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Cues to Deception

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Do people behave differently when they are lying compared with when they are telling the truth? The combined results of 1,338 estimates of 158 cues to deception are reported. Results show that in some ways, liars are less forthcoming than truth tellers, and they tell less compelling tales. They also make a more negative impression and are more tense. Their stories include fewer ordinary imperfections and unusual contents. However, many behaviors showed no discernible links, or only weak links, to deceit. Cues to deception were more pronounced when people were motivated to succeed, especially when the motivations were identity relevant rather than monetary or material. Cues to deception were also stronger when lies were about transgressions.

Do people behave in discernibly different ways when they are lying compared with when they are telling the truth? Practitioners and laypersons have been interested in this question for centuries (Troville, 1939). The scientific search for behavioral cues to deception is also longstanding and has become especially vigorous in the past few decades.

In 1981, Zuckerman, DePaulo, and Rosenthal published the first comprehensive meta-analysis of cues to deception. Their search for all reports of the degree to which verbal and nonverbal cues occurred differentially during deceptive communications compared with truthful ones produced 159 estimates of 19 behavioral cues to deception. These estimates were from 36 independent samples. Several subsequent reviews updated the Zuckerman et al. (1981) meta-analysis (B. M. DePaulo, Stone, & Lassiter, 1985a;

Zuckerman, DePaulo, & Rosenthal, 1986; Zuckerman & Driver, 1985), but the number of additional estimates was small. Other reviews have been more comprehensive but not quantitative (see Vrij, 2000, for the most recent of these). In the present review, we summarize quantitatively the results of more than 1,300 estimates of 158 cues to deception. These estimates are from 120 independent samples.

We define deception as a deliberate attempt to mislead others. Falsehoods communicated by people who are mistaken or self-deceived are not lies, but literal truths designed to mislead are lies. Although some scholars draw a distinction between *deceiving* and *lying* (e.g., Bok, 1978), we use the terms interchangeably. As Zuckerman et al. (1981) did in their review, we limit our analysis to behaviors that can be discerned by human perceivers without the aid of any special equipment. We also limit our review to studies of adults, as the dynamics of deceiving may be markedly different in children (e.g., Feldman, Devin-Sheehan, & Allen, 1978; Lewis, Stanger, & Sullivan, 1989; Shennum & Bugental, 1982).

Predicting Cues to Deception: Previous Approaches

Ekman and Friesen (1969)

In 1969, Ekman and Friesen published the first influential theoretical statement about cues to deception. They described two broad categories of cues, leakage cues and deception cues. Leakage cues reveal what the liars are trying to hide—typically, how they really feel. Anticipating the self-presentational perspective that would become important later, Ekman and Friesen (1969) noted that the operation of display rules (i.e., culturally and socially determined norms for managing facial expressions of emotions) can result in leakage cues. For example, when deceivers try to squelch the facial expression of an emotion they are trying to conceal, the resulting expression—a micro affect display—may be briefer than it is ordinarily, but the nature of the affect may still be identifiable. If instead the facial expression is so brief that the

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emotion cannot be discerned, then the resulting micro affect display functions as a deception cue. Deception cues indicate that deception may be occurring, without indicating the nature of the information that is being concealed. Almost all of the cues that have been reported in the literature are deception cues.

Ekman and Friesen (1969) described various conditions under which liars would be especially likely to succeed in their deception attempts (e.g., perhaps by evidencing fewer or less obvious cues). Their formulation was based on the psychology of both the liars and the targets of lies as they relate to each other. For example, they predicted that success is more likely when the salience of deception is asymmetrical such that the liars are focused on getting away with their lies while the issue of deception is not salient to the targets or that the liars are focusing primarily on deceiving while the targets are simultaneously trying to deceive and detect deceit.

Zuckerman et al. (1981)

Zuckerman et al. (1981) began their formulation with the widely accepted premise that no one behavior or set of behaviors would ever be found that always occurs when people are lying and never occurs any other time. Instead, they argued, the search should be for the kinds of thoughts, feelings, or psychological processes that are likely to occur more or less often when people are lying compared with when they are telling the truth and for the behavioral cues that may be indicative of those states. They then delineated four factors that could be used to predict cues to deception: generalized arousal, the specific affects experienced during deception, cognitive aspects of deception, and attempts to control behavior so as to maintain the deception.

Arousal

Citing the research and theory available at the time on the psychophysiological detection of deception, Zuckerman et al. (1981) proposed that liars may experience greater undifferentiated arousal than truth tellers. That arousal could be evidenced by liars' greater pupil dilation, increased blinking, more frequent speech disturbances, and higher pitch. However, Zuckerman et al. (1981) also acknowledged that autonomic responses that seem characteristic of deception may be explained by the specific affects experienced while lying without invoking the notion of diffuse arousal.

Feelings While Lying

To the extent that liars experience guilt about lying or fear of getting caught lying, behaviors indicative of guilt and fear are shown more often by liars than truth tellers. Zuckerman et al. (1981) suggested that liars might fidget more than truth tellers, and they may also sound more unpleasant. They also suggested that guilt and anxiety could become apparent in liars' distancing of themselves from their deceptive communications. Drawing from Wiener and Mehrabian's (1968; see also Mehrabian, 1972) account of the verbal and nonverbal cues indicative of distancing (which they called *nonimmediacy*), Zuckerman et al. (1981) predicted that liars would communicate in more evasive and indirect ways than truth tellers and that they would maintain less eye contact with their interaction partners.

Cognitive Aspects of Deception

Zuckerman et al. (1981) conceptualized lying as a more cognitively complex task than telling the truth. Liars, they claimed, need to formulate communications that are internally consistent and consistent with what others already know. The greater cognitive challenges involved in lying (relative to truth telling) were predicted to result in longer response latencies, more speech hesitations, greater pupil dilation, and fewer illustrators (hand movements that accompany and illustrate speech).

Attempted Control of Verbal and Nonverbal Behaviors

Liars' attempts to control their behaviors so as to maintain their deception can paradoxically result in cues that instead betray it. For example, liars' behaviors may seem less spontaneous than truth tellers'. Also, liars' inability to control all aspects of their behavior equally effectively could result in verbal and nonverbal discrepancies.

Ekman (1985/1992)

Ekman (1985/1992) described two major categories of cues, thinking cues and feeling cues. Liars who prepare their deceptions inadequately or who cannot keep their stories straight produce inconsistencies that betray their deceptions. Those who overprepare produce stories that seem rehearsed. If liars need to think carefully about their lies as they tell them, they may speak more slowly than truth tellers. These are all thinking cues.

Ekman's (1985/1992) more important contribution, however, was his conceptualization of the role of emotions in deceiving. By understanding the emotions that liars are experiencing, Ekman argued, it is possible to predict behaviors that distinguish liars from truth tellers. For example, the cues indicative of detection apprehension are fear cues. These include higher pitch, faster and louder speech, pauses, speech errors, and indirect speech. The greater the liars' detection apprehension, the more evident these fear cues should be. For example, liars should appear more fearful as the stakes become higher and the anticipated probability of success becomes lower.

Similarly, liars who feel guiltier about their lies, such as those who are lying to people who trust them, should show more behavioral indicators of guilt. Ekman (1985/1992) noted that guilt cues have not been clearly determined, but they could include cues to sadness such as lower pitch, softer and slower speech, and downward gazing.

Liars' feelings about lying are not necessarily negative ones. Ekman (1985/1992) suggested that liars sometimes experience "duping delight," which could include excitement about the challenge of lying or pride in succeeding at the lie. This delight could become evident in cues to excitement such as higher pitch, faster and louder speech, and more use of illustrators. The duping delight hypothesis has not yet been tested.

Ekman (1985/1992) pointed out that emotions become significant not only when liars feel apprehensive, guilty, or excited about their lies but also when liars are experiencing emotions that they are trying to hide or when they are faking emotions that they are not really experiencing. The particular cues that signal lying depend on the particular emotions that the liars are experiencing and

simulating. For example, people who are only pretending to be enjoying a film would show fewer genuine enjoyment smiles and more feigned smiles than people who really are enjoying a film. These differences in smiling would not be predicted if the feelings that people really were experiencing or just pretending to experience were, for example, feelings of pain instead of enjoyment. From this perspective, cues to emotions that liars are trying to hide or to simulate cannot be combined across all studies in the literature. Instead, the relevant subset of studies must be selected (e.g., only those in which liars are hiding or simulating enjoyment). This is also a perspective that eschews the notion of undifferentiated arousal and instead argues for the study of specific emotions (Ekman, Levenson, & Friesen, 1983; Levenson, Ekman, & Friesen, 1990).

Buller and Burgoon (1996)

From a communications perspective, Buller and Burgoon (1996) argued that to predict the behavior of deceivers, it is important to consider not just individual psychological variables such as motivations and emotions but also interpersonal communicative processes. Reiterating Ekman and Friesen's (1969) point about the importance of multiple roles, Buller and Burgoon noted that when people are trying to deceive, they are engaged in several tasks simultaneously. They are attempting to convey their deceptive message, and at the same time, they are continually monitoring the target of their deception for signs of suspiciousness and then adapting their behavior accordingly. Although these multiple demands can prove challenging at first, compromising effectiveness at maintaining credibility, "these difficulties should typically dissipate over time as participants acquire more feedback, attempt further repairs, and gain greater control over their performance" (Buller & Burgoon, 1996, p. 220). They therefore predicted that "deceivers in interactive contexts should display increasing immediacy and involvement, pleasantness, composure, fluency, and smooth turn taking over the course of the interaction" (Buller & Burgoon, 1996, p. 220). They also noted that patterns of behavior vary with factors such as the deceivers' expectations, goals, motivations, and relationship with the targets and with the targets' degree of suspiciousness, so that there would be no one profile of deceptive behaviors.

One of the moderator variables for which Buller and Burgoon (1996) made predictions is deceivers' motivations. A number of taxonomies of motivations for deceiving have been proposed (e.g., Camden, Motley, & Wilson, 1984; B. M. DePaulo, Kashy, Kirkendol, Wyer, & Epstein, 1996; Hample, 1980; Lippard, 1988; Metts, 1989; Turner, Edgley, & Olmstead, 1975), and some are quite complex. For example, Metts (1989) described four categories of motives (partner focused, teller focused, relationship focused, and issue focused) and 15 subcategories. Buller and Burgoon considered three motivations: instrumental, relational (e.g., avoiding relationship problems), and identity (e.g., protecting the liar's image). They predicted that liars would experience more detection apprehension when motivated by self-interest than by relational or identity goals. As a result, instrumentally motivated liars exhibit more nonstrategic behaviors (unintentional behaviors that Buller & Burgoon, 1996, have described as *arousal cues*). Those liars were also predicted by Buller and Burgoon to engage

in more strategic behaviors, which are behaviors used in the pursuit of high level plans.

The Present Approach to Predicting Cues to Deception: A Self-Presentational Perspective

In 1992, B. M. DePaulo described a self-presentational perspective for understanding nonverbal communication. Her formulation was not specific to the communication of deception. In this section, we further articulate her perspective, incorporating subsequent research and theory and specifying the implications of a self-presentational perspective for the prediction of cues to deception. We begin with a review of the incidence and nature of lying in everyday life and a comparison of the lies people typically tell in their lives with the lies studied in the research literature on deception.

Lies in Social Life

Lying is a fact of everyday life. Studies in which people kept daily diaries of all of their lies suggest that people tell an average of one or two lies a day (B. M. DePaulo & Kashy, 1998; B. M. DePaulo, Kashy, et al., 1996; Kashy & DePaulo, 1996; see also Camden et al., 1984; Feldman, Forrest, & Happ, 2002; Hample, 1980; Lippard, 1988; Metts, 1989; Turner et al., 1975). People lie most frequently about their feelings, their preferences, and their attitudes and opinions. Less often, they lie about their actions, plans, and whereabouts. Lies about achievements and failures are also commonplace.

Occasionally, people tell lies in pursuit of material gain, personal convenience, or escape from punishment. Much more commonly, however, the rewards that liars seek are psychological ones. They lie to make themselves appear more sophisticated or more virtuous than they think their true characteristics warrant. They lie to protect themselves, and sometimes others, from disapproval and disagreements and from getting their feelings hurt. The realm of lying, then, is one in which identities are claimed and impressions are managed. It is not a world apart from nondeceptive discourse. Truth tellers edit their self-presentations, too, often in pursuit of the same kinds of goals, but in ways that stay within boundaries of honesty. The presentations of liars are designed to mislead.

There are only a few studies in which people have been asked how they feel about the lies they tell in their everyday lives (B. M. DePaulo & Kashy, 1998; B. M. DePaulo, Kashy, et al., 1996; Kashy & DePaulo, 1996). The results suggest that people regard their everyday lies as little lies of little consequence or regret. They do not spend much time planning them or worrying about the possibility of getting caught. Still, everyday lies do leave a smudge. Although people reported feeling only low levels of distress about their lies, they did feel a bit more uncomfortable while telling their lies, and directly afterwards, than they had felt just before lying. Also, people described the social interactions in which lies were told as more superficial and less pleasant than the interactions in which no lies were told.

Interspersed among these unremarkable lies, in much smaller numbers, are lies that people regard as serious. Most of these lies are told to hide transgressions, which can range from misdeeds such as cheating on tests to deep betrayals of intimacy and trust,

such as affairs (B. M. DePaulo, Ansfield, Kirkendol, & Boden, 2002; see also Jones & Burdette, 1993; McCornack & Levine, 1990; Metts, 1994). These lies, especially if discovered, can have serious implications for the liars' identities and reputations.

Lies in Studies of Cues to Deception

In the literature on cues to deception, as in everyday life, lies about personal feelings, facts, and attitudes are the most commonplace. Participants in studies of deception might lie about their opinions on social issues, for example, or about their academic interests or musical preferences. Sometimes emotions are elicited with video clips, and participants try to hide their feelings or simulate entirely different ones. The literature also includes lies about transgressions, as in studies in which participants are induced to cheat on a task and then lie about it. There are a few studies (Hall, 1986; Horvath, 1973; Horvath, Jayne, & Buckley, 1994) of lies about especially serious matters, such as those told by suspects in criminal investigations, and one study (Koper & Sahlman, 2001) of the truthful and deceptive communications of people whose lies were aired in the media (e.g., Richard Nixon, Pete Rose, Susan Smith).

Self-Presentation in Truthful and Deceptive Communications

The prevalence of self-presentational themes in the kinds of lies that people most often tell and in their reasons for telling them suggests the potential power of the self-presentational perspective for predicting cues to deception. Following Schlenker (1982, 2002; Schlenker & Pontari, 2000), we take a broad view of self-presentation as people's attempts to control the impressions that are formed of them. In self-presenting, people are behaving "in ways that convey certain roles and personal qualities to others" (Pontari & Schlenker, 2000, p. 1092). From this perspective, all deceptive communications involve self-presentation—so do all truthful communications.

Fundamental to the self-presentational perspective is the assumption, based on our understanding of the nature of lying in everyday life, that cues to deception ordinarily are quite weak. There are, however, conditions under which cues are more apparent. As we explain, such moderators of the strength of deception cues can be predicted from the self-presentational processes involved in communicating truthfully and deceptively.

The Deception Discrepancy

Lies vary markedly in the goals they serve and in the kinds of self-presentations enacted to achieve those goals. Yet this vast diversity of lies is united by a single identity claim: the claim of honesty. From the friend who feigns amusement in response to the joke that actually caused hurt feelings to the suspect who claims to have been practicing putts on the night of the murder, liars succeed in their lies only if they seem to be sincere.¹ However, this claim to honesty does not distinguish liars from truth tellers either. Truth tellers fail in their social interaction goals just as readily as liars if they seem dishonest. The important difference between the truth teller's claim to honesty and the liar's is that the liar's claim is

illegitimate. From this discrepancy between what liars claim and what they believe to be true, we can predict likely cues to deceit.

Implications of the Deception Discrepancy

Two implications of the deception discrepancy are most important: First, deceptive self-presentations are often not as convincingly embraced as truthful ones. Second, social actors typically experience a greater sense of deliberateness when their performances are deceptive than when they are honest. These predictions are the starting point for our theoretical analyses. There are also qualifications to the predictions, and we describe those as well.

Deceptive Self-Presentations Are Not as Fully Embraced as Truthful Ones

The most significant implication of the deception discrepancy is that social actors typically are unwilling, or unable, to embrace their false claims as convincingly as they embrace their truthful ones (cf. Mehrabian, 1972; Weiner & Mehrabian, 1968). Several factors undermine the conviction with which liars make their own cases. First, liars, in knowingly making false claims, may suffer moral qualms that do not plague truth tellers. These qualms may account for the faint feelings of discomfort described by the tellers of everyday lies (B. M. DePaulo, Kashy, et al., 1996). Second, even in the absence of any moral misgivings, liars may not have the same personal investment in their claims as do truth tellers. When social actors truthfully describe important aspects of themselves, their emotional investment in their claims may be readily apparent (B. M. DePaulo, Epstein, & LeMay, 1990). Furthermore, those self-relevant claims are backed by an accumulation of knowledge, experience, and wisdom that most liars can only imagine (Markus, 1977). Liars may offer fewer details, not only because they have less familiarity with the domain they are describing, but also to allow for fewer opportunities to be disproved (Vrij, 2000).

In sum, compared with truth tellers, many liars do not have the moral high ground, the emotional investment, or the evidentiary basis for staking their claims. As a result, liars relate their tales in a less compelling manner, and they appear less forthcoming, less pleasant, and more tense.

Deceptive Self-Presenters Are Likely to Experience a Greater Sense of Deliberateness Than Truthful Ones

Cues to deliberateness. When attempting to convey impressions they know to be false, social actors are likely to experience a sense of deliberateness. When instead people are behaving in ways they see as consistent with their attitudes, beliefs, emotions, and self-images, they typically have the sense of "just acting

¹ We could have described our theoretical formulation as impression management rather than self-presentation. Impression management includes attempts to control the impressions that are formed of others, as well as impressions formed of oneself (e.g., Schlenker, 2002). We chose self-presentation because of the central role in our formulation of the impression of sincerity conveyed by the actor. Even when people are lying about the characteristics of another person, the effectiveness of those lies depends on their own success at appearing sincere.

naturally.” They are presenting certain roles and personal qualities to others, and they expect to be seen as truthful, but they do not ordinarily experience this as requiring any special effort or attention. Our claim is not that people acting honestly never experience a sense of deliberateness. Sometimes they do, as for example, when the thoughts or feelings they are trying to communicate are difficult to express or when the stakes for a compelling performance are high; however, the focus of their deliberateness is typically limited to the content of their performance and not its credibility. Liars usually make an effort to seem credible; truth tellers more often take their credibility for granted (B. M. DePaulo, LeMay, & Epstein, 1991).²

Deliberate attempts to manage impressions, including impressions of credibility, are attempts at self-regulation, and self-regulation consumes mental resources (Baumeister, 1998). Social actors who are performing deceptively may experience greater self-regulatory busyness than those who are performing honestly. Even when the attempted performance is the same (e.g., conveying enthusiasm), the self-regulatory demands may be greater for the liar. Enthusiasm flows effortlessly from those who truly are experiencing enthusiasm, but fakers have to marshal theirs. Liars can be preoccupied with the task of reminding themselves to act the part that truth tellers are not just role-playing but living.

Other thoughts and feelings could also burden liars more than truth tellers (Ekman, 1985/1992). These include thoughts about whether the performance is succeeding, feelings about this (e.g., anxiety), and feelings about the fabricated performance (e.g., guilt) or about discreditable past acts that the liar is trying to hide.

To the extent that liars are more preoccupied with these intrusive mental contents than are truth tellers, their performance could suffer. For example, they could seem less involved and engaged in the interaction, and any attempts at cordiality could seem strained. People busy with self-regulatory tasks, compared with those who are not so busy, sometimes process concurrent information less deeply (Gilbert & Krull, 1988; Gilbert, Krull, & Pelham, 1988; Richards & Gross, 1999) and perform less well at subsequent self-regulatory tasks (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Muraven, Tice, & Baumeister, 1998). One potential implication of this regulatory depletion may be that liars fail to notice some of the ways in which the targets of their lies are reacting (cf. Butterworth, 1978). (This is contrary to Buller & Burgoon’s, 1996, assumption that liars monitor targets closely for feedback.) Another implication is that liars’ busyness could compromise their attempts to generate detailed responses of their own.

One likely response to the offending thoughts and feelings liars experience is to try to control them. For example, liars can try not to think about their blemished past or the insincerity of their ongoing performance. However, attempts at thought suppression can backfire, resulting in even greater preoccupation with those thoughts (Wegner, 1994). Attempts to regulate emotional experiences can also augment rather than dissipate the targeted feelings (e.g., Wegner, Erber, & Zanakos, 1993) and increase physiological activation (Gross, 1998; Gross & Levenson, 1993; Richards & Gross, 1999).

The primary target of liars’ efforts at self-regulation, though, is probably not their thoughts and feelings but their overt behaviors. In theory, liars could adopt the goal of trying to appear honest and sincere, which in some instances could involve trying to behave in the generally positive and friendly way that they believe to be

more characteristic of truth tellers than of liars (Malone, DePaulo, Adams, & Cooper, 2002). Especially confident and skilled liars may do just that, and succeed (cf. Roney, Higgins, & Shah, 1995). However, it may be more commonplace for people who are misleading others to adopt the defensive goal of trying not to get caught (e.g., Bell & DePaulo, 1996; B. M. DePaulo & Bell, 1996). Liars pursuing this strategy may try to avoid behaving in the ways that they think liars behave. One risk to this strategy is that some of their beliefs about how liars behave may be wrong. For example, social perceivers typically believe that liars cannot stay still; they expect them to fidget, shift their posture, and shake their legs (Malone et al., 2002; Vrij, 2000). In trying to avoid these movements (either directly or as a result of the higher level goal of trying not to give anything away), liars may appear to be holding back. A sense of involvement and positive engagement would be lacking.

Deliberate attempts by liars at controlling expressive behaviors, such as attempts to control thoughts and feelings, can be the seeds of their own destruction (e.g., B. M. DePaulo, 1992; B. M. DePaulo & Friedman, 1998). One route to failure is to try to regulate expressive behaviors, such as tone of voice, that may not be so amenable to willful control (e.g., Scherer, 1986). It is possible, for example, that people’s attempts not to sound anxious would result in an even higher pitched and anxious sounding tone of voice than would have resulted if they had not deliberately tried to quiet the sounds of their insecurity. Another path to self-betrayal is to direct efforts at expressive control at the wrong level (Vallacher & Wegner, 1987; Vallacher, Wegner, McMahan, Cotter, & Larsen, 1992). For example, social actors who ordinarily convey convincing impressions of sincerity and friendliness may instead seem phony if they deliberately try to smile and nod. In focusing on specific behaviors, they may be unwittingly breaking apart the components of the well-practiced and established routine of acting friendly (e.g., Kimble & Perlmutter, 1970). The process may be akin to what happens to experienced typists who try to focus on the location of each of the characters on the keyboard instead of typing in their usual un-self-conscious way. Finally, if some behaviors are more controllable than others, or if liars only try to control some behaviors and not others, discrepancies could develop.

