are generally

weak, researchers have tried to elicit stronger cues. They use strategic questioning methods (e.g. Levine, Shaw, & Shulman, 2010). It has long been assumed that certain questions may evoke different psychophysiological responses from liars and truth-tellers (e.g. Honts, 2004). More recently, this idea has been explored in the context of lie detection from behaviours.

In this new wave of research, studies have examined the effect of various forms of strategic questions on audible and visible behavioural cues (Vrij & Granhag, 2012). These questioning methods emphasize cognitive rather than emotional differences in the psychological processes of liars and truth-tellers (Vrij, Granhag, & Porter, 2010). Some methods are designed to elicit verbal cues to deception. For example, the strategic use of evidence (SUE) framework posits that liars and truth-tellers have different information management strategies, and that liars' strategies of verbal evasion and concealment can be exploited through systematic use of available evidence (Granhag & Hartwig, 2008). By posing questions about the information that liars are motivated to conceal without revealing that one possesses this information, a questioner may lead liars to contradict these facts in their attempts to distance themselves from incriminating information (Hartwig, Granhag, Strömwall, & Vrij, 2005). Other methods of eliciting verbal cues to deception are based on the premise that liars prepare some, but not all, of their responses. It might thus be possible to create difficulties for liars in producing plausible accounts by asking them unanticipated questions that they are unlikely to be prepared to answer (Vrij & Granhag, 2012). Unanticipated questions have been found to produce inconsistencies between the statements of pairs of liars (Vrij et al., 2009), as well as less detailed accounts from single liars (Lancaster, Vrij, Hope, & Waller, 2012).

Other strategies may produce differences in liars and truth-tellers' demeanour. The cognitive load approach assumes that lying can be more cognitively demanding than telling the truth (Gamer, 2011; Vrij, Ennis, Farman, & Mann, 2010; however, see McCornack, 1997). The strategy is to impose additional cognitive load on senders, hoping that liars will display more pronounced signs of mental strain, as they are already taxed by the burden inherent in lying. Cognitive load has been operationally defined in various ways in empirical research, for example, by asking senders to provide their statements in reverse chronological order (Vrij, Leal, Mann, & Fisher, 2012; Vrij et al., 2008) or by asking them to maintain eye contact with the interviewer (Vrij, Mann, Leal, & Fisher, 2010). As predicted, cognitive load manipulations strengthen visual cues to deception. For example, in a study by Vrij and colleagues (2008), liars in a reverse order recall condition showed more

pronounced signs of being taxed in that they were more prone to speech hesitations. They also spoke at a slower rate and made more speech errors. Liars and truth-tellers in the control (i.e. normal chronological order recall) condition did not differ in these respects. In sum, an emerging body of work suggests that both verbal and non-verbal cues to deception may become more pronounced if lie-catchers take a strategic approach to interacting with targets.

Finally, some approaches to strategic questioning eschew non-verbal cues completely and instead focus on message content (e.g. Blair, Levine, & Shaw, 2010; Levine, Blair, & Clare, 2013). Such approaches seek to illicit honest verbal responses and content that can be fact-checked.

NON-VERBAL DETERMINANTS OF DECEPTION JUDGEMENTS

Although most research continues to focus on cues useful in accurately detecting deception, arguably the strongest recent findings are those that link non-verbal behaviours with judgements of deception. Researchers have recently focused on and analysed individual differences in appearing honest or deceptive (Levine 2010; Levine et al., 2011). From a psychometric analysis of results from hundreds of studies, Bond and DePaulo (2008) concluded that the primary determinant of a deception judgement is the sender's demeanour. Some people appear more honest than others. They appear more honest when they are lying, and also when they are telling the truth. Individual differences in apparent honesty are large. In studies where people are judged as lying or truth-telling, the standard deviation from sender to sender in percentage truth judgements received is over 11%, and this is an estimate that corrects for measurement error. These individual differences are evident throughout the extensive research literature on deception judgements – people differ widely in apparent honesty when they tell motivated lies, when they engage in deceptive interactions and when their lies are detectable. When Person A judges the truthfulness of Person B, the largest single determinant of the judgement is Person B's demeanour.

Levine et al. (2011) reported a series of experiments on individual differences in demeanour. They began by videotaping people who were telling lies and truths, and solicited deception judgements of these videotapes from undergraduates. Using the undergraduates' judgements, they identified the people on the videotape who were perceived as most and least deceptive. The researchers then created two videotapes – a veracity-matched tape and a veracity-mismatched tape. On the

veracity-matched tape were people who appeared honest and were telling the truth, as well as people who appeared dishonest and were lying. On the veracity-mismatched tape were people who appeared dishonest but were telling the truth, as well as people who appeared honest but were lying. The investigators solicited deception judgements to these two specially constructed tapes from a variety of judges – American undergraduates, Koreans and U.S. government security agents. Without exception, the judges were highly accurate in discriminating lies from truths on the veracity-matched tape. These accuracy rates were invariably above 70%. Without exception, the judges were highly inaccurate when judging the veracity-mismatched tape. Their accuracy rates were invariably under 45%. Deception judgements can be more strongly affected by a sender's apparent truthfulness than the sender's actual truthfulness, as these experiments dramatically show.