In sum, we predicted that to the extent that liars (more than truth tellers), deliberately try to control their expressive behaviors, thoughts, and feelings, their performances would be compromised. They would seem less forthcoming, less convincing, less pleasant, and more tense.

Moderators of the strength of cues to deliberateness. As the motivation to tell a successful lie increases, liars may redouble their deliberate efforts at self-regulation, resulting in an even more debilitated performance (B. M. DePaulo & Kirkendol, 1989; B. M.

² Certain deceptive exchanges are so often practiced that they, too, unfold in a way that feels effortless (e.g., looking at the baby picture proffered by the proud parents and exclaiming that the bald wrinkled blob is just adorable). Lies told in these instances may be guided by what Bargh (1989) described as *goal-dependent automaticity*. Although they may not feel like deliberate lies, the critical intent to mislead is clearly present. The flatterer would feel mortified if the parents realized he or she thought the baby was hideous. It is in part because the sense of deliberateness is critical to people’s sense of having lied that these exchanges are so often unrecognized as lies.

DePaulo, Kirkendol, Tang, & O'Brien, 1988; B. M. DePaulo, Stone, & Lassiter, 1985b; see also Ben-Shakhar & Eyal, in press). We tested this proposed moderator of cues to deception by comparing the results of studies in which inducements were offered for success at deceit with studies in which no special attempts were made to motivate the participants.

As we have noted all along, identity-relevant concerns are fundamental to deceptive and nondeceptive communications. They appear even in the absence of any special motivational induction. Such concerns can, however, be exacerbated by incentives that are linked specifically to people's identities and images. In the literature we are reviewing, identity-relevant motivators include ones in which skill at deception was described as indicative of people's competence or of their prospects for success at their chosen careers. Other identity-relevant motivators raised the self-presentational stakes by informing participants that their performances would be evaluated or scrutinized. Compared with other kinds of incentives such as money or material rewards, identity-relevant incentives are more likely to exacerbate public self-awareness, increase rumination, and undermine self-confidence. All of these factors can further disrupt performance (e.g., Baumeister, 1998; Carver & Scheier, 1981; B. M. DePaulo et al., 1991; Wicklund, 1982; Wine, 1971; see also Gibbons, 1990). Consequently, tellers of identity-relevant lies seem especially less forthcoming, less pleasant, and more tense. They also tell tales that seem less compelling.

In sum, our predictions were that cues to deception would be stronger and more numerous among people who have been motivated to succeed in their self-presentations than for those who have not been given any special incentive. This predicted impairment would be even more evident when incentives are identity relevant than when they are not.

Qualifications. There are two important qualifications to our discussion of the effects of deliberate attempts at self-regulation. One is that an increase in self-regulatory demands does not always result in a decrement in performance. When attempts at self-regulation shift the focus of attention away from negative self-relevant thoughts (Pontari & Schlenker, 2000) or from the individual components of the task (Lewis & Linder, 1997), performance can improve.

The second is that the self-regulatory demands of lying do not always exceed those of telling the truth. For example, honest but insecure actors may be more preoccupied with thoughts of failure than deceptive but cocky ones. In addition, for most any social actor, the telling of truths that impugn the truth teller's character or cause pain or harm to others may pose far greater self-regulatory challenges than the telling of lies about the same topics.

Finally, it is important, as always, to bear in mind the nature of the lies that people tell in their everyday lives. Most are little lies that are so often practiced and told with such equanimity that the self-regulatory demands may be nearly indistinguishable from the demands of telling the truth. Therefore, we expected the consequences of deliberate self-regulation that we have described to be generally weak and that stronger effects of attempted control would be evident in studies in which participants were motivated to get away with their lies, particularly if the motivations were identity relevant.

The Formulation of Deceptive and Nondeceptive Presentations

The self-regulatory demands we have just described are those involved in executing the deceptive and nondeceptive performances. Earlier descriptions of deceptive communications focused primarily on the processes involved in formulating lies. We consider those next. As we elaborate below, we reject the argument that lies are necessarily more difficult to construct than truths. Still, we predicted that lies would generally be shorter and less detailed than truths. In doing so, we drew from the literatures on the use of scripts as guides to storytelling, the differences between accounts of events that have or have not been personally experienced, and lay misconceptions about the nature of truthful communications.

Cues to the Formulation of Lies

Previous formulations have typically maintained that it is more difficult to lie than to tell the truth because telling lies involves the construction of new and never-experienced tales whereas telling the truth is a simple matter of telling it like it is (e.g., Buller & Burgoon, 1996; Miller & Stiff, 1993; Zuckerman et al., 1981; but see McCornack, 1997, for an important exception). We disagree with both assumptions—that lies always need to be assembled and that truths can simply be removed from the box. When the truth is hard to tell (e.g., when it would hurt the other person's feelings), then a careful piecing together of just the right parts in just the right way would be in order. But even totally mundane and nonthreatening truths can be conveyed in a nearly infinite variety of shapes and sizes. For example, in response to the question "How was your day?" on a day when nothing special happened, the answer could be "Fine," a listing of the main events (but, what counts as a main event?), or a description of a part of the day. Even in the latter instance, there is no one self-evident truth. As much work on impression management has indicated (e.g., Schlenker, 1980, 1985), presentations are edited differently depending on identity-relevant cues, such as the teller's relationship with the other person and the interaction goals. Yet all of this editing can occur within the bounds of truthfulness.

Truths, then, are not often prepackaged. But lies can be. A teenage girl who had permission to spend the night at a girlfriend's home but instead went camping with a boyfriend may have no difficulty spinning a tale to tell to her parents the next morning. For example, she can easily access a script for what spending the night at a girlfriend's home typically involves. Or, she could relate her best friend's favorite story about an evening at the home of a girlfriend. Lies based on scripts or familiar stories are unlikely to be marked by the signs of mental effort (described below) that may characterize lies that are fabricated. The teller of scripts and of familiar stories may also be less likely to get tangled in contradictions than the liar who makes up a new story.

Even prepackaged lies, however, may be shorter and less detailed than truthful answers. Liars working from scripts may have only the basics of the scripted event in mind (e.g., Smith, 1998), and liars who have borrowed their stories have at hand only those details they were told (and of those, only the ones they remember).

All lies, whether scripted, borrowed, or assembled anew, could be shorter and less detailed than truthful accounts for another reason: The truthful accounts are based on events that were actu-

ally experienced, whereas the lies are not. The literature on reality monitoring (e.g., Johnson & Raye, 1981) suggests ways in which memories of past experiences or perceptions (i.e., memories based on external sources) differ from memories of experiences that were imagined (i.e., memories based on internal sources). This perspective can be applied to the prediction of cues to deception only by extrapolation, because reality monitoring describes processes of remembering whereas deception describes processes of relating (Vrij, 2000). In relating a story, even a truthful one, people often fill in gaps and in other ways create a more coherent tale than their memories actually support. Nonetheless, deceptive accounts may differ from truthful ones in ways that weakly parallel the ways in which memories of imagined experiences differ from memories of externally based experiences. If so, then truthful accounts would be clearer, more vivid, and more realistic than deceptive ones, and they would include more sensory information and contextual cues. Deceptive accounts, in contrast, should be more likely to include references to cognitive processes such as thoughts and inferences made at the time of the event.

The conventional wisdom that lies are more difficult to formulate than truths is most likely to be supported when liars make up new stories. Lies that are fabricated mostly from scratch are likely to be shorter and more internally inconsistent than truths and to be preceded by longer latencies. Signs of mental effort may also be evident. These could include increases in pauses and speech disturbances (Berger, Karol, & Jordan, 1989; Butterworth & Goldman-Eisler, 1979; Christenfeld, 1994; Goldman-Eisler, 1968; Mahl, 1987; Schachter, Christenfeld, Ravina, & Bilous, 1991; Siegman, 1987), more pupil dilation (E. H. Hess & Polt, 1963; Kahneman, 1973; Kahneman & Beatty, 1967; Kahneman, Tursky, Shapiro, & Crider, 1969; Stanners, Coulter, Sweet, & Murphy, 1979; Stern & Dunham, 1990), decreased blinking (Bagley & Manelis, 1979; Holland & Tarlow, 1972, 1975; Wallbott & Scherer, 1991), and decreased eye contact (Fehr & Exline, 1987). People who are preoccupied with the formulation of a complex lie may appear to be less involved and expressive, as well as less forthcoming.

Unfortunately, in the literature we are reviewing, liars were almost never asked how they came up with their lies, and truth tellers were not asked how they decided which version of the truth to relate (e.g., a short version or a long one). In the only study we know of in which liars were asked about the origins of their lies (Malone, Adams, Anderson, Ansfield, & DePaulo, 1997), the most common answer was not any we have considered so far. More than half the time, liars said that they based their lies on experiences from their own lives, altering critical details. With this strategy, liars may be just as adept as truth tellers at accessing a wealth of details, including clear and vivid sensory details.

Still, even the most informed and advantaged liars may make mistakes if they share common misconceptions of what truthful accounts really are like (Vrij, Edward, & Bull, 2001). For example, if liars believe that credible accounts are highly structured and coherent, with few digressions or inessential details, their accounts may be smoother and more pat than those of truth tellers. The embedding of a story in its spatial and temporal context and the relating of the specifics of the conversation may provide a richness to the accounts of truth tellers that liars do not even think to simulate. Liars may also fail to appreciate that memory is fallible and reporting skills are imperfect even when people are telling the

truth and that truth tellers who are not concerned about their credibility may not be defensive about admitting their uncertainties. Consequently, truth tellers may express self-doubts, claim they do not remember things, or spontaneously correct something they already said, whereas liars would scrupulously avoid such admissions of imperfection. The stories told by liars, then, would be too good to be true.

Liars can also fail if they know less than their targets do about the topic of the deceit. The babysitter who claims to have taken the kids to the zoo and relates how excited they were to see the lion, would be undone by the parent who knows that there are no lions at that zoo. The man suspected of being a pedophile who points to his service as leader of his church's youth group may believe he is painting a picture of a pillar of the community, whereas instead he has unwittingly described just the sort of volunteer work that is a favorite of known pedophiles (Steller & Kohnken, 1989; Undeutsch, 1989; Yuille & Cutshall, 1989).³

Moderators of Cues to the Formulation of Lies

Factors that alter the cognitive load for liars are candidates for moderators of cognitive cues to deception. We consider two such moderators in this review: the opportunity to plan a presentation and the duration of that presentation.

Liars who have an opportunity to plan their difficult lies, relative to those who must formulate their lies on the spot, may be able to generate more compelling presentations (e.g., H. D. O'Hair, Cody, & McLaughlin, 1981; Vrij, 2000). Because they can do some of their thinking in advance, their response latencies could be shorter and their answers longer. However, mistakes that follow from misconceptions about the nature of truthful responses would not be averted by planning and may even be exacerbated.

We think that, in theory, cues to deception could occur even for the simplest lies. For example, when just a "yes" or "no" answer is required, a lie could be betrayed by a longer response latency in instances in which the truth comes to mind more readily and must be set aside and replaced by the lie (Walczyk, Roper, & Seeman, in press). However, we believe that the cognitive burdens generally would be greater when a short answer would not suffice and that cues to deception would therefore become clearer and more numerous as the duration of the response increases. For example, lies may be especially briefer than truths when people are expected to tell a story rather than to respond with just a few words. Also,

³ Statement Validity (or Reality) Analysis was developed initially by Undeutsch (1989) to assess the credibility of child witnesses in cases of alleged sexual abuse. The overall assessment includes an evaluation of the characteristics and possible motives of the child witness. It also includes a set of 19 criteria to be applied to transcripts of statements made by the witness (Steller & Kohnken, 1989). This analysis of witness statements, called Criteria-Based Content Analysis (CBCA), was subsequently applied to the analysis of statements made by adults in other kinds of criminal proceedings and in experimental research (e.g., Yuille & Cutshall, 1989). All of the characteristics discussed in this section of our review, from the excessive structure and coherence of accounts to the typical characteristics of criminals or crimes related by people who do not realize their significance, are drawn from CBCA, though some of the interpretations are our own. The use of CBCA to analyze statements made by adults is controversial (e.g., Vrij, 2000).

liars who are experiencing affects and emotions that they are trying to hide may be more likely to show those feelings when they need to sustain their lies longer (cf. Ekman, 1985/1992).

The Role of Identity-Relevant Emotions in Deceptive and Nondeceptive Presentations

People experience the unpleasant emotional state of guilt when they have done something wrong or believe that others may think that they have (Baumeister, Stillwell, & Heatherton, 1994). Even more aversive is the feeling of shame that occurs when people fail to meet their own personal moral standards (Keltner & Buswell, 1996; Tangney, Miller, Flicker, & Barlow, 1996; see also Scheff, 2001). Some lies, especially serious ones, are motivated by a desire to cover up a personal failing or a discreditable thought, feeling, or deed (e.g., B. M. DePaulo, Ansfield, et al., 2002). Yet those who tell the truth about their transgressions or failings may feel even greater guilt and shame than those whose shortcomings remain hidden by their lies. If the behavior of truthful transgressors was compared with that of deceptive transgressors, cues to these self-conscious emotions would be more in evidence for the truth tellers, if they distinguished them from the liars at all. In most studies, however (including all of the studies of transgressions included in this review), liars who had transgressed were compared with truth tellers who had not. For those comparisons, then, we expected to find that liars, compared with truth tellers, showed more shame and guilt cues.

There is no documented facial expression that is specific to guilt; therefore, we expected to find only more general cues to negativity and distress (Keltner & Buswell, 1996; Keltner & Harker, 1998). Shame, however, does seem to have a characteristic demeanor that includes gaze aversion, a closed posture, and a tendency to withdraw (Keltner & Harker, 1998).

Lies about transgressions, though, are the exceptions, both in everyday life and in the studies in this review. The more commonplace lies cover truths that are not especially discrediting. For example, people may not feel that it is wrong to have an opinion that differs from someone else's or to hide their envy of a coworker's success. In most instances, then, we did not, on the basis of the hidden information alone, expect to find more guilt cues in liars than in truth tellers.

By definition, though, there is a sense in which all liars are candidates for experiencing guilt and shame, as they all have done something that could be considered wrong: They have intentionally misled someone. Truth tellers have not. It is important to note, however, that liars do not always feel badly about their lies, and truth tellers do not always feel good about their honesty. In fact, liars often claim that in telling their lies, they have spared their targets from the greater distress that would have resulted had they told the truth (B. M. DePaulo, Kashy, et al., 1996).

Guilt and shame are not the only emotions that have been hypothesized to betray liars. Fear of being detected has also been described as responsible for cues to deception (e.g., Ekman, 1985/1992). We believed fear of detection would also vary importantly with factors such as the nature of the behavior that is covered by the lie. Liars would fear detection when hiding behaviors such as transgressions, which often elicit punishment or disapproval. But the more typical liars, those who claim that their movie preferences match those of their dates or who conceal their pride in their own

work, would have little to fear from the discovery of that hidden information.

People may fear detection not only because of the nature of the behavior they are hiding but also because of the implications of being perceived as dishonest (Schlenker, Pontari, & Christopher, 2001). The blemishes in perceived and self-perceived integrity that could result from a discovered deception depend on factors such as the justifiability of the deceit and are often quite minimal. But even utterly trivial lies told in the spirit of kindness, such as false reassurances about new and unbecoming hairstyles, have identity implications if discovered. For instance, the purveyors of such kind lies may be less often trusted when honest feedback really is desired.

Across all of the lies in our data set, we expected to find weak cues to anxiety and negativity. For example, liars may look and sound more anxious than truth tellers (Slivken & Buss, 1984) and speak less fluently (Kasl & Mahl, 1965; Mahl, 1987) and in a higher pitch (Kappas, Hess, & Scherer, 1991; Scherer, 1986). They may also blink more (Harrigan & O'Connell, 1996), and their pupils may be more dilated (Scott, Wells, Wood, & Morgan, 1967; Simpson & Molloy, 1971; Stanners et al., 1979). Relative to truth tellers, liars may also make more negative statements and complaints, sound less pleasant, and look less friendly and less attractive. In a moderator analysis comparing lies about transgressions with other kinds of lies, we expected to find more pronounced distress cues in the lies about transgressions.

Convergent Perspectives on the Strength of Cues to Deceit

Our self-presentational perspective has led us to reject the view that lie telling is typically a complicated, stressful, guilt-inducing process that produces clear and strong cues. Instead, we believe that most deceptive presentations are so routinely and competently executed that they leave only faint behavioral residues. Fiedler and Walka (1993) offered a similar point of view. They argued that ordinary people are so practiced, so proficient, and so emotionally unfazed by the telling of untruths that they can be regarded as professional liars. Therefore, they also expected to find mostly only weak links between verbal and nonverbal behaviors and the telling of lies. Bond, Kahler, and Paolicelli (1985), arguing from an evolutionary perspective, drew a similar conclusion. Any blatantly obvious cues to deceit, they contended, would have been recognized by human perceivers long ago; evolution favors more flexible deceivers.

Methodological Implications of the Self-Presentational Perspective

Our self-presentational perspective suggests that social actors try to convey particular impressions of themselves, both when lying and when telling the truth, and that social perceivers routinely form impressions of others. We have conceptualized the ways in which lies could differ from truths in terms of the different impressions that deceptive self-presentations could convey. For example, we hypothesized that liars would seem more distant than truth tellers. One way to assess differences in distancing is to code the many behaviors believed to be indicative of nonimmediacy, such as the use of the passive rather than the active voice, the use

of negations rather than assertions, and looking away rather than maintaining eye contact. This approach, which is the usual one, has the advantage that the behaviors of interest are clearly defined and objectively measured. However, for many of the kinds of impressions that social actors attempt to convey, the full range of behaviors that contribute to the impression may be unknown. For example, Wiener and Mehrabian (1968; Mehrabian, 1972) have described a precise set of behaviors that they believed to be indicative of verbal and nonverbal immediacy and have reported some supportive data. However, others who have discussed immediacy and related constructs have included other cues (e.g., Brown & Levinson, 1987; Fleming, 1994; Fleming & Rudman, 1993; Holtgraves, 1986; Searle, 1975). This raises the possibility that social perceivers, who can often form valid impressions even from rather thin slices of social behavior (e.g., Ambady & Rosenthal, 1992), can discriminate truths from lies by their subjective impressions of the constructs of interest (e.g., distancing) just as well, if not better, than can objective coding systems (cf. B. M. DePaulo, 1994; Malone & DePaulo, 2001). To test this possibility, we used objective and subjective measurement as levels of a moderator variable in analyses of cues for which multiple independent estimates of both levels were available.

Summary of Predictions

Predicted Cues

The self-presentational perspective predicts five categories of cues to deception. First, liars are predicted to be less forthcoming than truth tellers. The model predicts they will respond less, and in less detail, and they will seem to be holding back. For example, liars' response latencies would be longer (an indication of cognitive complexity in the Zuckerman et al., 1981, model) and their speech would be slower (a thinking cue in Ekman's, 1985/1992, formulation). Second, the tales told by liars are predicted to be less compelling than those told by truth tellers. Specifically, liars would seem to make less sense than truth tellers (e.g., there would be more discrepancies in their accounts), and they would seem less engaging, less immediate, more uncertain, less fluent, and less active than truth tellers. Zuckerman et al. (1981) predicted that discrepancies would occur as a result of attempted control, and Ekman (1985/1992) regarded them as a thinking cue. Less immediacy (more distancing) was described as a possible cue to detection apprehension and guilt by Ekman (1985/1992) and Zuckerman et al. (1981), and it was regarded as a strategic behavior by Buller and Burgoon (1996).

The self-presentational perspective also predicts that liars will be less positive and pleasant than truth tellers, as is also suggested by the description of cues to guilt and apprehensiveness put forth by Ekman (1985/1992) and Zuckerman et al. (1981). The fourth prediction of the self-presentational perspective is that liars will be more tense than truth tellers. Some cues to tension, such as higher pitch, have sometimes been conceptualized as indicative of undifferentiated arousal (e.g., Zuckerman et al., 1981). Finally, the self-presentational perspective alone predicts that liars will include fewer ordinary imperfections and unusual contents in their stories than will truth tellers.

Predicted Moderators

A number of perspectives, including the self-presentational one, maintain that cues to deception, when combined across all lies, will be weak. However, several factors are predicted to moderate the strength of the cues. From a self-presentational point of view, cues to negativity and tension should be stronger when lies are about transgressions than when they are not. The self-presentational formulation also maintains that cues will be clearer and more numerous when told under conditions of high motivation to succeed, especially when the motivation is identity relevant. Buller and Burgoon (1996), in contrast, predicted stronger cues when the liars' motives are instrumental. They also predicted more pleasantness, immediacy, composure, and fluency with increasing interactivity.

The self-presentation model predicts that for social actors who have an opportunity to plan their performances, compared with those who do not, response latency will be a less telling cue to deception. Also, as the duration of a response increases, cues to deception will be more in evidence. Finally, the model predicts that cues assessed by subjective impressions will more powerfully discriminate truths from lies than the same cues assessed objectively.

A predicted moderator of cues to deception can be tested only if the moderator variable can be reliably coded from the information that is reported and if multiple estimates of the relevant cues are available for each of the levels of the moderator. Some of the predictions generated by the perspectives we have reviewed could not be tested, and that obstacle limited our ability to evaluate each of the perspectives comprehensively. The self-presentational perspective, for example, points to the potential importance of a number of moderators we could not test, such as the communicator's confidence and focus of attention and the emotional implications of the truths or lies for the targets of those messages. The self-presentational perspective, as well as the formulations of Ekman (1985/1992) and Buller and Burgoon (1996), all suggest that the liar's relationship with the target may be another important moderator of cues to deception (see also Anderson, DePaulo, & Ansfield, 2002; Levine & McCornack, 1992; Stiff, Kim, & Ramesh, 1992). However, the number of studies in which the liars and targets were not strangers was too small to test this moderator.

Method

Literature Search Procedures

We used literature search procedures recommended by Cooper (1998) to retrieve relevant studies. First, we conducted computer-based searches of *Psychological Abstracts* (PsycLIT) and *Dissertation Abstracts International* through September of 1995 using the key words *deception*, *deceit*, *lie*, and *detection* and combinations of those words. Second, we examined the reference lists from previous reviews (B. M. DePaulo et al., 1985a; Zuckerman et al., 1981; Zuckerman & Driver, 1985). Third, we reviewed the reference lists from more than 300 articles on the communication of deception from Bella M. DePaulo's personal files and the references lists from any new articles added as a result of the computer search. Fourth, we sent letters requesting relevant papers to 62 scholars who had published on the communication of deception. We also asked those scholars to continue to send us their papers in the coming years. We repeated our computer search in October of 1999. No other reports were added after that date.