Individual differences among liars can be explicated in terms of cues that predispose people to appear more or less honest. Hartwig and Bond (2011) cumulated relevant research and found that many cues are correlated with a person's apparent honesty. For example, people are judged to be lying if they appear incompetent and if their remarks do not place events within context. In general, behavioural, verbal and impressionistic cues are more strongly related to a person's apparent deception than the person's actual deception. Further, Levine and colleagues (2011) found that the cues to apparent honesty are highly inter-correlated.

Here we seek to extend the understanding of individual differences in apparent honesty. We do so by examining differences in apparent honesty in different deception media. Some people may *look* more honest than others when they are seen lying. Some may *sound* more honest than others when they are heard lying. Moreover, there may be individual differences in the convincingness of verbal content – some people's words may appear more honest than others' when read on a transcript. We wondered whether people who *look* honest *sound* honest and whether their words appear honest when read.

To address the generality of individual differences in the honesty of a person's demeanour, we searched for studies in which a given individual was judged for deceptiveness in more than one medium. From each of these studies, we attempted to extract a Pearson product–moment correlation coefficient between a person's apparent honesty when judged in one deception medium and that person's apparent honesty when judged in a second medium. In many studies that would otherwise be relevant, no such correlation could be extracted. It could, however, be extracted from 12 documents. Here the unit of analysis is a target person. Typically, each person tells a lie and a truth and the

percentage of times the person is judged deceptive is averaged across these two messages before being correlated across media. In other studies, message veracity was manipulated across target persons. In this latter case, we analysed a partial cross-medium correlation, controlling for message veracity. We converted each r to a Fisher's Zr and cumulated the Zrs using standard meta-analytic fixed-effects techniques.

Here we assess the consistency of individual differences in apparent honesty across four media: audiovisual, audio-only, video-only and verbal transcript. The results of this meta-analysis appear in Table 2.1. On each line of the table are results for the relationship of a person's apparent honesty in one medium with that person's apparent honesty in a second medium. The first line, for example, displays the relationship of a person's apparent honesty in an audio-only medium with his/her apparent honesty in a video-only medium. As we see there, the more honest a person sounds, the more honest the person looks, r corresponding to the weighted mean Fisher's $Z = .36, p < .05$.

In fact, individual differences in apparent honesty are consistent across all four of the media in Table 2.1. People who look honest not only sound honest, their words appear honest in a transcript. Each correlation in the table is positive and statistically significant. Many of the lies of everyday life are told face-to-face, that is, in an audiovisual medium. It is interesting to note that a person's apparent honesty in the audiovisual medium is strongly correlated with how honest that person sounds ($r = .67$) and less strongly correlated with how honest that person looks ($r = .44$); for the difference, $Z = 4.34$, $p < .001$. Indeed, audiovisual impressions of honesty are at least as highly correlated with impressions of honesty from words in a written transcript ($r = .58$)

Table 2.1 Individual differences in apparent honesty across deception media

			r-to-*Z*-to-*r*	
Media[a]	*k*	*N*	*r*	95% CI
A with V	6	222	.36	(0.24, 0.48)
A with T	3	78	.51	(0.32, 0.66)
V with T	3	78	.34	(0.11, 0.53)
A with AV	10	264	.67	(0.59, 0.73)
V with AV	15	474	.44	(0.36, 0.52)
T with AV	4	90	.58	(0.37, 0.68)

[a]Each line depicts the relationship of a person's apparent honesty in one medium with the person's apparent honesty in a second medium. The media are symbolized as follows: A (audio-only), V (video-only), T (transcript) and AV (audiovisual).

as they are with visible impressions of honesty (again, $r = .44$). These results suggest words and voice figure heavily in the face-to-face deception judgements of everyday life. This is true despite the fact that people in 58 countries worldwide believe that they can detect lies through gaze aversion and a number of other visible cues (Global Deception Research Team, 2006).

LIE DETECTION ACCURACY

Although deception researchers have an interest in the determinants of naïve deception judgements, the public at large focuses on a different issue: lie detection. We end this chapter by discussing contemporary issues in the accuracy of deception judgements.