Criteria for Inclusion and Exclusion of Studies

We included reports in which behavior while lying was compared with behavior while telling the truth. Behaviors that were measured objectively, as well as those based on others' impressions (e.g., impressions that the social actors seemed nervous or evasive), were all included. Physiological indices with no discernible behavioral manifestation (e.g., galvanic skin response, heart rate) were not included, nor were senders' (i.e., social actors') reports of their own behaviors. We excluded reports that were not in English and reports in which the senders were not adults (i.e., under 17 years old). We included data from adult senders in reports of children and adults if we could compute effect sizes separately for the subset of the data in which both the senders and the judges were adults. We excluded reports in which senders role-played an imagined person in an imagined situation because we were concerned that the imaginary aspects of these paradigms could sever the connection between social actors and their self-presentations that is important to our theoretical analysis.

There were several reports from which we could not extract useful data. For example, Yerkes and Berry (1909) reported one experiment based on just one sender and another based on two. Studies comparing different kinds of lies without also comparing them with truths (e.g., di Battista & Abrahams, 1995) were not included. Studies describing individual differences in cues to deception that did not also report overall differences between truths and lies (e.g., Siegman & Reynolds, 1983) were also excluded. A series of reports based on the same independent sample (e.g., Buller, Burgoon, Buslig, & Roiger, 1996, Study 2) were excluded as well. (For a detailed explanation, see B. M. DePaulo, Ansfield, & Bell, 1996).

Determining Independent Samples

Our final data set consisted of 120 independent samples from 116 reports (see Table 1). Of those 120 samples in our review, only 32 were included in the Zuckerman et al. (1981) review.⁴

Most often, the behaviors of a particular sample of senders were described in just one report. For example, Bond et al. (1985) coded 11 different cues from 34 different senders. The behaviors of those 34 senders were not described in any other report. Therefore, we considered the sample of senders from that study to be an independent sample. Sometimes senders were divided into different subgroups (e.g., men and women, Jordanians and Americans, senders who planned their messages and different senders who did not), and cues to deception were reported separately for each of those subgroups. In those instances, we considered each of the subgroups to be an independent sample. For example, Bond, Omar, Mahmoud, and Bonser (1990) coded 10 different cues separately for the 60 Jordanian senders and the 60 American senders. Therefore, the Jordanian senders were one independent sample and the Americans were another. In 11 instances, data from the same senders were published in different reports. For example, Hadjistavropoulos and Craig (1994) coded 11 cues from 90 senders, and Hadjistavropoulos, Craig, Hadjistavropoulos, and Poole (1996) coded two cues from the same 90 senders. Therefore, the samples described in those two reports were not independent. In Table 1, they have the same letter code in the column labeled "Ind. sample code." Most samples listed in Table 1 have no letter code in that column; all of those samples are independent samples.

All estimates of a particular cue were included in the analyses of that cue. We used independent sample codes, not to exclude data, but to estimate degrees of freedom properly and to weight estimates appropriately. As we explain in more detail below, multiple estimates of the same cue that came from the same independent sample were averaged before being entered into the analyses.

Cue Definitions

Within the sample of studies, 158 different behaviors or impressions, which we call *cues to deception*, were reported. These are defined in

Appendix A. We categorized most of the 158 cues into the five categories that followed from our theoretical analysis. To determine whether liars are less forthcoming than truth tellers, we looked at cues indicative of the amount of their responding (e.g., response length), the level of detail and complexity of their responses, and the degree to which they seemed to be holding back (e.g., pressing lips; Keltner, Young, Heerey, Oemig, & Monarch, 1998). To explore whether liars tell less compelling tales than truth tellers, we examined cues indicating whether the presentations seemed to make sense (e.g., plausibility), whether they were engaging (e.g., involving), and whether they were immediate (e.g., eye contact) instead of distancing. Self-presentations that fell short on characteristics such as certainty, fluency, or animation may also seem less compelling, so we included those cues, too. In the third category, we included cues indicating whether liars are less positive and pleasant than truth tellers, and in the fourth, we collected behaviors indicating whether liars are more tense than truth tellers. Finally, in the last category, we determined whether deceptive self-presentations included fewer ordinary imperfections and unusual contents than truthful ones by examining cues such as spontaneous corrections and descriptions of superfluous details.

For clarity, we assigned a number, from 1 to 158, to each cue. Cue numbers are shown along with the cue names and definitions in Appendix A. The last column of Table 1 lists all of the cues reported in each study and the number of estimates of each.

Variables Coded From Each Report

From each report, we coded characteristics of the senders, characteristics of the truths and lies, publication statistics, and methodological aspects of the studies (see Table 2). In the category of sender characteristics we coded the population sampled (e.g., students, suspects in crimes, patients in pain clinics, people from the community), the senders' country, and the relationship between the sender and the interviewer or target of the communications (e.g., strangers, acquaintances, friends). We also coded senders' race or ethnicity and their precise ages, but this information was rarely reported and therefore could not be analyzed.

To test our predictions about the links between senders' motivations and cues to deception, we determined whether senders had identity-relevant incentives, instrumental incentives, both kinds of incentives, or no special incentives. Coded as identity-relevant were studies in which senders' success was described as indicative of their competence at their chosen profession or reflective of their intelligence or other valued characteristics. Also included were studies in which senders expected to be evaluated or scrutinized. Studies in which senders were motivated by money or material rewards were coded as primarily instrumental. Studies in which both incentives were offered to senders were classified separately.

The characteristics of the messages that we coded included their duration and whether senders had an opportunity to prepare. If senders had an opportunity to prepare some but not all of their messages, but behavioral differences were not reported separately, we classified the study as having some prepared and some unprepared messages. In other studies, the messages were scripted. For example, senders may have been instructed to give a particular response in order to hold verbal cues constant so that investigators could assess nonverbal characteristics of truths and lies more precisely.

We also coded the experimental paradigm used to elicit the truths and lies or the context in which they occurred. In some studies, senders lied or told the truth about their beliefs or opinions or about personal facts. In others, senders looked at videotapes, films, slides, or pictures and described

(text continues on page 89)

⁴ There were three unpublished reports (describing results from four independent samples) in the Zuckerman et al. (1981) review that we were unable to retrieve for this review.

Table 1
Summary of Studies Included in the Meta-Analysis

Report	<i>N</i>	No. of effect sizes	No. of cues	Ind. sample code ^a	Mot ^b	Trans ^c	Msg	Int ^d	Cues ^e
Alonso-Quecuty (1992)								P	
Unplanned messages	11	5	5		0	0			001, 005, 037, 076, 085
Planned messages	11	5	5		0	0			001, 005, 037, 076, 085
Anolli & Ciceri (1997)	31	36	12		0	0	L	1	001 (8), 004 (2), 010 (6), 032 (2), 039 (2), 063 (2), 094 (2), 097 (2), 110 (2), 112 (2), 113 (2), 140 (4)
Berrien & Huntington (1943)	32	1	1		2	1		1	155
Bond et al. (1985)	34	11	11		2	0		1	003, 022, 027, 035, 038, 044, 045, 046, 052, 058, 068
Bond et al. (1990)									
Jordanians	60	10	10		0	0	L	1	001, 027, 037, 038, 045, 046, 052, 058, 066, 068
Americans	60	10	10		0	0	L	1	001, 027, 037, 038, 045, 046, 052, 058, 066, 068
Bradley & Janisse (1979/1980)	60	1	1		0	0	L	1	065
Bradley & Janisse (1981)	192	1	1		2	1		1	065
Buller & Aune (1987)	130	17	15		0	0		1	016, 018, 026, 027, 028, 044 (2), 053, 054 (2), 055, 064, 067, 068, 069, 105, 119
Buller et al. (1996)	120	4	4	A	0	0	L	1	021, 022, 023, 101
Buller et al. (1989)	148	18	16		0	0	L	1	001 (2), 009, 017, 018, 027 (2), 034, 037, 040, 044, 055, 058, 067, 068, 069, 111, 119
Burgoon & Buller (1994)	120	4	4	A	0	0		1	026, 053, 054, 061
Burgoon, Buller, Afifi, et al. (1996)	61	8	5		0	0		1	001, 015 (4), 064, 104, 106
Burgoon, Buller, Floyd, & Grandpre (1996)									
Interactants	18	11	8		0	0		1	004, 015 (2), 025 (2), 026, 031, 049, 061, 115 (2)
Observers	10	11	8		0	0		1	004, 015 (2), 025 (2), 026, 031, 049, 061, 115 (2)
Burgoon, Buller, Guerrero, et al. (1996)	40	4	2		0	0		1	004, 025 (3)
Burns & Kintz (1976)	20	2	1		0	1		1	027 (2)
Chiba (1985)	16	4	2		0	0	L	1	033 (2), 066 (2)
Christensen (1980)	12	6	3		0	0		1	016 (2), 049 (2), 061 (2)
Ciofu (1974)	16	1	1		2	0		1	063
Cody et al. (1989)	66	85	17	B	2	0	P	1	001 (5), 004 (5), 009 (5), 010 (5), 018 (5), 021 (5), 022 (5), 027 (5), 038 (5), 039 (5), 041 (5), 046 (5), 055 (5), 058 (5), 066 (5), 070 (5), 119 (5)
Cody et al. (1984)	42	54	8		0	0	P	1	001 (6), 004 (27), 007 (3), 009 (3), 010 (3), 035 (3), 039 (6), 041 (3)
Cody & O'Hair (1983)									
Men	36	8	4	C1	0	0		1	009 (2), 018 (2), 048 (2), 069 (2)
Women	36	8	4	C2	0	0		1	009 (2), 018 (2), 048 (2), 069 (2)
Craig et al. (1991)	120	28	13		0	0	L	1	033 (2), 056 (2), 057 (2), 059 (2), 060 (2), 066 (2), 129 (4), 130 (2), 131 (2), 132 (2), 133 (2), 146 (2), 148 (2)
Cutrow et al. (1972)	63	3	3		3	0		1	009, 066, 144
B. M. DePaulo et al. (1992)	32	2	2		1	0		0	015, 051
B. M. DePaulo et al. (1990)	96	3	3	D	1	0		1	001, 004, 016
B. M. DePaulo, Jordan, et al. (1982)	8	1	1		0	0	L	0	014
B. M. DePaulo et al. (1983)	32	2	2		1	0		1	061, 091
B. M. DePaulo et al. (1991)	96	1	1	D	1	0		1	012
B. M. DePaulo & Rosenthal (1979a)	40	1	1	E	0	0	L	0	014
B. M. DePaulo, Rosenthal, Green, & Rosenkrantz (1982)	40	4	3	E	0	0	L	0	014 (2), 061, 090
B. M. DePaulo, Rosenthal, Rosenkrantz, & Green (1982)	40	16	11	E	0	0	L	0	006 (2), 010 (2), 022, 023, 024 (2), 035, 038, 052 (3), 096, 136, 137
P. J. DePaulo & DePaulo (1989)	14	16	15		2	0		0	001, 004, 010, 014 (2), 021, 034, 035, 039, 044, 049, 052, 055, 066, 070, 091
deTurck & Miller (1985)									
Unaroused truth tellers	36	10	10		1	1		1	001, 009, 028, 037, 042, 046, 048, 058, 066, 070
Aroused truth tellers	36	10	10		1	1		1	001, 009, 028, 037, 042, 046, 048, 058, 066, 070

Table 1 (continued)

Report	N	No. of effect sizes	No. of cues	Ind. sample code ^a	Mot ^b	Trans ^c	Msg	Int ^d	Cues ^e
Dulaney (1982)	20	20	10		0	1		1	001 (2), 004, 007 (3), 009, 019 (6), 020 (3), 022, 024, 042, 139
Ekman & Friesen (1972)	21	3	3	F	1	0		1	034, 069, 070
Ekman et al. (1988)	31	2	2	F	1	0	L	1	117, 118
Ekman et al. (1976)	16	1	1	F	1	0		1	034
Ekman et al. (1985)	14	40	20		0	0		1	011 (2), 044 (2), 045 (2), 056 (2), 057 (2), 059 (2), 060 (2), 088 (2), 129 (2), 130 (2), 131 (2), 132 (2), 133 (2), 146 (2), 147 (2), 148 (2), 149 (2), 156 (2), 157 (2), 158 (2)
Ekman et al. (1991)	31	2	2	F	1	0	L	1	018, 063
Elliot (1979)	62	4	4		2	0	L	1	012, 049, 050, 115
Exline et al. (1970)	34	2	2		2	1		1	027, 061
Feeley & deTurck (1998)									
Unsanctioned liars	58	15	14		0	1		1	001 (2), 009, 010, 022, 024, 027, 035, 037, 038, 044, 046, 048, 058, 068
Sanctioned liars	68	15	14		0	1		1	001 (2), 009, 010, 022, 024, 027, 035, 037, 038, 044, 046, 048, 058, 068
Fiedler (1989)									
Study 1	23	1	1		0	0		1	012
Study 2	64	1	1		0	0			012
Fiedler et al. (1997)	12	8	6		0	0		1	001, 004 (3), 008, 012, 016, 061
Fiedler & Walka (1993)	10	10	10		0	0	L	1	010, 012, 014, 015, 016, 039, 045, 063, 068, 118
Finkelstein (1978)	20	14	10	E	0	0	L	0	017, 043, 045 (3), 046 (2), 047 (2), 051, 058, 064, 067, 068
Frank (1989)	32	12	12		3	0		0	001, 009, 018, 027, 034, 040, 044, 045, 048, 058, 066, 068
Gagnon (1975)									
Men	16	11	9		2	0		1	001 (2), 010, 027, 040 (2), 044, 045, 046, 047, 048
Women	16	11	9		2	0		1	001 (2), 010, 027, 040 (2), 044, 045, 046, 047, 048
Galin & Thorn (1993)	60	26	12		0	0	L	0	011 (4), 033 (2), 056 (2), 059 (2), 060 (2), 066 (2), 129 (2), 130 (2), 132 (2), 133 (2), 147 (2), 149 (2)
Goldstein (1923)	10	2	1		2	0		1	009 (2)
Greene et al. (1985)	39	45	15		0	0	P	1	001 (3), 009 (3), 018 (3), 027 (3), 034 (3), 044 (3), 045 (3), 046 (3), 048 (3), 055 (3), 058 (3), 067 (3), 068 (3), 069 (3), 119 (3)
Hadjistavropoulos & Craig (1994)	90	24	11	G	0	0	L	1	011 (2), 033 (2), 056 (2), 057 (2), 059 (2), 060 (2), 066 (2), 129 (4), 130 (2), 131 (2), 132 (2)
Hadjistavropoulos et al. (1996)	90	2	2	G	0	0	L	1	054, 088
Hall (1986)	80	3	3		3	1		1	010, 032, 063
Harrison et al. (1978)	72	2	2		0	0	L	1	001, 009
Heilveil (1976)	12	1	1		0	0		1	065
Heilveil & Muehleman (1981)	26	9	9		0	0		1	001, 009, 027, 037, 040, 046, 048, 055, 058
Heinrich & Borkenau (1998)	40	6	1		0	0	L	0	014 (6)
Hemsley (1977)	20	13	10		0	0		1	008, 009, 027 (2), 029, 042, 043, 044, 058 (2), 066, 068 (2)
Hernandez-Fernaund & Alonso-Quecuty (1977)	73	12	4		2	0		1	004 (9), 005, 076, 083
U. Hess (1989)	35	5	4	H	0	0		0	011 (2), 057, 117, 132
U. Hess & Kleck (1990)									
Study 1	35	2	2	H	0	0		0	089, 150
Study 2	48	2	2	H	0	0		0	089, 150
U. Hess & Kleck (1994)	35	3	3	H	0	0		0	029, 058, 066
Hocking & Leathers (1980)	16	25	21		1	0		1	009, 010, 018, 027 (2), 036, 037 (2), 038, 044, 045, 048 (2), 054, 058, 061 (2), 062, 069, 070, 107, 108, 109, 144, 145
Horvath (1973)	100	11	8		3	1		1	002, 025, 027, 049, 050, 052 (3), 061 (2), 121

(table continues)

Table 1 (continued)

Report	<i>N</i>	No. of effect sizes	No. of cues	Ind. sample code ^a	Mot ^b	Trans ^c	Msg	Int ^d	Cues ^e
Horvath (1978)	60	1	1		0	0		1	062
Horvath (1979)	32	1	1		2	0	L	1	062
Horvath et al. (1994)	60	6	4		3	1		1	025, 050, 064 (3), 090
Janisse & Bradley (1980)	64	1	1		0	0	L	1	065
Kennedy & Coe (1994)	19	10	8		0	0		1	027, 056, 058, 064, 066, 120, 122 (3), 129
Knapp et al. (1974)	38	32	23		2	0	L	1	001 (3), 002, 003, 004, 007, 018, 020 (2), 021 (2), 022 (2), 023, 024 (2), 027 (2), 030 (2), 036, 037, 038, 048, 052, 055, 058, 070, 126 (2), 138
Kohnken et al. (1995)	59	19	18		0	0		1	004, 013, 041, 071, 072, 073 (2), 074, 077, 078, 079, 080, 082, 123, 124, 127, 128, 142, 143
Koper & Sahlman (2001)	83	37	27		3	1	L		001, 009, 012, 014, 015 (2), 017, 018, 025 (2), 028, 031 (3), 035, 039, 043, 044, 054, 055, 058, 061 (3), 062, 066, 067, 068, 104, 105 (2), 119, 134 (4), 153
Krauss (1981)									
High arousal, face to face	8	11	11	I1	1	0	L	1	001, 009, 027, 031, 042, 046, 051, 061, 086, 089, 093
High arousal, intercom	8	11	11	I2	1	0	L	0	001, 009, 027, 031, 042, 046, 051, 061, 086, 089, 093
Low arousal, face to face	8	11	11	I3	0	0	L	1	001, 009, 027, 031, 042, 046, 051, 061, 086, 089, 093
Low arousal, intercom	8	11	11	I4	0	0	L	0	001, 009, 027, 031, 042, 046, 051, 061, 086, 089, 093
Kraut (1978)	5	9	9		1	0	L	1	001, 004, 009, 012, 014, 040, 044, 058, 068
Kraut & Poe (1980)	62	14	14		2	1		1	001, 003, 008, 009, 018, 025, 028, 031, 035, 044, 058, 061, 064, 068
Kuiken (1981)	48	1	1		0	0		0	019
Kurasawa (1988)	8	1	1		0	0	L	0	092
Landry & Brigham (1992)	12	14	13		0	0	L	0	004, 013, 072, 073, 074, 075, 076, 077 (2), 078, 079, 080, 082, 083
Manaugh et al. (1970)	80	2	2		0	0		1	006, 009
Marston (1920)	10	1	1		0	0		1	009
Matarazzo et al. (1970)									
Discuss college major	60	4	4		0	0		1	006, 009, 027, 119
Discuss living situation	60	4	4		0	0		1	006, 009, 027, 119
McClintock & Hunt (1975)	20	5	5		0	0		1	018, 027, 044, 058, 070
Mehrabian (1971)									
Study 1									
Men, reward	14	11	10		2	0		0	001, 010, 026, 035, 044, 046, 048 (2), 054, 055, 064
Men, punishment	14	11	10		1	0		0	001, 010, 026, 035, 044, 046, 048 (2), 054, 055, 064
Women, reward	14	11	10		2	0		0	001, 010, 026, 035, 044, 046, 048 (2), 054, 055, 064
Women, punishment	14	11	10		1	0		0	001, 010, 026, 035, 044, 046, 048 (2), 054, 055, 064
Study 2									
Men	24	10	9		2	0		0	001, 010, 026, 029, 046, 048 (2), 054, 055, 064
Women	24	10	9		2	0		0	001, 010, 026, 029, 046, 048 (2), 054, 055, 064
Study 3	32	13	12		2	1		1	001, 002, 010, 026, 032, 044, 046, 048 (2), 054, 055, 064, 070
Miller et al. (1983)	32	10	10		3	0	P	1	001, 007, 009, 029, 036, 037, 038, 046, 048, 070
Motley (1974)	20	3	3		0	0		1	001, 032, 063
D. O'Hair & Cody (1987)								P	
Men	21	2	1		2	0		1	062 (2)
Women	26	2	1		2	0		1	062 (2)
D. O'Hair et al. (1990)								P	
Men	36	2	1	B1	2	0		1	062 (2)
Women	25	2	1	B2	2	0		1	062 (2)

Table 1 (continued)

Report	N	No. of effect sizes	No. of cues	Ind. sample code ^a	Mot ^b	Trans ^c	Msg	Int ^d	Cues ^e
H. D. O'Hair et al. (1981)	72	22	11	C	0	0	P	1	001 (2), 009 (2), 018 (2), 027 (2), 034 (2), 044 (2), 048 (2), 055 (2), 058 (2), 069 (2), 070 (2)
Pennebaker & Chew (1985)	20	2	2		0	0		1	029, 089
Porter & Yuille (1996)	60	18	18		2	1		1	001, 004, 007, 008, 013, 022, 030, 038, 071, 072, 073, 078, 079, 080, 081, 083, 103, 141
Potamkin (1982)									
Heroin addicts	10	6	6		2	0	L	1	018, 044, 048, 070, 151, 152,
Nonaddicts	10	6	6		2	0	L	1	018, 044, 048, 070, 151, 152
Riggio & Friedman (1983)	63	12	11		0	0	L	0	010, 027, 029, 035, 038, 044, 045, 046, 048, 058, 068 (2)
Ruby & Brigham (1998)	12	16	15		0	0		0	001, 004, 013, 071, 072, 073, 074, 075, 076, 077 (2), 078, 079, 080, 081, 083
Rybold (1994)	34	4	4		3	0		1	001, 010, 035, 039
Sayenga (1983)	14	24	16		2	0		1	001 (2), 004 (2), 006 (3), 009 (2), 010 (2), 020, 022, 032 (2), 036, 037, 038, 041, 052, 062 (2), 063, 102
Scherer et al. (1985)	15	2	2	F	1	0	L	1	053, 062
Schneider & Kintz (1977)									
Men	14	2	2		0	0		1	048, 154
Women	16	2	2		0	0		1	048, 154
Sitton & Griffin (1981)	28	1	1		0	0		1	027
Sporer (1997)	40	22	17		0	0		0	001 (2), 004, 005, 006, 013, 071, 076 (3), 077 (2), 078, 079, 080, 082, 083 (2), 087, 098, 099, 100
Stiff & Miller (1986)	40	19	16		2	1		1	001 (2), 004, 009, 012, 022, 023, 024, 037, 040, 044, 046, 048, 058, 066, 068, 134 (3)
Streeter et al. (1977)									
High arousal, face to face	8	1	1	I1	1	0	L	1	063
High arousal, intercom	8	1	1	I2	1	0	L	0	063
Low arousal, face to face	8	1	1	I3	0	0	L	1	063
Low arousal, intercom	8	1	1	I4	0	0	L	0	063
Todd-Mancillas & Kilber (1979)	37	11	9		2	0		1	001 (3), 002, 004, 007, 020, 021, 022, 023, 052
Vrij (1993)	20	1	1	J	2	1	L	1	046
Vrij (1995)	64	11	11	J	2	1	L	1	018, 028, 035, 038, 044, 045, 048, 058, 068, 095, 114
Vrij et al. (1997)	56	1	1		0	1	L	1	114
Vrij & Heaven (1999)	40	6	4		0	0		1	004, 030, 035 (2), 038 (2)
Vrij et al. (1996)	91	3	1		1	1	L	1	043 (3)
Vrij & Winkel (1990/1991)	92	11	10		0	1	L	1	010, 027, 035, 038, 044 (2), 045, 046, 058, 070, 094
Vrij & Winkel (1993)	64	1	1	J	2	1	L	1	001
Wagner & Pease (1976)	49	1	1		0	0		0	019
Weiler & Weinstein (1972)	64	13	8		2	0		1	004 (2), 008, 016, 027, 031, 116 (4), 123, 135 (2)
Zaparniuk et al. (1995)	40	18	16		0	0		1	004, 013, 071, 072, 073, 074, 075, 077 (2), 078, 079, 080, 081 (2), 082, 083, 124, 125
Zuckerman et al. (1979)	60	6	5		0	0	L	0	016, 031 (2), 053, 054, 063
Zuckerman et al. (1982)	59	1	1	K	0	0	L	0	014
Zuckerman et al. (1984)	59	1	1	K	0	0	L	0	084

Note. N = number of senders; Ind. = independent; Mot = motivation of the senders; Trans = transgression; Msg = message; Int = interactivity; P = compared cues to deception for planned messages with cues to deception for unplanned messages; L = length (duration) of the messages was reported. ^a Samples with the same letter code report data from the same senders; that is, they are not independent. All samples without a letter code are independent samples. ^b Motivation of the senders; 0 = none; 1 = identity-relevant; 2 = instrumental; 3 = identity-relevant and instrumental. ^c Transgression: 0 = lie is not about a transgression; 1 = lie is about a transgression. ^d Interactivity: 0 = no interaction between sender and target; 1 = interaction. ^e Cue numbers are of the cues described in the current article. The number in parentheses indicates the number of estimates of that cue (if more than one). The cue names corresponding to the cue numbers are shown in Appendix A.

Table 2
Summary of Study Characteristics

Characteristic	<i>k</i>	Characteristic	<i>k</i>
Senders		Truths and lies (<i>continued</i>)	
Population sampled		Paradigm (<i>continued</i>)	
Students	101	Person descriptions	7
Suspects	3	Simulated job interview	6
Community members and students	3	Described personal experiences	5
Patients in a pain clinic	2	Naturalistic	4
Community members	2	Responded to personality items	3
Immigrants to United States	2	Reactions to pain	3
Salespersons and customers	1	Other paradigms	7
Travelers in an airport	1	Unable to determine from report	1
Shoppers in a shopping center	1	Lies were about transgressions	
Heroin addicts (and nonaddicts)	1	No	99
Publicly exposed liars	1	Yes	21
Unable to determine from report	2		
Country		Publication statistics	
United States	88	Year of report	
Canada	9	Before 1970	3
Germany	7	1970–1979	34
England	4	1980–1989	46
Spain	3	1990–2000	37
Japan	2	Source of study	
Immigrants to United States	2	Journal article	96
Jordan	1	Dissertation, thesis	10
Italy	1	Book chapter	4
Romania	1	Unpublished paper	3
The Netherlands and England	1	Multiple sources	7
The Netherlands and Surinam	1		
Relationship between sender and interviewer or target		Methodological aspects	
Strangers	103	Sample size (no. of senders)	
Acquaintances	2	5–20	41
Acquaintances or friends and strangers	2	21–59	43
Friends	1	60–192	36
Intimates, friends, and strangers	1	Experimental design	
No interviewer	9	Within-sender (senders told truths and lies)	78
Unable to determine from report	2	Between-senders (senders told truths or lies)	42
Motivation for telling successful lies		In between-senders designs, no. of liars	
None	68	Fewer than 20	15
Identity relevant	13	20–32	16
Instrumental	31	More than 32	11
Identity and instrumental	8	In between-senders designs, no. of truth tellers	
		Fewer than 20	15
Truths and lies		20–32	13
Length of messages		More than 32	14
Under 20 s	14	No. of messages communicated by each sender	
20–60 s	14	1	21
More than 60 s	8	2–4	59
Unable to determine from report	84	More than 4	40
Message preparation		Degree of interaction between sender and interviewer or target	
No preparation	44	No interaction	12
Messages were prepared	43	Partial interaction	83
Some prepared, some unprepared	18	Fully interactive	8
Messages were scripted	7	No one else present	12
Unable to determine from report	8	Unable to determine from report	4
Paradigm		Reliability of measurement of cues ^a	
Described attitudes or facts	44	Under .70	36 ^b
Described films, slides, or pictures	16	.70–.79	43 ^b
Cheating	8	.80–.89	251 ^b
Mock crime	8	.90–1.00	239 ^b
Card test or guilty knowledge test	8	Unable to determine from report	769 ^b

^a Includes correlational measures as well as percentage of agreement (divided by 100). ^b Number of estimates (not number of independent estimates).

what they were seeing truthfully or deceptively. In cheating paradigms, senders were or were not induced to cheat and then lie about it. Mock crime paradigms included ones in which some of the senders were instructed to “steal” money or to hide supposed contraband on their persons and to then lie to interviewers about their crime. Some paradigms involved card tests (in which the senders chose a particular card and answered “no” when asked if they had that card) and guilty knowledge tests (in which senders who did or did not know critical information, such as information about a crime, were asked about that information); most of these were modeled after tests often used in polygraph testing. In person-description paradigms, senders described other people (e.g., people they liked and people they disliked) honestly and dishonestly. Some paradigms were simulations of job interviews; typically in those paradigms, senders who were or were not qualified for a job tried to convince an interviewer that they were qualified. In other paradigms, participants described personal experiences (e.g., times during which they acted especially independently or dependently; traumatic experiences that did or did not actually happen to them). Naturalistic paradigms were defined as ones in which the senders were not instructed to tell truths or lies but instead did so of their own accord. These included interrogations of suspects later determined to have been lying or telling the truth (Hall, 1986; Horvath, 1973; Horvath, Jayne, & Buckley, 1994) and a study (Koper & Sahlman, 2001) of people who made public statements later exposed as lies. In another paradigm, senders indicated their responses to a series of items on a personality scale, then later lied or told the truth about their answers to those items. In a final category, senders who really were or were not experiencing pain sometimes expressed their pain freely and other times masked their pain or feigned pain that they were not experiencing. A few other paradigms used in fewer than three independent samples were assigned to a miscellaneous category.

We recoded the paradigms into two categories to test our prediction that lies about transgressions would produce clearer cues than lies that were not about transgressions. The lies about mock crimes or real crimes, cheating, and other misdeeds were categorized as lies about transgressions, the others as lies that were not about transgressions.

The two publication statistics that we coded were the year of the report and the source of the report (e.g., journal article, dissertation, thesis). In some instances, the same data were reported in two places (typically a dissertation and a journal article); in those cases, we coded the more accessible report (i.e., the journal article).

The methodological aspects of the studies that we coded included the sample size and the design of the study. The design was coded as within senders if each sender told both truths and lies or between senders if each sender told either truths or lies. This determination was based on the messages that were included in the analyses of the behavioral cues. For example, if senders told both truths and lies, but the cues to deception were assessed from just one truth or one lie told by each sender, the design was coded as between senders. For each between-senders study, we coded the number of liars and the number of truth tellers. For all studies, we coded the total number of messages communicated by each sender.

We also coded the degree of interaction between the sender and the interviewer or target person. Fully interactive paradigms were ones in which the senders and interviewers interacted freely, with no scripts. In partially interactive paradigms, the senders and interviewers interacted, but the interviewers' behavior was typically constrained, usually by a predetermined set of questions they were instructed to ask. In noninteractive paradigms, an interviewer or target person was present in the room but did not interact with the sender. In still other paradigms, the senders told truths and lies (usually into a tape recorder) with no one else present.

We categorized each cue as having been either objectively or subjectively assessed. Behaviors that could be precisely defined and measured (often in units such as counts and durations) were coded as objectively assessed. Cues were coded as subjectively assessed when they were based on observers' impressions.

Behavioral cues were usually coded from videotapes, audiotapes, or transcripts of the truths and lies. If reliabilities of the measures of the cues were reported (percentages or correlations), we recorded them.

We attempted to compute the effect size for each cue in each study. To this end, we indicated whether the effect sizes were (a) ones that could be precisely calculated (which we call *known effects*), (b) ones for which only the direction of the effect was known, or (c) effects that were simply reported as not significant (and for which we were unable to discern the direction).

Coding decisions were initially made by James J. Lindsay, Laura Muhlenbruck, and Kelly Charlton, who had participated in standard training procedures (discussion of definitions, practice coding, discussion of disagreements) before beginning their task. Each person coded two thirds of the studies. Therefore, each study was coded by two people and discrepancies were resolved in conference. For objective variables such as the year and the source of the report, the percentage of disagreements was close to zero. The percentage ranged as high as 12 for more subjective decisions, such as the initial categorization of paradigms into more than 12 different categories. However, agreement on the two levels of the paradigm variable that were used in the moderator analysis (transgressions vs. no transgressions) was again nearly perfect. Bella M. DePaulo also independently coded all study characteristics, and any remaining discrepancies were resolved in consultation with Brian E. Malone, who was not involved in any of the previous coding. A meta-analysis of accuracy at detecting deception (Bond & DePaulo, 2002) included some of the same studies that are in this review. Some of the same study characteristics were coded for that review in the same manner as for this one. Final decisions about each characteristic were compared across reviews. There were no discrepancies.

Meta-Analytic Techniques

Effect Size Estimate

The effect size computed for each behavioral difference was d , defined as the mean for the deceptive condition (i.e., the lies) minus the mean for the truthful condition (i.e., the truths), divided by the mean of the standard deviations for the truths and the lies (Cohen, 1988). Positive d s therefore indicate that the behavior occurred more often during lies than truths, whereas negative d s indicate that the behavior occurred less often during lies than truths. In cases in which means and standard deviations were not provided but other relevant statistics were (e.g., r s, χ^2 s, t s, or F s with 1 df) or in which corrections were necessary because of the use of within-sender designs (i.e., the same senders told both truths and lies), we used other methods to compute d s (e.g., Hedges & Becker, 1986; Rosenthal, 1991).

With just a few exceptions, we computed effect sizes for every comparison of truths and lies reported in every study. For example, if the length of deceptive messages relative to truthful ones was measured in terms of number of words and number of seconds, we computed both d s. If the same senders conveyed different kinds of messages (e.g., ones in which they tried to simulate different emotions and ones in which they tried to mask the emotions they were feeling) and separate d s were reported for each, we computed both sets of d s. We excluded a few comparisons in cases in which the behavior described was uninterpretable outside of the context of the specific study and in which an effect size could be computed but the direction of the effect was impossible to determine. Also, if preliminary data for a particular cue were reported in one source and more complete data on the same cue were reported subsequently, we included only the more complete data.

If the difference between truths and lies was described as not significant, but no further information was reported, the d for that effect was set to zero. If the direction of the effect could be determined, but not the precise magnitude, we used a conservative strategy of assigning the value +0.01 when the behavior occurred more often during lies than truths and -0.01 when it occurred less often during lies than truths. This procedure resulted in a total of 1,338 effect sizes. Of these, 787 could be estimated precisely,

396 were set to zero, and 155 were assigned the values of ± 0.01 . Twenty-seven (2%) of the effect sizes (d s) were greater than ± 1.50 and were winsorized to ± 1.50 .

Estimates of Central Tendency

The most fundamental issue addressed by this review is the extent to which each cue is associated with deceit. To estimate the magnitude of the effect size for each cue, we averaged within cues and within independent samples. For example, within a particular independent sample, all estimates of response length were averaged. As a result, each independent sample could contribute to the analyses no more than one estimate of any given cue. Table 1 shows the number of effect sizes computed for each report and the number of cues assessed in each report. If the number of effect sizes is greater than the number of cues, then there was more than one estimate of at least one of the cues.

The mean d for each cue within each independent sample was weighted to take into account the number of senders in the sample.⁵ Sample sizes ranged from 5 to 192 ($M = 41.73$, $SD = 31.93$) and are shown in the second column of Table 1. Because larger samples provide more reliable estimates of effect sizes than do smaller ones, larger studies were weighted more heavily in the analyses. For within-sender designs, we weighted each effect size by the reciprocal of its variance. For between-senders designs, we computed the weight from the formula: $[2(n_1 + n_2) n_1 n_2] / [2(n_1 + n_2)^2 + (n_1 n_2 d^2)]$. A mean d is significant if the confidence interval does not include zero.

To determine whether the variation in effect sizes for each cue was greater than that expected by chance across independent samples, we computed the homogeneity statistic Q , which is distributed as chi-square with degrees of freedom equal to the number of independent samples (k) minus 1. The p level associated with the Q statistic describes the likelihood that the observed variance in effect sizes was generated by sampling error alone (Hedges & Olkin, 1985).

Moderator Analyses

We have described several factors that have been predicted to moderate the size of the cues to deception: whether an incentive was provided for success, the type of incentive that was provided (identity relevant or instrumental), whether the messages were planned or unplanned, the duration of the messages, whether the lies were about transgressions, and whether the context was interactive. All of the moderator variables except planning were ones that could be examined only on a between-studies basis. For example, it was usually the case that in any given study, all of the senders who lied were lying about a transgression or they were all lying about something other than a transgression. Conclusions based on those analyses (e.g., that the senders' apparent tension is a stronger cue to lies about transgressions than to lies that are not about transgressions) are open to alternative interpretations. Any way that the studies differed (other than the presence or absence of a transgression) could explain the transgression differences.

Stronger inferences can be drawn when the levels of the moderator variable occur within the same study. Seven independent samples (indicated in Table 1) included a manipulation of whether senders' messages were planned or unplanned.⁶ For each cue reported in each of these studies, we computed a d for the difference in effect sizes between the unplanned and planned messages. We then combined these d s in the same manner as we had in our previous analyses.

Of the remaining moderator variables, all except one (the duration of the message) were categorical variables. For the categorical moderator variables, we calculated fixed-effect models using the general linear model (regression) program of the Statistical Analysis System (SAS Institute, 1985). The model provides a between-levels sum of squares, Q_B , that can be interpreted as a chi-square, testing whether the moderator variable is a

significant predictor of differences in effect sizes. A test of the homogeneity of effect sizes within each level, Q_W , is also provided. For the continuous moderator variable (the duration of the messages), we also used the general linear model (leaving duration in its continuous form) and tested for homogeneity (Hedges & Olkin, 1985). A significant Q_B indicates that duration did moderate the size of the effect, and the direction of the unstandardized beta (b) weight indicates the direction of the moderation.

Results

Description of the Literature

Characteristics of the Senders

As indicated in Table 2, the senders in most of the studies were students from the United States who were strangers to the interviewer or target of their communications. In 52 of the 120 independent samples, incentives for success were provided to the senders.

Characteristics of the Truths and Lies

The duration of the messages was 1 min or less for 28 of the 36 samples for which that information was reported. The number of samples in which senders were given time to prepare their communications was about the same as the number in which they were not given any preparation time.

In 44 of the 120 samples, senders told truths and lies about their attitudes or personal facts. In 16 others, they looked at films, slides, or pictures and described them honestly or dishonestly. All other paradigms were used in fewer than 9 samples. In 21 of the samples, senders told lies about transgressions.

Publication Statistics and Methodological Aspects

Table 2 also shows that only 3 of the 120 independent samples were published before 1970. Most reports were journal articles.

In 84 of the samples, there were fewer than 60 senders. The samples included a mean of 22.4 male senders ($SD = 24.6$) and a mean of 19.2 female senders ($SD = 19.2$). In 25 samples, all of the senders were men, and in 15 samples, all were women. In 16 samples, the sex of the senders was not reported.

Within-sender designs (in which senders told truths and lies) were nearly twice as common as between-senders designs (in which senders told truths or lies). In the between-senders designs, the number of liars was typically the same as the number of truth tellers. Senders usually communicated between one and four messages.

⁵ Only weighted mean d s are reported, and all estimates of a given cue are included in each mean. A table of all 1,338 individual effect sizes is available from Bella M. DePaulo. The table includes the weights for each effect size and information about the independence of each estimate. The table also indicates whether each estimate was a known effect (i.e., the magnitude could be determined precisely) or if only the direction of the effect or its nonsignificance was reported. Therefore, the information in that table can be used to calculate weighted effect sizes for each cue that include only the known estimates or to compute unweighted means that include all effect sizes or only the precisely estimated ones.

⁶ We did not include studies in which planning was confounded with another variable (e.g., Anolli & Cicceri, 1997).

In most studies, there was some interaction between the sender and the interviewer or target. In 24 of the 120 samples, there was no interaction or there was no one else present when the senders were telling their truths or lies.

When the reliability of the measurement was reported, the reliability was usually high (see Table 2). Of the 1,338 estimates of the 158 cues to deception, 273 (20%) were based on the subjective impressions of untrained raters.

Meta-Analysis of the Literature

Overview

We first present the combined effect sizes for each individual cue to deception. The individual cues to deception are grouped by our five sets of predictions. Cues suggesting that liars may be less forthcoming than truth tellers are shown in Table 3; cues suggesting that liars may tell less compelling tales than truth tellers are shown in Table 4; cues suggesting that liars communicate in a less positive and more tense way are shown in Tables 5 and 6, respectively; and cues suggesting that liars tell tales that are too good to be true are shown in Table 7. Any given cue is included in Tables 3–7 only if there are at least three independent estimates of it, at least two of which could be calculated precisely (as opposed to estimates of just the direction of the effect or reports that the effect was not significant). All other cues are reported in Appendix B. Five of the 88 cues that met the criteria for inclusion in the tables but did not fit convincingly into any particular table are also included in Appendix B (brow raise, lip stretch, eyes closed, lips apart, and jaw drop).

The placement of cues into the five different categories was to some extent arbitrary. For example, because blinking may be indicative of anxiety or arousal, we included it in the “tense” category (see Appendix A). However, decreased blinking can also be suggestive of greater cognitive effort; therefore, we could have placed it elsewhere. Rate of speaking is another example. We

included that cue under “forthcoming” because people who are speaking slowly may seem to be holding back. However, faster speech can also be indicative of confidence (C. E. Kimble & Seidel, 1991); thus, we could have included it under “compelling” (certainty) instead.

In Table 8, we have arranged the 88 cues (the ones based on at least three estimates) into four sections by the crossing of the size of the combined effect (larger or smaller) and the number of independent estimates contributing to that effect (more or fewer). We also present a stem and leaf display of the 88 combined effect sizes in Table 9. The results of our analyses of the factors that might moderate the magnitude of the differences between liars and truth tellers are presented in subsequent tables.

Individual Cues to Deception

Are liars less forthcoming than truth tellers? Table 3 shows the results of the cues indicating whether liars were less forthcoming than truth tellers. We examined whether liars had less to say, whether what they did say was less detailed and less complex, and whether they seemed to be holding back.

We had more independent estimates of the length of the responses ($k = 49$) than of any other cue, but we found just a tiny and nonsignificant effect in the predicted direction ($d = -0.03$). When amount of responding was operationalized in terms of the percentage of the talking time taken up by the social actor compared with the actor’s partner, then liars did take up less of that time than did truth tellers ($d = -0.35$). The entire interaction tended to terminate nonsignificantly sooner when 1 person was lying than when both were telling the truth ($d = -0.20$).

Our prediction that liars would provide fewer details than would truth tellers was clearly supported ($d = -0.30$). Extrapolating from reality monitoring theory, we also predicted that there would be less sensory information in deceptive accounts than in truthful ones. There was a nonsignificant trend in that direction ($d = -0.17$). The finding that liars pressed their lips more than truth

Table 3
Are Liars Less Forthcoming Than Truth Tellers?

Cue	<i>N</i>	<i>k</i> ₁	<i>k</i> ₂	<i>d</i>	CI	<i>Q</i>
Amount of responding						
001 Response length	1,812	49	26	-0.03	-0.09, 0.03	92.1*
002 Talking time	207	4	3	-0.35*	-0.54, -0.16	8.1
003 Length of interaction	134	3	2	-0.20	-0.41, 0.02	0.7
Detailed, complex responses						
004 Details	883	24	16	-0.30*	-0.38, -0.21	76.2*
005 Sensory information (RM)	135	4	3	-0.17	-0.39, 0.06	13.2*
006 Cognitive complexity	294	6	3	-0.07	-0.23, 0.10	0.9
007 Unique words	229	6	3	-0.10	-0.26, 0.06	6.2
Holding back						
008 Blocks access to information	218	5	4	0.10	-0.13, 0.33	19.8*
009 Response latency	1,330	32	20	0.02	-0.06, 0.10	112.4*
010 Rate of speaking	806	23	14	0.07	-0.03, 0.16	21.7
011 Presses lips	199	4	3	0.16*	0.01, 0.30	30.9*

Note. Cue numbers are of the cues described in the current article as indexed in Appendix A. Bold type indicates statistical significance. *N* = total number of participants in the studies; *k*₁ = total number of independent effect sizes (*ds*); *k*₂ = number of *ds* that could be estimated precisely; CI = 95% confidence interval; *Q* = homogeneity statistic (significance indicates rejection of the null hypothesis of homogeneity of *ds*); RM = reality monitoring.
* *p* < .05.

Table 4
Do Liars Tell Less Compelling Tales Than Truth Tellers?