Can people infer deception from behaviour? Most studies suggest that human lie detection abilities are limited. Indeed, a recent meta-analysis synthesized several decades of research on human ability to detection deception (Bond & DePaulo, 2006). This study included 206 studies in which nearly 25,000 judgements of deception were made. The average accuracy rate was 54%, which is hardly impressive given that the accuracy rate obtained by simply guessing is 50%. Moreover, results did not vary much from study to study. The highest variability in accuracy rates occurred in studies that had the smallest samples. A few small samples produced very high accuracy rates, and a few produced very low accuracy rates. This would be expected by chance.

Are certain individuals especially gifted at non-verbal lie detection? A large-scale statistical compilation reveals no lie detection wizards. Indeed, the Bond and DePaulo (2008) meta-analysis concluded that people barely differ from one another in the ability to detect lies. Correcting for measurement error, the standard deviation across perceivers in percentage of lies detected is less than 1%. Bond and DePaulo found that the most successful judges of deception in the accumulated research literature are no more successful than would be expected under a simple statistical model. Relatedly, Leach et al. (2009) found that individual performances on lie detection tests are not generally stable over time.

Although most researchers have concluded that people are poor at detecting lies, O'Sullivan, Frank, Hurley, and Tiwana (2009) claim that certain people are adept at detecting certain lies. In particular, the authors claim that police officers are good at spotting consequential, high-stakes deception. In support of this contention, O'Sullivan et al. reviewed 23 studies of deception detection by 31 groups of police officers. Each detection task was coded as involving high- or low-stakes

lies. O'Sullivan and colleagues report that police officers average 67.2% accuracy when judging high-stakes lies and 55.2% accuracy when judging low-stakes lies.

O'Sullivan et al.'s (2009) portrayal of the literature conflicts sharply with the results from formal meta-analyses. Whereas O'Sullivan et al. assert as fact that college students are inferior to older adults in lie detection, the meta-analysis by Aamodt and Custer (2006) found no relationship between age and accuracy, $r = -.03$. In their large-scale meta-analysis, Bond and DePaulo (2006) examined the impact on lie detection accuracy of both motivation and judge expertise. Neither of these factors had a significant effect. Accuracy for unmotivated lies was 53.4% compared to 53.3% for motivated lies.

Several factors likely explain the discrepancy between the results of large-scale meta-analyses and O'Sullivan et al.'s (2009) smaller and less formal literature review. The first issue is the sample sizes associated with the evidence cited by O'Sullivan et al. The three highest accuracy rates that support O'Sullivan's conclusions derive from samples with less than 24 judges. Sampling error may, in part, explain these results. Second, and more importantly, O'Sullivan et al. cherry-picked findings consistent with their view. As they wrote in their method: 'Where more than one mean accuracy was available for several different tests from the same group of subjects, the lie scenario resulting in the highest mean accuracy was used' (p. 532). For example, they report the accuracy obtained by Porter, Woodworth, and Birt (2000) as 77%. The parole officers in the Porter et al. study were tested four times. Yes, they scored 76.7% on one test, but 40.4% on another test. Third, O'Sullivan and colleagues' highest accuracy rate (88%) reflected data collected by O'Sullivan herself. Those data were never peer-reviewed, and no relevant procedural details have been made public. Fourth, a number of the people whom O'Sullivan et al. credited with accurate lie detection were allowed to score their own tests (Bond, 2008). In sum, because O'Sullivan et al.'s conclusions rest on the opportunistic selection of favourable accuracy rates from small samples, many will be sceptical of their claims.

As the review already mentioned shows, it is apparent that many deception judgements are wrong. Why are people so often inaccurate when they attempt to infer deception from behaviour? Two answers to this question have been proposed: (1) there is insufficient behavioural evidence of deception and (2) people tend to rely on the wrong cues when judging lies. To assess these two possibilities, Hartwig and Bond (2011) conducted a series of meta-analyses. They used Brunswik's lens model, which is an analytic framework to examine predictions of criteria that are probabilistically related to cues (Brunswik, 1952). Results suggested that the principal cause of inaccuracy in deception

judgements is the minute behavioural differences between liars and truth-tellers. Given the meagre evidence at their disposal, those who must infer deception from behaviour do nearly as well as they can.