Cue	<i>N</i>	<i>k</i> ₁	<i>k</i> ₂	<i>d</i>	CI	<i>Q</i>
Makes Sense						
012 Plausibility	395	9	6	-0.23*	-0.36, -0.11	13.1
013 Logical structure	223	6	6	-0.25*	-0.46, -0.04	21.5*
014 Discrepant, ambivalent	243	7	3	0.34*	0.20, 0.48	14.3*
Engaging						
015 Involved, expressive (overall)	214	6	4	0.08	-0.06, 0.22	23.3*
016 Verbal and vocal involvement	384	7	3	-0.21*	-0.34, -0.08	5.8
017 Facial expressiveness	251	3	2	0.12	-0.05, 0.29	9.6*
018 Illustrators	839	16	10	-0.14*	-0.24, -0.04	23.9
Immediate						
019 Verbal immediacy (all categories)	117	3	2	-0.31*	-0.50, -0.13	2.4
020 Verbal immediacy, temporal	109	4	3	0.15	-0.04, 0.34	2.3
021 Generalizing terms	275	5	3	0.10	-0.08, 0.28	1.7
022 Self-references	595	12	9	-0.03	-0.15, 0.09	30.1*
023 Mutual and group references	275	5	4	-0.14	-0.31, 0.02	4.4
024 Other references	264	6	5	0.16	-0.01, 0.33	5.6
025 Verbal and vocal immediacy (impressions)	373	7	4	-0.55*	-0.70, -0.41	26.3*
026 Nonverbal immediacy	414	11	3	-0.07	-0.21, 0.07	6.9
027 Eye contact	1,491	32	17	0.01	-0.06, 0.08	41.1
028 Gaze aversion	411	6	4	0.03	-0.11, 0.16	7.4
029 Eye shifts	218	7	3	0.11	-0.03, 0.25	43.8*
Uncertain						
030 Tentative constructions	138	3	3	-0.16	-0.37, 0.05	12.5*
031 Verbal and vocal uncertainty (impressions)	329	10	4	0.30*	0.17, 0.43	11.0
032 Amplitude, loudness	177	5	3	-0.05	-0.26, 0.15	2.2
033 Chin raise	286	4	4	0.25*	0.12, 0.37	31.9*
034 Shrugs	321	6	3	0.04	-0.13, 0.21	3.3
Fluent						
035 Non-ah speech disturbances	750	17	12	0.00	-0.09, 0.09	60.5*
036 Word and phrase repetitions	100	4	4	0.21*	0.02, 0.41	0.5
037 Silent pauses	655	15	11	0.01	-0.09, 0.11	18.5
038 Filled pauses	805	16	14	0.00	-0.08, 0.08	22.2
039 Mixed pauses	280	7	3	0.03	-0.11, 0.17	3.6
040 Mixed disturbances (ah plus non-ah)	283	7	5	0.04	-0.14, 0.23	7.0
041 Ritualized speech	181	4	3	0.20	-0.06, 0.47	2.3
042 Miscellaneous dysfluencies	144	8	5	0.17	-0.04, 0.38	13.9
Active						
043 Body animation, activity	214	4	4	0.11	-0.03, 0.25	11.7*
044 Posture shifts	1,214	29	16	0.05	-0.03, 0.12	14.1
045 Head movements (undifferentiated)	536	14	8	-0.02	-0.12, 0.08	9.4
046 Hand movements	951	29	11	0.00	-0.08, 0.08	28.0
047 Arm movements	52	3	3	-0.17	-0.54, 0.20	3.5
048 Foot or leg movements	857	28	21	-0.09	-0.18, 0.00	20.5

Note. Cue numbers are of the cues described in the current article as indexed in Appendix A. Bold type indicates statistical significance. *N* = total number of participants in the studies; *k*₁ = total number of independent effect sizes (*ds*); *k*₂ = number of *ds* that could be estimated precisely; CI = 95% confidence interval; *Q* = homogeneity statistic (significance indicates rejection of the null hypothesis of homogeneity of *ds*). * *p* < .05.

tellers did (*d* = 0.16) was the only cue in the “holding back” subcategory that was statistically reliable.

In sum, the most reliable indicator (in terms of the size of the effect and the number of independent estimates) that liars may have been less forthcoming than truth tellers was the relatively smaller number of details they provided in their accounts. The directions of the cues in Table 3 tell a consistent story: All except 1 of the 11 cues (rate of speaking) was in the predicted direction, indicating that liars are less forthcoming than truth tellers, though usually nonsignificantly so.

Are deceptive accounts less compelling than truthful ones? To determine whether deceptive accounts were less compelling than

truthful ones, we asked whether the lies seemed to make less sense than the truths and whether they were told in a less engaging and less immediate manner. We also asked whether liars seemed more uncertain or less fluent than truth tellers and whether they seemed less active or animated. The results are shown in Table 4.

By all three of the indicators, the lies made less sense than the truths. They were less plausible (*d* = -0.23); less likely to be structured in a logical, sensible way (*d* = -0.25); and more likely to be internally discrepant or to convey ambivalence (*d* = 0.34).

For the four cues to the engagingness of the message, the results of two were as predicted. Liars seemed less involved verbally and vocally in their self-presentations than did truth tellers (*d* =

Table 5
Are Liars Less Positive and Pleasant Than Truth Tellers?

Cue	<i>N</i>	<i>k</i> ₁	<i>k</i> ₂	<i>d</i>	CI	<i>Q</i>
049 Friendly, pleasant (overall)	216	6	3	-0.16	-0.36, 0.05	11.3
050 Cooperative (overall)	222	3	3	-0.66*	-0.93, -0.38	11.2*
051 Attractive (overall)	84	6	3	-0.06	-0.27, 0.16	3.1
052 Negative statements and complaints	397	9	6	0.21*	0.09, 0.32	21.5*
053 Vocal pleasantness	325	4	2	-0.11	-0.28, 0.05	1.4
054 Facial pleasantness	635	13	6	-0.12*	-0.22, -0.02	25.1*
055 Head nods	752	16	3	0.01	-0.09, 0.11	1.5
056 Brow lowering	303	5	4	0.04	-0.08, 0.16	9.0
057 Sneers	259	4	3	0.02	-0.11, 0.15	38.1*
058 Smiling (undifferentiated)	1,313	27	16	0.00	-0.07, 0.07	18.3
059 Lip corner pull (AU 12)	284	4	3	0.00	-0.12, 0.12	1.9
060 Eye muscles (AU 6), not during positive emotions	284	4	4	-0.01	-0.13, 0.11	3.6

Note. Cue numbers are of the cues described in the current article as indexed in Appendix A. Bold type indicates statistical significance. *N* = total number of participants in the studies; *k*₁ = total number of independent effect sizes (*ds*); *k*₂ = number of *ds* that could be estimated precisely; CI = 95% confidence interval; *Q* = homogeneity statistic (significance indicates rejection of the null hypothesis of homogeneity of effect sizes); AU = facial action unit (as categorized by Ekman & Friesen, 1978).
* *p* < .05.

-0.21). They also displayed fewer of the gestures used to illustrate speech (*d* = -0.14).

The set of immediacy cues includes three composite measures and a number of individual immediacy measures. The individual cues were the ones described by Mehrabian (1972) that were reported separately in several studies or other cues that seemed to capture the immediacy construct (e.g., Fleming, 1994). The composite measures were verbal immediacy (all categories), verbal and vocal immediacy, and nonverbal immediacy. The verbal immediacy composite is an index consisting of all of the linguistic categories described by Wiener and Mehrabian (1968). They are all verbal constructions (e.g., active vs. passive voice, affirmatives vs. negations) that are typically coded from transcripts. The verbal and vocal immediacy measure is based on raters' overall impressions of the degree to which the social actors seemed direct, relevant, clear, and personal. The nonverbal immediacy measure includes the set of nonverbal cues described by Mehrabian (1972) as indices

of immediacy (e.g., interpersonal proximity, leaning and facing toward the other person).

The verbal composite and the verbal and nonverbal composite both indicated that liars were less immediate than truth tellers (*d* = -0.31 and -0.55, respectively). Liars used more linguistic constructions that seemed to distance themselves from their listeners or from the contents of their presentations, and they sounded more evasive, unclear, and impersonal. The nonverbal composite was only weakly (nonsignificantly) suggestive of the same conclusion (*d* = -0.07).

The results of other individual indices of immediacy were inconsistent and unimpressive. It is notable that none of the measures of looking behavior supported the widespread belief that liars do not look their targets in the eye. The 32 independent estimates of eye contact produced a combined effect that was almost exactly zero (*d* = 0.01), and the *Q* statistic indicated that the 32 estimates were homogeneous in size. The estimates of gaze aversion were

Table 6
Are Liars More Tense Than Truth Tellers?

Cue	<i>N</i>	<i>k</i> ₁	<i>k</i> ₂	<i>d</i>	CI	<i>Q</i>
061 Nervous, tense (overall)	571	16	12	0.27*	0.16, 0.38	37.3*
062 Vocal tension	328	10	8	0.26*	0.13, 0.39	25.4*
063 Frequency, pitch	294	12	11	0.21*	0.08, 0.34	31.2*
064 Relaxed posture	488	13	3	-0.02	-0.14, 0.10	19.6
065 Pupil dilation	328	4	4	0.39*	0.21, 0.56	1.1
066 Blinking	850	17	13	0.07	-0.01, 0.14	54.4*
067 Object fidgeting	420	5	2	-0.12	-0.26, 0.03	4.0
068 Self-fidgeting	991	18	10	-0.01	-0.09, 0.08	19.5
069 Facial fidgeting	444	7	4	0.08	-0.09, 0.25	7.7
070 Fidgeting (undifferentiated)	495	14	10	0.16*	0.03, 0.28	28.2*

Note. Cue numbers are of the cues described in the current article as indexed in Appendix A. Bold type indicates statistical significance. *N* = total number of participants in the studies; *k*₁ = total number of independent effect sizes (*ds*); *k*₂ = number of *ds* that could be estimated precisely; CI = 95% confidence interval; *Q* = homogeneity statistic (significance indicates rejection of the null hypothesis of homogeneity of *ds*).
* *p* < .05.

Table 7
Do Lies Include Fewer Ordinary Imperfections and Unusual Contents Than Truths?

Cue	<i>N</i>	<i>k</i> ₁	<i>k</i> ₂	<i>d</i>	CI	<i>Q</i>
071 Unstructured productions	211	5	4	-0.06	-0.27, 0.15	24.8*
072 Spontaneous corrections	183	5	5	-0.29*	-0.56, -0.02	3.8
073 Admitted lack of memory	183	5	5	-0.42*	-0.70, -0.15	18.7*
074 Self-doubt	123	4	3	-0.10	-0.42, 0.21	5.1
075 Self-deprecation	64	3	3	0.21	-0.19, 0.61	0.9
076 Contextual embedding	159	6	6	-0.21	-0.41, 0.00	21.5*
077 Verbal and nonverbal interactions	163	5	4	-0.03	-0.25, 0.19	8.6
078 Unexpected complications	223	6	5	0.04	-0.16, 0.24	2.2
079 Unusual details	223	6	5	-0.16	-0.36, 0.05	9.5
080 Superfluous details	223	6	5	-0.01	-0.21, 0.19	11.0
081 Related external associations	112	3	3	0.35*	0.02, 0.67	2.1
082 Another's mental state	151	4	4	0.22	-0.02, 0.46	7.2
083 Subjective mental state	237	6	6	0.02	-0.18, 0.22	8.1

Note. Cue numbers are of the cues described in the current article as indexed in Appendix A. Bold type indicates statistical significance. All of the cues in this table were coded using the Criteria-Based Content Analysis system that is part of Statement Validity Analysis (e.g., Steller & Kohnken, 1989). *N* = total number of participants in the studies; *k*₁ = total number of independent effect sizes (*ds*); *k*₂ = number of *ds* that could be estimated precisely; CI = 95% confidence interval; *Q* = homogeneity statistic (significance indicates rejection of the null hypothesis of homogeneity of *ds*).

* *p* < .05.

equally unimpressive (*d* = 0.03). Estimates of eye shifts produced just a nonsignificant trend (*d* = 0.11).

The one cue that was consistent with our prediction that liars would seem less certain than truth tellers was verbal and vocal uncertainty (as measured by subjective impressions); liars did sound more uncertain than truth tellers (*d* = 0.30). One other behavior unexpectedly produced results in the opposite direction. More often than truth tellers, liars raised their chins (*d* = 0.25). In studies of facial expressions in conflict situations, a particular facial constellation, called a *plus face*, has been identified (Zivin, 1982). It consists of a raised chin, direct eye contact, and medially raised brows. People who show this plus face during conflict situations are more likely to prevail than those who do not show it or who show a *minus face*, consisting of a lowered chin, averted eyes, and pinched brows (Zivin, 1982). That research suggests that raising the chin could be a sign of certainty.

Mahl and his colleagues (e.g., Kasl & Mahl, 1965; Mahl, 1987) have suggested that the large variety of disturbances that occur in spontaneous speech can be classified into two functionally distinct categories: non-ah disturbances, which indicate state anxiety (Mahl, 1987), and the commonplace filled pauses such as "ah," "um," and "er," which occur especially often when the available options for what to say or how to say it are many and complex (Berger, Karol, & Jordan, 1989; Christenfeld, 1994; Schachter et al., 1991). Of the non-ah disturbances, the most frequently occurring are sentence changes, in which the speaker interrupts the flow of a sentence to change its form or content, and superfluous repetitions of words or phrases. The other non-ah disturbances are stutters, omissions of words or parts of words, sentences that are not completed, slips of the tongue, and intruding incoherent sounds.

Most studies reported a composite that included all non-ah disturbances, or one that included non-ahs as well as ahs. When individual disturbances were reported separately, we preserved the distinctions. In the fluency subcategory, we also included silent

pauses, mixed pauses (silent plus filled, for studies in which the two were not reported separately), ritualized speech (e.g., "you know," "well," "I mean"), and miscellaneous dysfluencies, which were sets of dysfluencies that were not based on particular systems such as Mahl's (1987).

Results of the fluency indices suggest that speech disturbances have little predictive power as cues to deceit. The categories of disturbances reported most often, non-ah disturbances, filled pauses, and silent pauses, produced combined effect sizes of 0.00, 0.00, and 0.01, respectively. Only one type of speech disturbance, the repetition of words and phrases, produced a statistically reliable effect (*d* = 0.21).

Under the subcategory of "active," we included all movements except those defined as expressive (i.e., illustrators were included in the subcategory of "engaging" cues) and those believed to be indicative of nervousness (i.e., forms of fidgeting, included in the tense category). There were nearly 30 independent estimates of posture shifts (*d* = 0.05), hand movements (*d* = 0.00), and foot or leg movements (*d* = -0.09), but we found little relationship with deceit for these or any of the other movements.

In sum, there were three ways in which liars told less compelling tales than did truth tellers. Their stories made less sense, and they told those stories in less engaging and less immediate ways. Cues based on subjective impressions of verbal and vocal cues (typically rated from audiotapes) were most often consistent with predictions. Specifically, liars sounded less involved, less immediate, and more uncertain than did truth tellers.

Are liars less positive and pleasant than truth tellers? All of the cues that assessed pleasantness in a global way produced results in the predicted direction, although some of the effects were small and nonsignificant (see Table 5). A small number of estimates (*k* = 3) indicated that liars were less cooperative than truth tellers (*d* = -0.66). Liars also made more negative statements and complaints (*d* = 0.21), and their faces were less pleasant (*d* = -0.12).

Table 8
Cues With Larger and Smaller Effect Sizes Based on Larger and Smaller Numbers of Estimates

Larger effect size ($d > 0.20 $)	d	k	Smaller effect size ($d \leq 0.20 $)	d	k
Larger no. of estimates ($k > 5$)					
025 Verbal and vocal immediacy (impressions)	-0.55*	7	042 Miscellaneous dysfluencies	0.17	8
014 Discrepant, ambivalent	0.34*	7	070 Fidgeting (undifferentiated)	0.16*	14
004 Details	-0.30*	24	049 Friendly, pleasant	-0.16	6
031 Verbal and vocal uncertainty (impressions)	0.30*	10	024 Other references	0.16	6
061 Nervous, tense (overall)	0.27*	16	079 Unusual details	-0.16	6
062 Vocal tension	0.26*	10	018 Illustrators	-0.14*	16
013 Logical structure	-0.25*	6	054 Facial pleasantness	-0.12*	13
012 Plausibility	-0.23*	9	029 Eye shifts	0.11	7
063 Frequency, pitch	0.21*	12	007 Unique words	-0.10	6
052 Negative statements and complaints	0.21*	9	048 Foot or leg movements	-0.09	28
016 Verbal and vocal involvement	-0.21*	7	069 Facial fidgeting	0.08	7
076 Contextual embedding	-0.21	6	015 Involved, expressive (overall)	0.08	6
			010 Rate of speaking	0.07	23
			066 Blinking	0.07	17
			026 Nonverbal immediacy	-0.07	11
			006 Cognitive complexity	-0.07	6
			051 Attractive	-0.06	6
			044 Posture shifts	0.05	29
			040 Mixed disturbances (ah plus non-ah)	0.04	7
			034 Shrugs	0.04	6
			078 Unexpected complications	0.04	6
			001 Response length	-0.03	49
			022 Self-references	-0.03	12
			039 Mixed pauses	0.03	7
			028 Gaze aversion	0.03	6
			009 Response latency	0.02	32
			045 Head movements (undifferentiated)	-0.02	14
			064 Relaxed posture	-0.02	13
			083 Subjective mental state	0.02	6
			027 Eye contact	0.01	32
			068 Self-fidgeting	-0.01	18
			055 Head nods	0.01	16
			037 Silent pauses	0.01	15
			080 Superfluous details	-0.01	6
			046 Hand movements	0.00	29
			058 Smiling (undifferentiated)	0.00	27
			035 Non-ah speech disturbances	0.00	17
			038 Filled pauses	0.00	16
Smaller no. of estimates ($k \leq 5$)					
050 Cooperative (overall)	-0.66*	3	041 Ritualized speech	0.20	4
073 Admitted lack of memory	-0.42*	5	003 Length of interaction	-0.20	3
065 Pupil dilation	0.39*	4	005 Sensory information	-0.17	4
002 Talking time	-0.35*	4	047 Arm movements	-0.17	3
081 Related external associations	0.35*	3	011 Presses lips	0.16*	4
019 Verbal immediacy (all categories)	-0.31*	3	030 Tentative constructions	-0.16	3
072 Spontaneous corrections	-0.29*	5	020 Verbal immediacy, temporal	0.15	4
033 Chin raise	0.25*	4	023 Mutual and group references	-0.14	5
082 Another's mental state	0.22	4	067 Object fidgeting	-0.12	5
036 Word and phrase repetitions	0.21*	4	017 Facial expressiveness	0.12	3
075 Self-deprecation	0.21	3	043 Body animation, activity	0.11	4
			053 Vocal pleasantness	-0.11	4
			008 Blocks access to information	0.10	5
			021 Generalizing terms	0.10	5
			074 Self-doubt	-0.10	4
			132 Lips apart (AU 25)	-0.08	5
			071 Unstructured productions	-0.06	5
			131 Eyes closed	-0.06	3
			032 Amplitude, loudness	-0.05	5
			056 Brow lowering	0.04	5
			130 Lip stretch (AU 20)	-0.04	4
			077 Descriptions of verbal and nonverbal interactions	-0.03	5
			057 Sneers	0.02	4
			129 Brow raise (AU 1)	0.01	5
			060 Eye muscles (AU 6), not during positive emotions	-0.01	4
			133 Jaw drop (AU 26)	0.00	5
			059 Lip corner pull (AU 12)	0.00	4

Note. AU = facial action unit (as categorized by Ekman & Friesen, 1978).

* $p < .05$.

Table 9
Stem and Leaf Plot of Combined Effect Sizes (d s) for Individual Cues to Deception

Stem	Leaf
0.6	6
0.6	
0.5	5
0.5	
0.4	
0.4	2
0.3	559
0.3	0014
0.2	55679
0.2	0011111123
0.1	566666777
0.1	000011122244
0.0	5566677778889
0.0	0000001111111222223333344444

Note. Included are the 88 cues for which at least three independent effect size estimates were available (at least two of which could be computed precisely).

Each of the more specific cues to positivity or negativity (e.g., head nods, brow lowering, sneers) produced combined effects very close to zero. The most notable finding was that the 27 estimates of smiling produced a combined effect size of exactly zero. The measures of smiling in those studies did not distinguish among different types of smiles. Ekman (1985/1992) argued that for smiling to predict deceptiveness, smiles expressing genuinely positive affect (distinguished by the cheek raise, facial action unit 6 [AU; as categorized by Ekman & Friesen, 1978], produced by movements of the muscles around the outside corner of the eye) must be coded separately from feigned smiles. Because our review contained only two estimates of genuine smiling and two of feigned smiling, the results are reported in Appendix B with the other cues for which the number of estimates was limited. The combined effects tend to support Ekman's position. When only pretending to be experiencing genuinely positive affect, people were less likely to show genuine smiles ($d = -0.70$) and more likely to show feigned ones ($d = 0.31$). There were no differences in the occurrence of the cheek raise for liars versus truth tellers in studies in which the participants were not experiencing or faking positive emotions ($d = -0.01$; e.g., studies of the expression and concealment of pain). Also as predicted by Ekman, the easily produced lip corner pull (AU 12) did not distinguish truths from lies either, again producing a combined effect size of exactly zero.

Are liars more tense than truth tellers? Except for two types of fidgeting, the results of every cue to tension were in the predicted direction, though again some were quite small and non-significant (see Table 6). Liars were more nervous and tense overall than truth tellers ($d = 0.27$). They were more vocally tense ($d = 0.26$) and spoke in a higher pitch ($d = 0.21$). Liars also had more dilated pupils ($d = 0.39$).

In studies in which different kinds of fidgeting were not differentiated, liars fidgeted more than truth tellers ($d = 0.16$). However, the effect was smaller for facial fidgeting (e.g., rubbing one's face, playing with one's hair; $d = 0.08$), and the results were in the opposite direction for object fidgeting (e.g., tapping a pencil, twisting a paper clip; $d = -0.12$) and self-fidgeting (e.g., scratch-

ing; $d = -0.01$). The best summary of these data is that there is no clear relationship between fidgeting and lying.

Do lies include fewer ordinary imperfections and unusual contents than do truths? The people who made spontaneous corrections while telling their stories were more likely to be telling truths than lies ($d = -0.29$). This is consistent with our prediction that liars would avoid behaviors they mistakenly construe as undermining the convincingness of their lies (see Table 7). Liars also seemed to avoid another admission of imperfection that truth tellers acknowledge: an inability to remember something ($d = -0.42$). There were also indications that liars stuck too closely to the key elements of the story they were fabricating. For example, like good novelists, truth tellers sometimes describe the settings of their stories; liars were somewhat less likely to do this ($d = -0.21$ for contextual embedding), and they provided nonsignificantly fewer unusual details ($d = -0.16$). However, liars did mention events or relationships peripheral to the key event ($d = 0.35$ for related external associations) more often than truth tellers did.

Summary of individual cues to deception. The most compelling results in this review are the ones based on relatively large numbers of estimates that produced the biggest combined effects. In Table 8, the 88 cues are arranged into four sections according to the number of independent estimates and the size of the combined effects. On the top half of the table are the cues for which six or more independent estimates were available. These were the 50 cues that were above the median in the number of estimates on which they were based (see also Field, 2001). On the bottom half are the 38 cues for which just three, four, or five estimates were available. In the first column are the 23 cues with combined effect sizes larger than $|0.20|$. In the second column are the 65 effect sizes equal to $|0.20|$ or smaller. The value of $|0.20|$ was selected based on Cohen's (1988) heuristic that effect sizes (d) of $|0.20|$ are small effects. Within each section, cues with the biggest effect sizes are listed first; within cues with the same effect sizes, those based on a larger number of estimates (k) are listed first.

Twelve cues are in the larger d and k section. These cues were based on at least six independent estimates and produced combined effects greater than $|0.20|$. Half of these cues were from the compelling category, including all three of the cues in the subcategory "makes sense." The effects for those three cues indicate that self-presentations that seem discrepant, illogically structured, or implausible are more likely to be deceptive than truthful. Verbal and vocal immediacy, from the "immediacy" subcategory, tops the list. Verbal and vocal uncertainty, from the subcategory "uncertain," is in this section, as is verbal and vocal involvement, a cue in the subcategory "engaging."

The larger d and k section also includes one of the cues in the forthcoming category (details) and one from the "positive, pleasant" category (negative statements and complaints). There are also three cues from the tense category (overall tension, vocal tension, and pitch) and one from the category of "ordinary imperfections and unusual details" (contextual embedding).

In the larger d and smaller k section of Table 8 are cues that produced relatively bigger effects but were based on smaller numbers of estimates. For example, a handful of estimates suggest that liars were less cooperative than truth tellers, were less likely to admit that they did not remember something, and had more dilated pupils.

Some of the cues in the smaller d and larger k section of Table 8 are noteworthy because the very tiny cumulative d s were based on large numbers of estimates. For example, response length, response latency, and eye contact were all based on more than 30 independent estimates, but they produced cumulative effect sizes of just -0.03 , 0.02 , and 0.01 , respectively.

Table 9 is a stem and leaf display of the absolute values of the 88 effect sizes. The median effect size is just $|0.10|$. Only two of the effect sizes meet Cohen's (1988) criterion of $|0.50|$ for large effects.

Moderators of Cues to Deception

In Tables 3–7, in which we present the combined results of the estimates of individual cues to deception, we included cues only if they were based on at least three effect sizes, at least two of which were precise estimates. In our moderator analyses, we needed to use a more stringent criterion to have a sufficient number of estimates at each level of the moderator variables. We began by considering all cues for which we had at least 10 precise estimates. Eighteen cues met that criterion: response length, details, response latency, rate of speaking, illustrators, eye contact, non-ah speech disturbances, silent pauses, filled pauses, posture shifts, hand movements, foot or leg movements, smiling (undifferentiated), nervous, pitch, blinking, self-fidgeting, and fidgeting (undifferentiated). Our initial analyses that combined across all estimates (as reported in Tables 3–7) indicated that for some of these cues, the estimates were homogeneous. Because our predictions were theoretically driven, we proceeded to test the moderator variables for all 18 of the cues. Four of the cues for which the estimates were homogeneous—illustrators, posture shifts, smiling (undifferentiated), and hand movements—produced no significant effects in any of our moderator analyses, indicating that the size of the effects was also homogeneous across levels of the moderators.

For the moderator analyses, we report three homogeneity statistics for each moderator. The Q_T statistic indicates the variability among all of the estimates of the cue included in the analysis. The Q_B statistic indicates between-groups variation. Significant between-groups effects indicate that the size of the effects differed across the levels of the moderator. The Q_W statistic indicates variability within each level of the moderator variable; a significant value indicates additional variability that has not been explained.

Motivation to succeed at lying. We predicted that cues to deception would be stronger in studies in which the social actors were motivated to get away with their lies than in studies in which no special incentives were provided. Table 10 shows the effect sizes for each cue for those two kinds of studies. Patterns of eye contact differed significantly between the motivated senders and the senders with no special motivation. When social actors were motivated to succeed, they made significantly less eye contact when lying than when telling the truth ($d = -0.15$). When no special incentive was provided to social actors, they made nonsignificantly more eye contact when lying ($d = 0.09$).

Two of the fluency cues, non-ah disturbances and filled pauses, varied with the motivation moderator. In studies in which no special incentive was provided, there was a small positive effect for both cues; deceptive self-presentations were nonsignificantly more likely to include non-ah disturbances ($d = 0.13$) and filled pauses ($d = 0.09$) than truthful ones. However, when incentives

were provided, this effect reversed, and deceptive self-presentations included nonsignificantly fewer non-ah speech disturbances ($d = -0.10$) and filled pauses ($d = -0.13$) than truthful ones.

Several cues to tension also discriminated cues to deception under the two motivational conditions. Social actors were more tense overall when lying compared with when telling the truth, and this effect was significant only when they were motivated to succeed ($d = 0.35$ vs. 0.15). Also, it was only in the incentive condition that lies were communicated in more highly pitched voices than were truths ($d = 0.59$ vs. -0.02).

Differences in the magnitude of the effects (absolute values) for studies in which social actors were or were not motivated to succeed are also telling. For studies in which there was no special incentive for succeeding, cues to deception were generally weak. Overall, the size of the effects increased somewhat when some incentive was provided.

Identity-relevant motivations to succeed. We had predicted that across all of the estimates in our data set, we would find that liars' responses would be shorter than those of truth tellers', would be preceded by a longer response latency, and would include more silent pauses. None of these predictions was supported in the overall analyses. However, all of these predictions were significantly more strongly supported under conditions of identity-relevant motivation than under no-motivation conditions (see Table 11). Within the identity-relevant condition, the effect sizes were nearly significant for response length ($d = -0.23$) and silent pauses ($d = 0.38$) but not significant for response latency ($d = 0.36$).

In the identity-relevant condition, the voice pitch of liars was significantly higher than that of truth tellers; the effect size was significant ($d = 0.67$), and it differed significantly from the effect size in the no-motivation condition ($d = -0.02$). Liars in the identity-relevant condition also made significantly fewer foot or leg movements than truth tellers ($d = -0.28$); however, the size of the effect was not significantly different when compared with the no-motivation condition ($d = -0.02$).

Instrumental motivations. Table 11 also shows cues to deception for studies in which the incentives were primarily instrumental (e.g., financial). Only two cues differed significantly in size between the studies that provided no incentives to the social actors and those that provided instrumental incentives. Non-ah disturbances ($d = -0.17$) and filled pauses ($d = -0.14$) occurred nonsignificantly less often in the speech of the liars than of the truth tellers in the studies that provided instrumental incentives. In the studies in which no incentives were provided, the speech of liars included somewhat more non-ah disturbances ($d = 0.13$) and filled pauses ($d = 0.09$) than the speech of truth tellers. Within the instrumental-motivation condition, there were no effect sizes that differed significantly from chance.

Identity-relevant versus instrumental motivations. The self-presentational perspective predicts stronger effects when incentives are identity relevant than when they are instrumental. Results (also shown in Table 11) indicate that the responses of liars tended to be even shorter than those of truth tellers when the social actors were motivated by identity-relevant incentives than when they were instrumentally motivated ($d = -0.23$ vs. -0.05); for the difference between conditions, $p = .06$. Response latencies were significantly longer ($d = 0.36$ vs. -0.01), and there were some-

Table 10
Cues to Deception When Incentives for Success Were or Were Not Provided

Cue	Condition		Q_T (df)	Q_B (1)
	No motivation	Motivation		
001 Response length				
d (CI)	-0.03 (-0.15, 0.09)	-0.03 (-0.14, 0.08)	92.1* (48)	0.0
Q_W (k)	59.6* (21)	32.5 (28)		
009 Response latency				
d (CI)	0.04 (-0.17, 0.26)	0.00 (-0.22, 0.22)	112.4* (32)	0.3
Q_W (k)	50.1* (18)	62.0* (15)		
010 Rate of speaking				
d (CI)	0.10 (-0.04, 0.25)	0.04 (-0.10, 0.17)	21.7 (22)	0.5
Q_W (k)	8.7 (8)	12.5 (15)		
027 Eye contact				
d (CI)	0.09 (-0.01, 0.19)	-0.15* (-0.29, -0.01)	41.1 (31)	9.0*
Q_W (k)	13.3 (20)	18.8 (12)		
035 Non-ah disturbances				
d (CI)	0.13 (-0.15, 0.41)	-0.10 (-0.34, 0.14)	60.5* (16)	6.3*
Q_W (k)	24.6* (7)	29.7* (10)		
037 Silent pauses				
d (CI)	-0.02 (-0.18, 0.15)	0.06 (-0.16, 0.29)	18.5 (14)	0.5
Q_W (k)	7.1 (8)	10.8 (7)		
038 Filled pauses				
d (CI)	0.09 (-0.03, 0.22)	-0.13 (-0.28, 0.02)	22.2 (15)	6.5*
Q_W (k)	8.3 (8)	7.4 (8)		
048 Foot or leg movements				
d (CI)	-0.02 (-0.15, 0.11)	-0.13* (-0.22, -0.03)	20.4 (27)	1.4
Q_W (k)	5.0 (9)	14.0 (19)		
061 Nervous, tense				
d (CI)	0.15 (-0.15, 0.44)	0.35* (0.11, 0.58)	37.3* (15)	3.0
Q_W (k)	10.8 (8)	23.4* (8)		
063 Frequency, pitch				
d (CI)	-0.02 (-0.23, 0.20)	0.59* (0.31, 0.88)	31.2* (11)	18.6*
Q_W (k)	2.9 (6)	9.7 (6)		
066 Blinking				
d (CI)	0.05 (-0.14, 0.25)	0.09 (-0.19, 0.36)	54.4* (16)	0.5
Q_W (k)	23.9* (9)	30.3* (8)		
068 Self-fidgeting				
d (CI)	0.08 (-0.03, 0.18)	-0.12 (-0.25, 0.01)	19.5 (17)	5.5*
Q_W (k)	10.1 (11)	3.9 (7)		
070 Fidgeting (undifferentiated)				
d (CI)	0.09 (-0.33, 0.53)	0.18 (-0.08, 0.43)	28.2* (13)	0.3
Q_W (k)	11.3* (3)	16.6* (11)		

Note. Cue numbers are of the cues described in the current article as indexed in Appendix A. Bold type indicates statistical significance. The Q statistics are homogeneity statistics; significance indicates rejection of the hypothesis of homogeneity of effect sizes (ds). Therefore, bigger Q s indicate less homogeneity. Q_T = homogeneity among all estimates for a particular cue; df = degree of freedom; Q_B = homogeneity between the two levels of the moderator being compared. CI = 95% confidence interval; Q_W = homogeneity of ds within the level of the moderator; k = number of independent estimates.

* $p < .05$.

what more silent pauses ($d = 0.38$ vs. -0.03 ; for the difference between conditions, $p = .07$). There were no cues that were significantly or nearly significantly stronger in the instrumental-motivation condition.

Unplanned and planned presentations. Seven independent samples (described in eight reports) included a manipulation of whether the senders' messages were unplanned or planned. Results for 33 specific cues were reported by the authors. However, there were only two cues (response length and response latency) that met our criterion of being based on at least three independent estimates (at least two of which were estimated precisely). Table 12 shows the results for those cues as well as several others that

met a less stringent criterion: At least two independent estimates were available, and at least one was estimated precisely. Those results should be interpreted with caution.

We computed the effect sizes in Table 12 by subtracting the effect size for the planned messages from the effect size from the unplanned messages. Therefore, more positive effect sizes indicate that the relationship of the cue to deception was more positive for the unplanned messages than for the planned messages.

As predicted, the combined effect for response latency was statistically reliable ($d = 0.20$). When social actors did not plan their messages, there was a longer latency between the end of the question and the beginning of their answer when they were lying

Table 11

Cues to Deception Under Conditions of No Motivation, Identity-Relevant Motivation, and Instrumental Motivation

Cue	Condition					
	No motivation (NM)	Identity-relevant (IR)	Instrumental (IN)	NM vs. IR	NM vs. IN	IR vs. IN
001 Response length						
<i>d</i> (CI)	-0.03 (-0.17, 0.11)	-0.23 (-0.48, 0.02)	-0.05 (-0.21, 0.12)			
Q_w (<i>k</i>)	59.6* (21)	5.0 (8)	12.0 (16)			
Q_T (<i>df</i>)				69.5* (28)	71.6* (36)	20.5 (23)
Q_B (1)				4.9*	0.1	3.6
009 Response latency						
<i>d</i> (CI)	0.04 (-0.15, 0.24)	0.36 (-0.11, 0.84)	-0.01 (-0.43, 0.40)			
Q_w (<i>k</i>)	50.2* (18)	10.1 (6)	2.8 (5)			
Q_T (<i>df</i>)				64.9* (23)	53.2* (22)	17.1 (10)
Q_B (1)				4.6*	0.2	4.2*
010 Rate of speaking						
<i>d</i> (CI)	0.10 (-0.05, 0.26)	0.06 (-0.28, 0.40)	-0.03 (-0.22, 0.17)			
Q_w (<i>k</i>)	8.7 (8)	0.3 (3)	10.0 (10)			
Q_T (<i>df</i>)				9.0 (10)	20.0 (17)	10.5 (12)
Q_B (1)				0.1	1.3	0.2
027 Eye contact						
<i>d</i> (CI)	0.09* (0.01, 0.17)	-0.19 (-0.50, 0.12)	-0.08 (-0.25, 0.09)			
Q_w (<i>k</i>)	13.3 (20)	1.2 (3)	10.3 (7)			
Q_T (<i>df</i>)				16.8 (22)	26.8 (26)	11.9 (9)
Q_B (1)				2.3	3.2	0.3
035 Non-ah disturbances						
<i>d</i> (CI)	0.13 (-0.17, 0.43)		-0.17 (-0.53, 0.18)			
Q_w (<i>k</i>)	24.6* (7)		16.8* (6)			
Q_T (<i>df</i>)					49.2* (12)	
Q_B (1)					8.0*	
037 Silent pauses						
<i>d</i> (CI)	-0.02 (-0.16, 0.13)	0.38 (-0.01, 0.77)	-0.03 (-0.36, 0.31)			
Q_w (<i>k</i>)	7.1 (8)	1.8 (3)	4.4 (3)			
Q_T (<i>df</i>)				13.5 (10)	11.5 (10)	9.8 (5)
Q_B (1)				4.6*	0.0	3.5
038 Filled pauses						
<i>d</i> (CI)	0.09 (-0.04, 0.23)		-0.14 (-0.32, 0.04)			
Q_w (<i>k</i>)	8.3 (8)		6.2 (6)			
Q_T (<i>df</i>)					20.9 (13)	
Q_B (1)					6.4*	
048 Foot or leg movements						
<i>d</i> (CI)	-0.02 (-0.14, 0.11)	-0.28* (-0.51, -0.06)	-0.09 (-0.22, 0.03)			
Q_w (<i>k</i>)	5.0 (9)	2.6 (5)	9.0 (12)			
Q_T (<i>df</i>)				10.8 (13)	14.6 (20)	13.3 (16)
Q_B (1)				3.2	0.6	1.7
061 Nervous, tense						
<i>d</i> (CI)	0.15 (-0.15, 0.44)	-0.02 (-0.35, 0.31)				
Q_w (<i>k</i>)	10.8 (8)	3.3 (4)				
Q_T (<i>df</i>)				15.2 (11)		
Q_B (1)				1.2		
063 Frequency, pitch						
<i>d</i> (CI)	-0.02 (-0.15, 0.11)	0.67* (0.43, 0.92)				
Q_w (<i>k</i>)	2.9 (6)	0.0 (3)				
Q_T (<i>df</i>)				17.0* (8)		
Q_B (1)				14.1*		
066 Blinking						
<i>d</i> (CI)	0.05 (-0.11, 0.22)	0.05 (-0.50, 0.39)				
Q_w (<i>k</i>)	23.9* (9)	0.3 (3)				
Q_T (<i>df</i>)					24.2* (1.1)	
Q_B (1)					0.0	
068 Self-fidgeting						
<i>d</i> (CI)	0.08 (-0.03, 0.19)	-0.09 (-0.27, 0.09)				
Q_w (<i>k</i>)	10.1 (11)	1.3 (4)				
Q_T (<i>df</i>)					13.8 (14)	
Q_B (1)					2.4	
070 Fidgeting (undifferentiated)						
<i>d</i> (CI)	0.09 (-0.43, 0.61)	0.11 (-0.43, 0.65)	0.33 (-0.12, 0.78)			
Q_w (<i>k</i>)	11.3* (3)	0.6 (4)	10.6 (6)			
Q_T (<i>df</i>)				11.9* (6)	23.8* (8)	12.8 (9)
Q_B (1)				0.0	1.9	1.6

Note. Cue numbers are of the cues described in the current article as indexed in Appendix A. Bold type indicates statistical significance. The Q statistics are homogeneity statistics; significance indicates rejection of the hypothesis of homogeneity of effect sizes (*ds*). Therefore, bigger Q s indicate less homogeneity. Q_T = homogeneity among all estimates for a particular cue; *df* = degree of freedom; Q_B = homogeneity between the two levels of the moderator being compared. CI = 95% confidence interval; Q_w = homogeneity of *ds* within the level of the moderator; *k* = number of independent estimates.

* $p < .05$.

Table 12
Cues to Deception: Differences Between Unplanned and Planned Communications

Cue	k_1	k_2	d	CI	Q
001 Response length	6	3	0.07	-0.06, 0.20	6.3
009 Response latency	4	1	0.20*	0.07, 0.34	8.7
018 Illustrators	3	1	0.03	-0.18, 0.11	0.4
027 Eye contact	3	1	-0.09	-0.23, 0.06	0.8
037 Silent pauses	2	2	0.57	0.00, 1.14	10.1*
055 Head nods	3	1	-0.11	-0.25, 0.04	3.1
058 Smiling	3	1	0.07	-0.08, 0.22	1.2
070 Fidgeting (undifferentiated)	3	2	-0.03	0.19, 0.14	1.6

Note. Cue numbers are of the cues described in the current article as indexed in Appendix A. Bold type indicates statistical significance. Effect sizes (ds) were computed by subtracting the d for planned messages from the d for unplanned messages. Therefore, more positive ds indicate that the behavior was more positively associated with deception for the unplanned messages than for the planned ones. k_1 = total number of ds ; k_2 = number of ds that could be estimated precisely; CI = 95% confidence interval; Q = homogeneity statistic (significance indicates rejection of the hypothesis of homogeneity of ds ; therefore, bigger Qs indicate less homogeneity).

* $p < .05$.

than when they were telling the truth, but when the senders planned their messages, they began responding relatively more quickly when lying than when telling the truth. There were also somewhat more silent pauses in the deceptive presentations than the truthful ones when those presentations were not planned than when they were planned ($d = 0.57$, $p = .05$).

Duration of the presentations. We predicted that if social actors needed to sustain their presentations for greater lengths of time, cues to deception would be clearer and more numerous. We used the mean duration of the messages in each study as an approximation of the degree to which social actors needed to sustain their presentations over time. Because duration is a continuous variable, there are no separate groups. Instead, a significant Q_B statistic indicates that the effect sizes were not homogeneous (i.e., the moderator was significant), and the unstandardized beta indicates the direction of the effect.

There were three cues for which at least eight independent estimates were available: response length ($Q_B = 5.4$, $k = 13$); response latency ($Q_B = 6.1$, $k = 8$); and pitch ($Q_B = 6.6$, $k = 8$), and for all three, Q_B indicated that the effect sizes were not homogeneous across message lengths. This means that all three cues varied significantly with the duration of the presentations. When presentations were sustained for greater amounts of time, deceptive responses were especially shorter than truthful ones ($b = -0.008$), and they were preceded by a longer latency ($b = 0.034$). Lies, relative to truths, were also spoken in an especially higher pitched voice when the presentations lasted longer ($b = 0.002$).

Communications that were or were not about transgressions. We expected to find stronger cues to negativity and tension in studies in which social actors lied about transgressions than in those in which the lies were not about transgressions. As shown in Table 13, this was an important moderator of cues to deception.

When the lie was about a transgression, compared with when it was not, liars took longer to begin responding than did truth tellers ($d = 0.27$ vs. -0.01). Once they started talking, they talked

significantly faster than truth tellers ($d = 0.32$ vs. 0.01). They also seemed more tense overall ($d = 0.51$ vs. 0.09), and they blinked more ($d = 0.38$ vs. 0.01). A trend suggested that they tended to avoid eye contact more ($d = -0.13$ vs. 0.04 , $p = .07$). There were also some cues suggestive of inhibition: People lying about transgressions made fewer foot or leg movements ($d = -0.24$ vs. -0.04), and they fidgeted less ($d = -0.14$ vs. 0.07 for self-fidgeting, $d = -0.16$ vs. 0.24 for undifferentiated fidgeting). Once again, the effect for non-ah disturbances was contrary to expectations: Lies about transgressions included fewer such disturbances than truths; the lies that were not about transgressions included relatively more of them ($d = -0.24$ vs. 0.17). Within the transgression condition, the effect sizes for response latency, rate of speaking, non-ah disturbances, foot or leg movements, tension, blinking, and self-fidgeting all differed significantly, or nearly so, from zero. Within the no-transgression condition, only the effect for undifferentiated fidgeting differed from zero.

Overall differences in the magnitude of the cues to deception for lies about transgressions compared with lies about other topics are also noteworthy. For 11 of the 12 cues, the absolute value of the effect was bigger for the lies about transgressions than for the other lies. In some instances, however, the direction of the effect was contrary to predictions (e.g., non-ah disturbances, fidgeting).

Interactivity. Buller and Burgoon's (1996) formulation predicts greater pleasantness, fluency, composure, involvement, and immediacy with increasingly interactive contexts. Effect sizes differed significantly for interactive paradigms relative to noninteractive ones for three cues: details ($Q_B = 4.41$), pitch ($Q_B = 8.21$), and blinking ($Q_B = 13.15$). Liars offered significantly fewer details than truth tellers in interactive contexts ($d = -0.33$; 95% confidence interval [CI] = $-0.51, -0.15$; $k = 20$); for noninteractive contexts, the effect was negligible ($d = -0.06$; CI = $-0.51, 0.39$; $k = 4$). This result does not seem consistent with Buller and Burgoon's predictions. Liars in interactive contexts spoke in a significantly higher pitched voice than did truth tellers ($d = 0.35$; CI = $0.07, 0.64$; $k = 9$); for noninteractive contexts, there was a very small effect in the opposite direction ($d = -0.06$; CI = $-0.45, 0.33$; $k = 3$). In that pitch typically rises with stress, this result is inconsistent with the prediction that liars would show more composure with increasing interactivity. Finally, liars in noninteractive contexts blinked significantly more than truth tellers ($d = 0.29$; CI = $0.03, 0.56$; $k = 4$); in interactive contexts, there was little difference ($d = -0.06$; CI = $-0.21, 0.80$; $k = 12$). In that blinking can be a sign of tension, this result is consistent with predictions.

Cues measured objectively and subjectively. To test our prediction that cues based on subjective impressions would more powerfully discriminate truths from lies than cues measured objectively, we searched the data set for cues that were assessed subjectively and objectively and that had at least three estimates per assessment type. Five cues that met the criterion are shown in Table 14. In addition, we compared the verbal immediacy composite (Cue 019), which is based on the objective scoring of linguistic forms, with the verbal and vocal immediacy cue (Cue 025), which is based on subjective impressions.