In their meta-analysis of cues to deception, DePaulo and colleagues (2003) found that deception can be detected to a statistically significant degree by some global impressions, such as impressions of the liar's vocal and verbal involvement, cooperation and ambivalence. Indeed, the meta-analysts found that impressionistic cues are generally more strongly linked to deception than more minute behavioural cues. The reason for this pattern is not clear. It is possible that deception is associated with complex psychological processes that give rise to subtle changes in broad constellations of behaviour rather than displays of particular, isolated cues. Relatedly, it might be that perceivers who are instructed to rate behaviours on general dimensions such as degree of involvement or cooperation rely more on intuitive processes, and that such processes are better equipped to evaluate deception. Several lines of research support this speculation (Albrechtsen, Meissner, & Susa, 2009; Anderson, DePaulo, Ansfield, Tickle, & Green, 1999; DePaulo & Morris, 2004). For example, a meta-analysis on the accuracy–confidence relationship in deception judgements showed that people's confidence levels were higher when they had been exposed to a true statement compared to a deceptive one, regardless of the veracity judgement that they made. It seems that perceiving true statements may be accompanied by an intuitive feeling of certainty, which is misinterpreted by perceivers as a meta-cognitive judgement rather than what it actually is: an indicator of the veracity of the message. Moreover, research suggests that people feel more suspicious when they hear a lie, even though the explicit judgement of veracity they ultimately make is not accurate (Anderson, DePaulo, & Ansfield, 2002). Indirect measures of deception are not invariably helpful, however (Klaver, Lee, Spidel, & Hart, 2009).

Can lies be detected more accurately with indirect methods than explicit deception judgements? We seek a research-based answer to this question, an answer that incorporates as much relevant evidence as possible. For purposes of comparing direct with indirect lie detection, we used results from three published meta-analyses: the DePaulo et al. (2003) meta-analysis of cues to deception, the Bond and DePaulo (2006) meta-analysis of explicit deception judgements and an earlier DePaulo, Charlton, Cooper, Lindsay, and Muhlenbruck (1997) meta-analysis on confidence in deception judgements.

From Bond and DePaulo (2006), we obtained a grand estimate of lie/truth discrimination accuracy from explicit judgements. Data in 384 samples yield an average accuracy of $d = 0.39$ (as a standardized mean difference). From DePaulo et al. (1997), we obtained an estimate of lie/truth discrimination from confidence in explicit deception judgements

(whether or not the judgements were correct). As DePaulo et al. note, people in the eight samples they analysed were more confident when judging truthful messages than deceptive messages, and this yielded a standardized mean difference between lies and truths of $d=0.30$. The 2003 meta-analysis by DePaulo and colleagues provided data on 158 cues to deception. Many of these cues, however, were objective behavioural measures, not observers' impressions. From the descriptions in appendix A of DePaulo et al. (2003), we identified 17 cues that were subjective impressions of liars and truth-tellers. From table 14 in the same review, we abstracted data on the strength of subjective measures of six additional cues. Altogether, the DePaulo et al. meta-analysis provided us with data on 23 indirect measures of deception. We noted the strength of each of these subjective deception cues (as an absolute mean weighted d), as well as the number of samples in which the measure had been studied.

For relevant results, see Table 2.2. In the table are 25 lines – 1 for each of 25 potential ways to discriminate lies from truths. We have

Table 2.2 Lie–truth discrimination with **direct** and indirect measures

Cue #	Cue name	*k*	*d*
50	Cooperative	3	0.66
92	Thinking hard	1	0.61
90	Indifferent	2	0.59
19/25	Audible immediacy	7	0.55
	Direct judgements	**384**	**0.39**
91	Not spontaneous	2	0.35
14	Ambivalent	7	0.34
4	Details	10	0.32
	Judgement confidence	8	0.3
31	Vocal uncertainty	10	0.3
121	Relaxed face	1	0.29
27	Eye contact	5	0.28
61	Nervous	16	0.27
12	Plausibility	9	0.23
54	Pleasant face	5	0.2
49	Friendly	6	0.16
17	Expressive face	3	0.12
53	Pleasant voice	4	0.11
15	Attentive	6	0.08
115	Competent	3	0.08
26	Non-verbal immediacy	4	0.07
51	Attractive	6	0.06
64	Relaxed posture	4	0.05
86	Shield face	4	0
93	Serious	4	0

arranged these from the strongest to the weakest methods for lie detection. Note that each deception cue extracted from DePaulo et al. is identified by a number those meta-analysts assigned.

Results of this comparative meta-analysis are easy to summarize. Relative to 24 indirect measures of lie detection, explicit judgements perform well. Explicit judgements are better than 20 indirect measures of lie detection. As a lie detector, explicit judgements appear to perform worse than only four indirect measures. None of the four high-performing indirect measures of deception has been widely studied. Having documented a decline effect in non-verbal deception cues, we will watch with interest the results of additional research into the perceived cooperativeness, cognitive busyness, indifference and audible involvement of liars and truth-tellers. In the meantime, it is apparent that explicit deception judgements (however fallible) provide better lie/truth discrimination than many indirect measures.

CONCLUSION

Here we have reviewed theories and recent research on non-verbal lie detection. We have made a few new contributions. We have documented a tendency for deception cues to decline over time. We have found that individual differences in apparent honesty generalize over deception media, and have discovered that direct judgements yield better lie detection than many indirect methods.

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