Three of the six comparisons were significant, and all of them showed that the effect sizes were stronger when the cues were assessed subjectively than when they were measured objectively. Impressions of immediacy separated truths from lies more power-

Table 13
Cues to Deception When Senders Did and Did Not Commit a Transgression

Cue	Condition		Q_T (df)	Q_B (1)
	No transgression	Transgression		
001 Response length				
d (CI)	-0.02 (-0.11, 0.08)	-0.08 (-0.25, 0.10)	92.1* (48)	0.7
Q_W (k)	74.6* (38)	16.7 (11)		
009 Response latency				
d (CI)	-0.07 (-0.24, 0.11)	0.27 (-0.02, 0.55)	112.4* (31)	13.7*
Q_W (k)	67.4* (24)	31.3* (8)		
010 Rate of speaking				
d (CI)	0.01 (-0.08, 0.10)	0.32* (0.13, 0.52)	21.7 (22)	6.6*
Q_W (k)	8.7 (18)	6.4 (5)		
027 Eye contact				
d (CI)	0.04 (-0.05, 0.14)	-0.13 (-0.33, 0.07)	41.1 (31)	3.3
Q_W (k)	24.4 (26)	13.3* (6)		
035 Non-ah disturbances				
d (CI)	0.17 (-0.04, 0.38)	-0.24 (-0.49, 0.01)	60.5* (16)	19.7*
Q_W (k)	6.5 (11)	34.3* (6)		
037 Silent pauses				
d (CI)	-0.01 (-0.15, 0.14)	0.10 (-0.24, 0.43)	18.5 (14)	0.5
Q_W (k)	11.8 (10)	6.2 (5)		
038 Filled pauses				
d (CI)	0.01 (-0.13, 0.14)	-0.03 (-0.26, 0.21)	22.2 (15)	0.1
Q_W (k)	9.5 (11)	12.6* (5)		
048 Foot or leg movements				
d (CI)	-0.04 (-0.12, 0.04)	-0.24* (-0.38, -0.09)	20.4 (27)	3.8*
Q_W (k)	11.4 (21)	5.2 (7)		
061 Nervous, tense				
d (CI)	0.09 (-0.11, 0.29)	0.51* (0.28, 0.75)	37.3* (15)	13.9*
Q_W (k)	15.2 (12)	8.2 (4)		
066 Blinking				
d (CI)	0.01 (-0.14, 0.16)	0.38* (0.03, 0.73)	54.4* (16)	12.2*
Q_W (k)	40.5* (13)	1.7 (4)		
068 Self-fidgeting				
d (CI)	0.07 (-0.03, 0.17)	-0.14 (-0.28, -0.00)	19.5 (17)	5.7*
Q_W (k)	8.2 (12)	5.5 (6)		
070 Fidgeting (undifferentiated)				
d (CI)	0.24* (0.02, 0.46)	-0.16 (-0.58, 0.27)	28.2* (13)	6.1*
Q_W (k)	18.1 (10)	4.1 (4)		

Note. Cue numbers are of the cues described in the current article as indexed in Appendix A. Bold type indicates statistical significance. The Q statistics are homogeneity statistics; significance indicates rejection of the hypothesis of homogeneity of effect sizes (ds). Therefore, bigger Q s indicate less homogeneity. Q_T = homogeneity among all estimates for a particular cue; df = degree of freedom; Q_B = homogeneity between the two levels of the moderator being compared. CI = 95% confidence interval; Q_W = homogeneity of ds within the level of the moderator; k = number of independent estimates.

* $p < .05$.

fully than did objective measures of immediacy ($d = -0.55$ vs. -0.31 ; only the d for subjective impressions was significant). When eye contact was based on subjective impressions, liars showed somewhat less eye contact than truth tellers ($d = -0.28$); there was virtually no difference when eye contact was measured objectively ($d = 0.04$). Similarly, subjective impressions of facial pleasantness indicated that liars were significantly less facially pleasant than truth tellers ($d = -0.20$), but this did not occur when facial pleasantness was measured objectively ($d = 0.07$).

Discussion

Previous perspectives on cues to deception have pointed to the predictive value of factors such as the feelings of guilt or apprehensiveness that people may have about lying, the cognitive chal-

lenges involved in lying, and the attempts people make to control their verbal and nonverbal behaviors (e.g., Ekman, 1985/1992; Ekman & Friesen, 1969; Zuckerman et al., 1981). Unlike past formulations, our self-presentational perspective is grounded in psychology's growing understanding of the nature of lying in everyday life. Lying, we now know, is a fact of daily life, and not an extraordinary event. Lies, like truths, are often told in the pursuit of identity-relevant goals. People frequently lie to make themselves (or sometimes others) look better or feel better; they try to appear to be the kind of person they only wish they could truthfully claim to be (B. M. DePaulo, Kashy, et al., 1996). Now that we have recognized the pedestrian nature of most lie telling in people's lives, the factors underscored by others assume their rightful place.

Table 14
Cues to Deception Based on Objective and Subjective Measures

Cue	Measurement		Q_T (df)	Q_B (1)
	Objective	Subjective		
004 Details				
d (CI)	-0.27* (-0.50, -0.04)	-0.32* (-0.58, -0.07)	76.2* (23)	0.3
Q_W (k)	34.9* (14)	41.0* (10)		
019 Verbal immediacy with				
025 Verbal, vocal immediacy				
d (CI)	-0.31 (-0.73, 0.10)	-0.55* (-0.88, -0.23)	28.7* (8)	3.9*
Q_W (k)	2.4 (3)	26.3* (7)		
026 Nonverbal immediacy				
d (CI)	-0.08 (-0.26, 0.11)	-0.07 (-0.28, 0.14)	6.9 (10)	0.0
Q_W (k)	2.2 (7)	4.6 (4)		
027 Eye contact				
d (CI)	0.04 (-0.05, 0.12)	-0.28 (-0.58, 0.02)	41.1 (31)	5.1*
Q_W (k)	30.0 (27)	5.9 (5)		
054 Facial pleasantness				
d (CI)	0.07 (-0.18, 0.33)	-0.20* (-0.37, -0.03)	25.1 (12)	6.7*
Q_W (k)	2.3 (8)	16.1* (5)		
064 Relaxed posture				
d (CI)	-0.00 (-0.24, 0.24)	-0.05 (-0.33, 0.23)	19.6 (12)	0.2
Q_W (k)	0.0 (9)	19.5* (4)		

Note. Cue numbers are of the cues described in the current article as indexed in Appendix A. Bold type indicates statistical significance. The Q statistics are homogeneity statistics; significance indicates rejection of the hypothesis of homogeneity of effect sizes (ds). Therefore, bigger Q s indicate less homogeneity. Q_T = homogeneity among all estimates for a particular cue; df = degree of freedom; Q_B = homogeneity between the two levels of the moderator being compared. CI = 95% confidence interval; Q_W = homogeneity of ds within the level of the moderator; k = number of independent estimates.

* $p < .05$.

Previous Perspectives on Cues to Deception

Feelings While Lying

In that the behaviors or feelings that people try to hide with their lies are usually only mildly discrediting, feelings of guilt should be mild as well. Similarly, for most lies, the sanctions attendant on getting caught are minimal; thus, liars should ordinarily seem only slightly more apprehensive than truth tellers. Perhaps these faint feelings of guilt and apprehensiveness account for the twinge of discomfort reported by the tellers of everyday lies. We believe that the discomfort is also born of the one identity-relevant implication that is common to all liars: They are willing to make claims they believe to be untrue.

Two predictions follow from this analysis. First, cues to negativity and tension will generally be weak. However, when liars have reason to feel especially guilty about their lies or apprehensive about the consequences of them, as when they are lying about transgressions, then those cues should be stronger. Consistent with predictions, we did find some of the expected cues in our analyses that combined across all studies. For example, liars made more negative statements than did truth tellers, and they appeared more tense. When we looked separately at the lies that were and were not about transgressions, we found that the cues to lies about transgressions were more plentiful and more robust than the cues to deception for any level of any of the other moderators we examined. In contrast, lies that were not about transgressions were barely discriminable from the truths.

The self-presentational perspective accords importance, not only to the feelings that liars experience more routinely than do truth

tellers, but also to the feelings that truth tellers genuinely experience and that liars can only try to fake. When social actors are truthfully presenting aspects of themselves that are especially important to them, they have an emotional investment that is not easily simulated by those who only pretend to have such personal qualities. They also have the support of a lifetime of experiences at living the part. Liars' performances, then, would pale in comparison. Consistent with this formulation is our finding that liars were generally less forthcoming than truth tellers, and their tales were less compelling. For example, liars provided fewer details than did truth tellers. In contrast, truth tellers sounded more involved, more certain, more direct, and more personal.

Arousal

Pupil dilation and pitch did function as cues to deception and could be regarded as supportive of the hypothesized importance of generalized arousal. However, we believe that it is theoretically and empirically more precise and defensible to interpret these cues as indicative of particular attentional or information-processing activities or of specific affective experiences (e.g., Cacioppo, Petty, & Tassinary, 1989; Ekman et al., 1983; Neiss, 1988; Sparks & Greene, 1992).

Cognitive Complexities

Several theoretical statements share the assumption that lie telling is more cognitively challenging than telling the truth (e.g., Buller & Burgoon, 1996; Zuckerman et al., 1981). From our

self-presentational perspective, we instead agree with McCornack (1997) in questioning that assumption. Because lie telling is so routinely practiced, it may generally be only slightly more challenging than telling the truth.

In the overall analyses combining all estimates of a given cue, we found some indications that liars may have been more preoccupied and more cognitively taxed than truth tellers. The level of involvement in their words and in their voices, which does not quite measure up to that of truth tellers, is one such possibility. So, too, is the impression of uncertainty that they convey. The discrepancies in their self-presentations may also be telling. Some of the expected cues, such as the longer response latencies, the shorter responses, and the more hesitant responses, did not emerge in the analyses that combined results across all studies. However, moderator analyses show that, as we had predicted, these cues were more revealing when the self-presentations may have been more challenging to generate. When social actors could not plan their presentations, compared with when they could, the response latencies of deceivers were greater than those of truth tellers, and their presentations tended to include more silent pauses. When presentations were sustained for greater lengths of time, liars' latencies to respond were again greater than those of truth tellers, and their responses were briefer and spoken in a higher pitch.

Attempted Control

From our self-presentational perspective, liars are attempting to control not just their behaviors (e.g., Zuckerman et al., 1981) but also their thoughts and feelings. Truth tellers attempt these forms of self-regulation as well, but liars' efforts are experienced as more deliberate. Deliberate self-regulatory efforts may be especially likely to usurp mental resources, leaving liars more preoccupied than truth tellers. Liars' tales therefore seem less compelling and less forthcoming. Because so many of the little lies that people tell require scant self-regulatory effort, the resulting cues generally are weak. However, when self-regulatory efforts intensify, as when social actors are highly motivated (especially by identity-relevant goals) to get away with their lies, then cues intensify, too.

Consistent with our formulation is our finding that motivated liars (compared with less motivated ones) had even higher pitched voices than truth tellers, and they seemed even more tense and inhibited. When the motivation was one that linked success at deceit to identity and self-presentational concerns, cues became clearer still. When social actors saw their success as reflective of important aspects of themselves, compared with when there were no particular incentives, their lies were betrayed by the time it took them to begin their deceptive responses (relative to their truthful ones), the relative brevity of those responses, the silent hesitations within them, and the higher pitch in which they were spoken. Incentives that were not self-relevant resulted in cues to deception that differed less markedly from the cues that occurred when no special incentive was in place.

Interactivity

In Buller and Burgoon's (1996) interpersonal model of deception, the central theoretical construct is the degree of interaction between the liar and the target of the lies. The model predicts greater involvement and immediacy with greater interactivity, but

our review found that liars in interactive contexts, relative to noninteractive ones, provided fewer details than did truth tellers. Eye contact, a nonverbal immediacy cue, did not differentially predict deception in interactive versus noninteractive contexts. Buller and Burgoon's model predicts greater composure with greater interaction, but we found that higher pitch—an indicator of lack of composure—was a cue to deception in interactive contexts only. Blinking was a more powerful cue to deception in noninteractive contexts. Other cues to composure, such as nervousness and fidgeting, did not vary with the interactivity of the context. Their model predicts greater fluency with increasing interaction, but our analysis indicates interactivity was not a significant moderator of any of the cues to fluency (non-ah speech disturbances, silent pauses, filled pauses).

We think Buller and Burgoon's (1996) interactivity predictions failed because their construct is theoretically imprecise (B. M. DePaulo, Ansfield, & Bell, 1996). Totally noninteractive contexts (e.g., leaving a lie on a target person's voicemail) differ from totally interactive ones (e.g., unscripted face-to-face interactions) in many important ways. One is the mere presence of the other person, even apart from any interaction with that person. That presence has the potential to affect self-awareness, awareness of the potential impact of the lie on that person, the salience of self-presentational goals, and feelings of accountability (e.g., Schlenker, 2002; Schlenker, Britt, Pennington, Murphy, & Doherty, 1994; Wicklund, 1982). Interactive exchanges entangle participants in multiple roles and tasks (Buller & Burgoon, 1996; Ekman & Friesen, 1969), which can be cognitively challenging. However, to the extent that interactive exchanges are the more familiar mode of communication, participants may find them less challenging than noninteractive communications. From a conversational analysis perspective, the significance of interactive processes may lie in the interpretive frame they provide (e.g., Brown & Levinson, 1987; Grice, 1989; Jacobs, Brashers, & Dawson, 1996; McCornack, 1992). For example, whether a person has provided too little, too much, unclear, or irrelevant information in response to an inquiry is more readily assessed within the context of the conversation than apart from it. To Buller and Burgoon, what was especially important about interaction is the opportunity it affords the participants to evaluate the effectiveness of their attempts (e.g., the liars can determine whether their targets seem suspicious) and adjust their behavior accordingly.

Some of the ways in which interactive contexts differ from noninteractive ones may be inconsistent with each other in their implications for cues to deception. Clarity should follow, not from Buller and Burgoon's (1996) approach of enumerating variables that moderate the effects of interactivity, but from looking separately at the important component processes. An example of this approach is Levine and McCornack's (1996, 2002) analysis of the "probing effect," which is the counterintuitive finding that communicators who are probed by their targets are perceived as more honest than those who are not probed. The initial explanation for this effect was behavioral adaptation: Probed communicators recognized the skepticism of their targets, and adapted their behavior to appear more truthful (e.g., Buller & Burgoon, 1996; Stiff & Miller, 1986). However, when Levine and McCornack (2002) manipulated the presence of probes in videotaped interviews in which the communicators' behavior was held constant (ruling out

the behavioral adaptation explanation) the probing effect still occurred.

The Self-Presentational Perspective on Cues to Deception Ordinary Imperfections and Unusual Contents

Only the self-presentational perspective predicts that lies are characterized by fewer ordinary imperfections and unusual contents than truths. Drawing from research and theory on credibility assessment (e.g., Yuille, 1989), we suggested that liars try to anticipate the kinds of communications that targets would find credible and that in doing so, fall prey to their own misconceptions about the nature of truth telling. Some of our results were consistent with that prediction. People who spontaneously corrected themselves and who admitted that they could not remember everything about the story they were relating, were more likely to be telling the truth than to be lying. It was also truth tellers who were somewhat more likely to tell stories richer in contextual embedding and unusual details.

The Looks and Sounds of Deceit Are Faint

We found evidence for all five of the categories of cues we predicted: Deceptive presentations (relative to truthful ones) were in some ways less forthcoming, less compelling, more negative, more tense, and suspiciously bereft of ordinary imperfections and unusual details. Fundamental to the self-presentational perspective is the prediction that these cues would be weak. In fact, they were. The median effect size of the 88 cues was just $|0.10|$. Only 3 of these cues had effect sizes greater than $|0.40|$.

Results of the moderator analyses suggest that pronouncements about the faintness of the signs of deceit are both understated and exaggerated. Lies told by social actors who have no special motivation to succeed in their presentations and lies that are not about transgressions leave almost no discernible cues. Even some of the cues that did seem promising in the results combined across all estimates—for example, cues to tension and to pitch—lost a bit of their luster for self-presentations that were not about transgressions and that were not driven by any particular incentives. These nearly cueless lies most closely resemble the deceptive presentations of self in everyday life. However, when social actors were using their lies to hide matters that could spoil their identities (such as when they were lying about transgressions), and when their success at lying was linked to important aspects of their self-concepts, then cues to deception were no longer quite so faint.

When Will Cues to Deception Be Clearer?

Using our self-presentational perspective, we were able to predict some important moderators of the strength of cues to deception. In this section, we consider five other ways in which the results of our overall analyses may have underestimated the potential for verbal and nonverbal cues to separate truths from lies.

First, perhaps effect sizes for cues to deception would be more impressive if they were computed separately for the different emotions that senders may be trying to conceal or to convey (Ekman, 1985/1992). There were not enough relevant studies available to test this possibility adequately in the present review. Second, in this review, as in most of the studies in the literature, we

tested the predictive power of each behavioral cue individually. However, the degree to which lies can be discriminated from truths could potentially be improved if combinations of cues were considered (e.g., Ekman, O'Sullivan, Friesen, & Scherer, 1991; Vrij, Edward, Roberts, & Bull, 2000). Third, if the replicability of a set of cues within a particular context can be established, the implications could be important even if the particular cues could not be generalized to different contexts. For example, behavioral cues believed to be indicative of deceit in the context of polygraph testing (e.g., Reid & Arthur, 1953) or criminal interrogations (e.g., Macdonald & Michaud, 1987) are worth establishing even if some of them occur infrequently outside of those contexts. Fourth, it is possible that particular individuals telegraph their lies in idiosyncratic yet highly reliable ways (Vrij & Mann, 2001) that are not captured by our meta-analytic approach. Finally, our results suggest that truths and lies may be discriminated more powerfully by using subjective measures rather than objective ones. However, detailed coding systems that are carefully validated and used to test theoretically based predictions may enable more precise discriminations than untrained observers could achieve with their subjective impressions (e.g., Ekman & Friesen, 1978; Scherer, 1982).

When Truths and Lies Switch Sides

It is important to emphasize that there are exceptions to the predictions we derived from the self-presentational perspective. There are times when people more readily embrace their deceptive presentations than their truthful ones. For example, a man who has long fantasized about being a war hero and has claimed repeatedly to have been one may eventually make that false claim more convincingly than he can describe his actual war-year experiences teaching in his homeland, which was at peace. There are also times when truthful presentations are enacted with a greater sense of deliberateness than are deceptive ones. Self-incriminating truths are examples of this (cf. Kraut, 1978). When the tables are turned, the cues are too; it is the truth tellers who seem less forthcoming, more tense, and more negative, and it is they who tell stories that sound less compelling.

The behaviors we have described as cues to deception, then, may be more accurately described as cues to the hypothesized processes (e.g., attempts to regulate thoughts, feelings, and behaviors) and to psychological states (e.g., investment in, and familiarity with, the attempted performance). Experimental research that directly tests the role of these processes in producing the predicted cues remains to be done.

Cues to Truths, to Personalities, and to Situations

Our use of the term *cues to deception* could suggest that we are describing the ways that liars behave, but in fact we are describing the ways in which liars act differently than truth tellers. Experimental manipulations and individual differences can be linked to cues to deception by their implications for the behavior of liars or truth tellers, or both. For example, in a study in which participants were selected because they saw themselves as very independent (B. M. DePaulo et al., 1991), the truthful life stories they told that showcased their independence were more responsive to the experimental manipulations than were the life stories that were fabricated.

Caution is also in order in interpreting the moderators of cues to deception. For example, when we say that eye contact is a cue to deception when senders are motivated to get away with their lies but not when they are not motivated, we are not necessarily claiming that liars more often avoid eye contact when they have an incentive to succeed than when they do not (though they may). Instead, we are saying that the degree to which liars avoid eye contact more than truth tellers do is greater when they are motivated to succeed than when they are not. The cues we describe in our analyses of motivation as a moderator are not cues to motivation (that is a different question), they are cues to deception under different levels of motivation.

For example, people telling lies in high stakes circumstances (e.g., while on trial for murder) may be expected to seem more nervous than people telling comparable lies when the stakes are lower (e.g., in traffic court). But truth tellers may also seem more nervous in the high stakes setting. Nervousness would only be a cue to deception in the murder trial if liars feel even more nervous than truth tellers. It would be a stronger cue to deception in the murder trial than in traffic court only if the degree to which liars are more nervous than truth tellers is greater in the murder trial than in traffic court.

To make these important distinctions clearer in future research, we suggest investigators adopt a reporting style that has rarely been used in the deception literature: Mean levels of the cues should be reported separately for truths and lies at each level of the experimental manipulations and for each of the individual difference categories. Results could then be analyzed in the familiar factorial. That would clearly indicate, for example, whether people seem more nervous when the stakes are high than when they are low, regardless of whether they are lying or telling the truth; whether they are more nervous when lying than when telling the truth, regardless of the stakes; and whether the degree to which they are more nervous when lying than when telling the truth is greater when the stakes are high than when they are low.

The implications for our understanding of individual differences are also important. For example, we claimed above that liars make an effort to seem credible whereas truth tellers take their credibility for granted. This may seem readily countered by the familiar finding from the social anxiety literature indicating that socially anxious people rarely take anything positive about themselves for granted (e.g., B. M. DePaulo, Kenny, Hoover, Web, & Oliver, 1987; Leary & Kowalski, 1995; Schlenker & Leary, 1982), but that is a main-effect finding about the ways in which socially anxious people differ from socially secure people. If socially anxious people do indeed feel insecure about the credibility of their truths, but they feel even more insecure about the credibility of their lies, then the predictions we outlined should apply to them as well as to others.

When Confounded Designs Are of Practical Significance

All of the studies of transgressions were marred by a confound: The people who lied were only those who committed a transgression, and the people who told truths were only those who did not. It is not clear, then, whether any of the resulting cues were cues to deception at all. They may have been cues to the transgression. From a scientific stance, we have no unambiguous data from these studies about the ways that lies differ from truths. However, when

considered from an applied perspective, these studies may tell practitioners exactly what they want to know. We do not wish to minimize the frequency or significance of false confessions (Kassin, 1997), but ordinarily, credibility is not much at issue when people admit to discrediting acts. Of greater interest are the ways in which truthful denials can be distinguished from deceptive ones.

Blurring the Line Between Truths and Lies

In the studies we reviewed, the line between truths and lies was drawn clearly. There were good methodological reasons for this. To distinguish the characteristics of lies from those of truths, it is of course necessary to first distinguish lies from truths. However, outside of the lab, the line between them is often blurred.

The self-presentational perspective underscores the similarities between truths and lies. Telling the whole truth and nothing but the truth is rarely possible or desirable. All self-presentations are edited. The question is one of whether the editing crosses the line from the honest highlighting of aspects of identity that are most relevant in the ongoing situation to a dishonest attempt to mislead. This suggests that truthful and deceptive self-presentations may be construed more aptly as aligned along a continuum rather than sorted into clear and distinct categories. But there may be categorical aspects as well. For example, B. R. Schlenker (1982) distinguished among self-presentations that fit within people's private latitudes of acceptance, neutrality, or rejection (cf. Sherif & Hovland, 1961). Self-presentations that are well within the boundaries of the latitude of acceptance are clearly truths. These presentations capture attitudes, feelings, and personal qualities that people unambiguously accept as their own. Self-presentations that are at the cusp of the latitude of acceptance just barely pass as truths. Self-presentations that are well within people's private latitudes of rejection are clearly lies. The most elusive statements are those falling in the latitude of neutrality; the editing of these statements slips beyond the bounds of honesty but stops just short of the brink of deceit. One implication of this conceptualization is that the effect sizes we reported for cues to deception, though generally small, may actually be overestimates of the true differences between truths and lies in everyday life (McCornack, 1997). In the studies we reviewed, the truths and lies were typically well within the bounds of acceptance and rejection. In many naturalistic situations, they are not.

Definitional dilemmas also arise in situations in which neither truths nor lies are entirely satisfying to people trying to decide what to say. Bavelas, Black, Chovil, and Mullett (1990a, 1990b) have described many of these intriguing predicaments in which people may prefer not to lie but dislike the alternative of telling a hurtful or costly truth. For example, what do people say when an acquaintance asks their opinion of a class presentation that was poorly organized and badly delivered? Bavelas et al.'s (1990a, 1990b) answer was that they equivocate: They make themselves unclear; they refrain from answering the question directly and avoid stating their true opinions. Yet, Bavelas et al. (1990a, 1990b) argued that equivocal answers are truthful. When participants in those studies read the responses to the classmate, they rated the responses as closer to the truthful end of the scale (labeled as *presentation was poorly organized and badly delivered*) than closer to the deceptive end (labeled as *well organized and well delivered*). This criterion of truthfulness bypasses the question of

intentionality. The perceivers of self-presentations have the full authority to make the judgments that determine what counts as deceptive.

We are not yet ready to hand over that authority to the perceivers. Definitional issues aside, though, we think that studies of social actors' responses to communicative dilemmas such as the ones described by Bavelas et al. (1990a, 1990b) are important for another reason. They point to some of the ways in which people's self-presentational strategies can be more imaginative and their goals more complex than much of the current literature on cues to deception might suggest.

In a pair of studies, B. M. DePaulo and Bell (1996) created the kind of dilemma that Bavelas et al. (1990a, 1990b) described. Students chose their favorite and least favorite paintings from the ones on display in the room, and then each interacted with an artist who claimed that the student's least favorite painting was one of her own. When students were asked what they thought of that painting, they amassed misleading evidence (i.e., they mentioned aspects of the painting they really did like while neglecting to note all of the aspects they disliked), and they implied that they liked the painting by emphasizing how much they disliked other paintings in the room that were painted by other artists (without stating directly that they liked the painting in question). B. M. DePaulo and Bell (1996) posited a "defensibility postulate" to account for these ploys. The students were trying to communicate in ways that could be defended as truthful (e.g., they really did like the aspects of the paintings they mentioned, and they really did dislike the other artists' work) but that would also mislead the artist about their true opinions. These strategies are not captured by any of the objectively measured cues we reviewed. Yet, they provide hints about what people are trying to accomplish in these challenging situations that are perhaps more telling than what can be learned by counting behaviors such as foot movements and speech disturbances.

Laboratory Lies

The studies we reviewed included lies told by criminal suspects and people in the news, but in most of the studies, college students told truths and lies in laboratory experiments. One common critique of such studies (e.g., Miller & Stiff, 1993) is that the participants typically are not highly motivated to get away with their lies. In many of these studies, there were neither rewards for successful lies nor sanctions for unsuccessful ones. Moreover, the participants often told their truths and lies because they were instructed to do so as part of the experimental procedures; they did not freely choose to lie or to tell the truth. A related critique (Miller & Stiff, 1993) is that in many studies, the degree of interaction between the social actor and another person was minimal; sometimes participants told their truths and lies with little or no feedback or skepticism from any other person.

Although these critiques are often cast as attacks on the ecological validity of studies of deception, as such they may be largely wrong. The critiqued characteristics of studies of deception may in fact aptly capture the nature of the vast majority of lies (B. M. DePaulo, Ansfield, & Bell, 1996; B. M. DePaulo, Kashy, et al., 1996). The everyday lies that people tell are rarely consequential. In many instances, they are essentially obligatory. The guest who is treated to an extensively prepared but unpalatable dinner rarely

feels free to say truthfully that the food was disgusting. The students whose late-night partying has interfered with the timely completion of their take-home exams tell lies to the course instructor just as readily as if they had been explicitly instructed to do so. Furthermore, the little lies of everyday life rarely trigger an extended discourse. The host or hostess nods in appreciation, and the course instructor waits for the students to depart before rolling his or her eyes.

One way that truths and lies told in the laboratory really may fail to reflect the dynamics of self-presentation outside of the lab is that people may be more self-conscious about their truthful presentations than they are ordinarily. If this is so, then the feeling of deliberateness that we have underscored in our analysis may separate truths from lies less definitively in the lab. In this respect, the effect sizes of the cues to deception we have reported may underestimate the true magnitude of the effects.

Discriminating Cues to Deception From Cues to Other Processes and States

We have combined the results of more than 1,300 estimates of the relationship between behaviors and deceit; therefore, we can name with some confidence some of the cues to deceit. But the behaviors that are indicative of deception can be indicative of other states and processes as well. In fact, we used a consideration of such states and processes to generate predictions about the kinds of behaviors we might expect to be indicative of deceit. However, the issue of discriminant validity still looms large. For example, is it possible to distinguish the anxiety that is sometimes associated with lying from the fear of being unfairly accused of lying (e.g., Bond & Fahey, 1987) or even from anxiety that has no necessary connection to deceit (e.g., nervousness about public speaking, shyness, distress about a personal problem)? Lying sometimes results in verbal and nonverbal inconsistencies, but so does genuine ambivalence (B. M. DePaulo & Rosenthal, 1979a, 1979b). Can the two be differentiated? Some attempts have been made to begin to address these kinds of issues (e.g., deTurck & Miller, 1985), and we expect to see some progress in the future. However, we also expect most future reports to end with the same cautionary note we issue here: Behavioral cues that are discernible by human perceivers are associated with deceit only probabilistically. To establish definitively that someone is lying, further evidence is needed.

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Appendix A

Definitions of Cues to Deception

Cue		Definition
Are Liars Less Forthcoming Than Truth Tellers?		
001	Response length	Length or duration of the speaker's message
002	Talking time	Proportion of the total time of the interaction that the speaker spends talking or seems talkative
003	Length of interaction	Total duration of the interaction between the speaker and the other person
004	Details	Degree to which the message includes details such as descriptions of people, places, actions, objects, events, and the timing of events; degree to which the message seemed complete, concrete, striking, or rich in details
005	Sensory information (RM)	Speakers describe sensory attributes such as sounds and colors
006	Cognitive complexity	Use of longer sentences (as indexed by mean length of the sentences), more syntactically complex sentences (those with more subordinate clauses, prepositional phrases, etc.), or sentences that includes more words that precede the verb (mean preverb length); use of the words <i>but</i> or <i>yet</i> ; use of descriptions of people that are differentiating and dispositional
007	Unique words	Type-token ratio; total number of different or unique words
008	Blocks access to information	Attempts by the communicator to block access to information, including, for example, refusals to discuss certain topics or the use of unnecessary connectors (<i>then, next, etc.</i>) to pass over information (The volunteering of information beyond the specific information that was requested was also included, after being reversed.)
009	Response latency	Time between the end of a question and the beginning of the speaker's answer
010	Rate of speaking	Number of words or syllables per unit of time
011	Presses lips (AU 23, 24)	Lips are pressed together
Do Liars Tell Less Compelling Tales Than Truth Tellers?		
012	Plausibility	Degree to which the message seems plausible, likely, or believable
013	Logical structure (CBCA)	"Consistency and coherence of statements; collection of different and independent details that form a coherent account of a sequence of events" (Zaparniuk, Yuille, & Taylor, 1995, p. 344)
014	Discrepant, ambivalent	Speakers' communications seem internally inconsistent or discrepant; information from different sources (e.g., face vs. voice) seems contradictory; speaker seems to be ambivalent
015	Involved, expressive (overall)	Speaker seems involved, expressive, interested
016	Verbal and vocal involvement	Speakers describe personal experiences, or they describe events in a personal and revealing way; speakers seems vocally expressive and involved
017	Facial expressiveness	Speaker's face appears animated or expressive
018	Illustrators	Hand movements that accompany speech and illustrate it
019	Verbal immediacy	Linguistic variations called <i>verbal nonimmediacy devices</i> , described by Wiener and Mehrabian (1968) as indicative of speakers' efforts to distance themselves from their listener, the content of their communications, or the act of conveying those communications. Wiener and Mehrabian (1968) described 19 categories and subcategories, such as spatial nonimmediacy (e.g., "There's Johnny" is more nonimmediate than "Here's Johnny"), temporal nonimmediacy (the present tense is more immediate than other tenses), and passivity (the passive voice is more nonimmediate than the active voice).
020	Verbal immediacy, temporal	A subcategory of verbal immediacy in which speakers use the present tense instead of past or future tenses
021	Generalizing terms	Generalizing terms (sometimes called <i>levelers</i>) such as <i>everyone, no one, all, none, and every</i> ; statements implying that unspecified others agree with the speaker
022	Self-references	Speakers' references to themselves or their experiences, usually indexed by the use of personal pronouns such as <i>I, me, mine, and myself</i>
023	Mutual and group references	Speakers' references to themselves and others, usually indexed by the use of second-person pronouns such as <i>we, us, and ours</i>

(Appendixes continue)

Appendix A (*continued*)

	Cue	Definition
Do Liars Tell Less Compelling Tales Than Truth Tellers? (<i>continued</i>)		
024	Other references	Speakers' references to others or their experiences, usually indexed by the use of third-person pronouns such as <i>he, she, they, or them</i>
025	Verbal and vocal immediacy (impressions)	Speakers respond in ways that seem direct, relevant, clear, and personal rather than indirect, distancing, evasive, irrelevant, unclear, or impersonal
026	Nonverbal immediacy	Speakers are nonimmediate when they maintain a greater distance from the other person, lean away, face away, or gaze away, or when their body movements appear to be nonimmediate.
027	Eye contact	Speaker looks toward the other person's eyes, uses direct gaze
028	Gaze aversion	Speakers look away or avert their gaze
029	Eye shifts	Eye movements or shifts in the direction of focus of the speaker's eyes
030	Tentative constructions	Verbal hedges such as "may," "might," "could," "I think," "I guess," and "it seems to me" (Absolute verbs, which include all forms of the verb <i>to be</i> , were included after being reversed.)
031	Verbal and vocal uncertainty (impressions)	Speakers seem uncertain, insecure, or not very dominant, assertive, or emphatic; speakers seem to have difficulty answering the question
032	Amplitude, loudness	Intensity, amplitude, or loudness of the voice
033	Chin raise (AU 17)	Chin is raised; chin and lower lip are pushed up
034	Shrugs	Up and down movement of the shoulders; or, the palms of the hand are open and the hands are moving up and down
035	Non-ah speech disturbances	Speech disturbances other than "ums," "ers," and "ahs," as described by Kasl and Mahl (1965); categories include grammatical errors, stuttering, false starts, incomplete sentences, slips of the tongue, and incoherent sounds
036	Word and phrase repetitions	Subcategory of non-ah speech disturbances in which words or phrases are repeated with no intervening pauses or speech errors
037	Silent pauses	Unfilled pauses; periods of silence
038	Filled pauses	Pauses filled with utterances such as "ah," "um," "er," "uh," and "hmm"
039	Mixed pauses	Silent and filled pauses (undifferentiated)
040	Mixed disturbances (ah plus non-ah)	Non-ah speech disturbances and filled pauses (undifferentiated)
041	Ritualized speech	Vague terms and cliches such as "you know," "well," "really," and "I mean"
042	Miscellaneous dysfluencies	Miscellaneous speech disturbances; speech seems dysfluent
043	Body animation, activity	Movements of the head, arms, legs, feet, and/or postural shifts or leans
044	Postural shifts	Postural adjustments, trunk movements, or repositionings of the body
045	Head movements (undifferentiated)	Head movements (undifferentiated)
046	Hand movements (undifferentiated)	Hand movements or gestures (undifferentiated)
047	Arm movements	Movements of the arms
048	Foot or leg movements	Movements of the legs and/or feet
Are Liars Less Positive and Pleasant Than Truth Tellers?		
049	Friendly, pleasant (overall)	Speaker seems friendly, pleasant, likable (Impressions of negative affect were also included after being reversed.)
050	Cooperative	Speaker seems cooperative, helpful, positive, and secure
051	Attractive	Speaker seems physically attractive
052	Negative statements and complaints	Degree to which the message seems negative or includes negative comments or complaints (Measures of positive comments were included after being reversed.)
053	Vocal pleasantness	Voice seems pleasant (e.g., positive, friendly, likable)
054	Facial pleasantness	Speaker's face appears pleasant; speakers show more positive facial expressions (such as smiles) than negative expressions (such as frowns or sneers)
055	Head nods	Affirmative head nods; vertical head movements
056	Brow lowering (AU 4)	Eyebrows are lowered
057	Sneers (AU 9, 10)	Upper lip is raised
058	Smiling (undifferentiated)	Smiling as perceived by the coders, who were given no specific definition or were given a definition not involving specific AUs (e.g., "corners of the mouth are pulled up"); laughing is sometimes included too
059	Lip corner pull (AU 12)	Corners of the lips are pulled up and back

Appendix A (*continued*)

	Cue	Definition
Are Liars More Tense Than Truth Tellers?		
060	Eye muscles (AU 6), not during positive emotions	Movement of the orbicularis oculi, or muscles around the eye, during emotions that are not positive
061	Nervous, tense (overall)	Speaker seems nervous, tense; speaker makes body movements that seem nervous
062	Vocal tension	Voice sounds tense, not relaxed; or, vocal stress as assessed by the Psychological Stress Evaluator, which measures vocal micro-tremors, or by the Mark II voice analyzer
063	Frequency, pitch	Voice pitch sounds high; or, fundamental frequency of the voice
064	Relaxed posture	Posture seems comfortable, relaxed; speaker is leaning forward or sideways
065	Pupil dilation	Pupil size, usually measured by a pupillometer
066	Blinking (AU 45)	Eyes open and close quickly
067	Object fidgeting	Speakers are touching or manipulating objects
068	Self-fidgeting	Speakers are touching, rubbing, or scratching their body or face
069	Facial fidgeting	Speakers are touching or rubbing their faces or playing with their hair
070	Fidgeting (undifferentiated)	Object fidgeting and/or self-fidgeting and/or facial fidgeting (undifferentiated)
Do Lies Include Fewer Ordinary Imperfections and Unusual Contents Than Do Truths?		
071	Unstructured production (CBCA)	"Narratives are presented in an unstructured fashion, free from an underlying pattern or structure." (Zaparniuk et al., 1995, p. 344)
072	Spontaneous corrections (CBCA)	"Spontaneous correction of one's statements" (Zaparniuk et al., 1995, p. 344)
073	Admitted lack of memory, unspecified (CBCA)	Admission of lack of memory
074	Self-doubt (CBCA)	"Raising doubts about one's own testimony; raising objections to the accuracy of recalled information" (Zaparniuk et al., 1995, p. 344)
075	Self-deprecation (CBCA)	"Inclusion of unfavorable, self-incriminating details" (Zaparniuk et al., 1995, p. 344)
076	Contextual embedding (CBCA)	"Statements that place the event within its spatial and temporal context" (Zaparniuk et al., 1995, p. 344)
077	Verbal and nonverbal interactions (CBCA)	"Verbatim reproduction of dialogue" and "descriptions of interrelated actions and reactions" (Zaparniuk et al., 1995, p. 344)
078	Unexpected complications (CBCA)	"The reporting of either an unforeseen interruption or difficulty, or spontaneous termination of the event" (Zaparniuk et al., 1995, p. 344)
079	Unusual details (CBCA)	"Inclusion of detail that is not unrealistic, but has a low probability of occurrence" (Zaparniuk et al., 1995, p. 344)
080	Superfluous details (CBCA)	"Vivid and concrete descriptions of superfluous details" (Zaparniuk et al., 1995, p. 344)
081	Related external associations (CBCA)	"Reference to events or relationships that are external to the event of immediate focus" (Zaparniuk et al., 1995, p. 344)
082	Another's mental state (CBCA)	"Statements inferring the cognitive and emotional state of others involved in the event" (Zaparniuk et al., 1995, p. 344)
083	Subjective mental state (CBCA)	"Accounts of the witness's own cognitive and emotional state at the time of the event" (Zaparniuk et al., 1995, p. 344)
Cues Listed in Appendix B ^a		
084	Number of segments	Perceived number of behavioral units
085	Idiosyncratic information (RM)	Speakers mention idiosyncratic information
086	Facial shielding	Speakers appear to be shielding their face
087	Realism (RM)	The story is realistic and makes sense
088	Intensity of facial expression	Speaker's facial expression appears to be intense; rated intensity of AUs
089	Face changes	Changes in facial expressions; onset, offset, and apex phases; face seems mobile
090	Indifferent, unconcerned	Speaker seems indifferent, unconcerned
091	Seems planned, not spontaneous	Message seems planned or rehearsed
092	Cognitively busy	Speaker seems to be making mental calculations
093	Serious	Speaker seems serious, formal
094	Pitch variety	Variation in fundamental frequency
095	Pitch changes	Frequency of changes in the pitch of the voice
096	Rate change	Rate of speaking in the second half of the message minus rate of speaking in the first half

(Appendixes continue)

Appendix A (*continued*)

	Cue	Definition
Cues Listed in Appendix B ^a (<i>continued</i>)		
097	Loudness variety	Standard deviation of amplitude
098	Clarity (RM)	"Clarity and vividness of the statement" (Vrij, 2000, p. 160)
099	Reconstructability (RM)	The event can be reconstructed with the information given
100	Cognitive processes (RM)	"Descriptions of inferences made by the participant at the time of the event" (Vrij, 2000, p. 160)
101	Modifiers	A subcategory of verbal nonimmediacy in which speakers qualify their responses (e.g., "sometimes") or objectify them (e.g., "it is obvious")
102	Verbally distal versus proximal	Ratio of distal (nonimmediacy) indices to proximal (immediacy) indices
103	Pronoun and tense deletion	Deviations from the use of the first person and the past tense
104	Facial immediacy (eye contact, head orientation)	Speaker is facing the other person and gazing at that person; speaker's face seems direct and intense
105	Direct orientation	Degree to which the body and head were directly oriented to the other person
106	Proximity	Speaker seems to be in close physical proximity to the other person
107	Sentence changes	Subcategory of non-ah speech disturbances in which the flow of the sentence is interrupted by a correction in the form or content (e.g., "Well she's . . . already she's lonesome"; "That was . . . it will be 2 years ago in the fall"; Mahl, 1987, p. 167)
108	Stutters	Subcategory of non-ah speech disturbances in which the speaker stutters
109	Intruding sounds	Subcategory of non-ah speech disturbances in which the speaker makes intruding sounds that are totally incoherent and are not stutters
110	Subset of non-ah	Subset of non-ah speech disturbances (interrupted words and repeated words)
111	Interruptions	Interruptions; simultaneous talk that results in a change in turns
112	Filled pause length	Duration of filled pauses
113	Unfilled pause length	Duration of unfilled pauses
114	Specific hand and arm movements	Hand movements that do not include arm movements and finger movements that do not include hand movements
115	Competent	Speaker's performance seems successful; speaker manages the conversation smoothly; speaker makes a good impression
116	Ingratiation	Speakers' use of tactics of ingratiation, such as agreeing with others' opinions or values, expressing approval of others, or revealing their own values that are relevant to the conversational context
117	Genuine smile (AU 6)	Movement of the muscles around the eye, orbicularis oculi, as well as the zygomatic major, during positive emotions
118	Feigned smile	Masking smiles involving the action of the zygomatic major and muscle movements associated with emotions that are not positive ones; incomplete smiling that appears masked or unnatural
119	Head shakes	Negative head shakes; side-to-side head movements
120	Mouth asymmetry	Mouth is asymmetrical
121	Relaxed face	Speakers appear to show nervous facial movements (reversed)
122	Hand, arm, and leg relaxation	Hands or legs are asymmetrical; hands are relaxed
123	Admitted uncertainties	Qualifying descriptions by expressions of uncertainty such as "I'm not sure but" or "at least I believe it was like that"
124	Details misunderstood (CBCA)	"Inclusion of actions and details that are not understood by the witness but may be understood by the interviewer" (Zaparniuk et al., 1995, p. 344)
125	Pardoning the perpetrator (CBCA)	"Providing explanations or rationalizations for the offender's actions" (Zaparniuk et al., 1995, p. 344)
126	Self-interest statements	Speakers' references to benefits to themselves (References to benefits to others were also included, after being reversed.)
127	Issue-related reporting style	Speakers' description stays on topic
128	Reasons for lack of memory	Speakers describe reasons for inability to provide a complete description
129	Brow raise (AU 1, 2)	Inner (AU 1) or outer (AU 2) corner of the brow is raised
130	Lip stretch (AU 20)	Lips are stretched sideways
131	Eyes closed (AU 43)	Eyes are closed
132	Lips apart (AU 25)	Lips are relaxed, parted slightly, as jaws remain closed
133	Jaw drop (AU 26)	Jaw is dropped open
134	Mentions responsibility	All mentions of responsibility for behavior, including accepting responsibility, blaming others, offering excuses or justifications, or denying participation in the behavior
135	Claims qualifications and truthfulness	Speakers' explicit claims that they have the necessary qualifications or that they are telling the truth
136	Extreme descriptions	Speakers' use of extreme descriptions of others (e.g., "the most aggressive person I know," "extremely intelligent")
137	Neutral descriptions	Speakers' use of evaluatively neutral descriptions

Appendix A (*continued*)

	Cue	Definition
	Cues Listed in Appendix B ^a (<i>continued</i>)	
138	Hypothetical statements	Speakers' references to conditions that did not currently exist but might exist in the future
139	Nonsensory-based words	Words referring to concepts not verifiable by the senses, such as <i>love</i> , <i>accidentally</i> , <i>interesting</i> , and <i>dishonesty</i>
140	Provides standard description	Speaker provides a description in a standard way (as instructed) (Modifications of the standard description were included after being reversed.)
141	Ratio of conclusion to introduction	Ratio of the number of words in the conclusion of a story to the number of words in the introduction
142	Repetition of story elements	Aspects of the story that were previously described are repeated without elaboration
143	Comments and interpretations	Speakers comment on others involved in an event or interpret the event
144	Eye blink latency	Time until the first eye blink
145	Eye flutters	"A barely discernible movement of the eyes in which, without fully breaking eye contact, the eyes 'jiggle'" (Hocking & Leathers, 1980, p. 127)
146	Eyelids tight (AU 7)	Eyelids are tightened
147	Eyelids droop (AU 41)	Eyelids are drooping
148	Lip pucker (AU 18)	Mouth is pushed forward in such a way that the lips pucker
149	Tongue out (AU 19)	Speaker's tongue is out
150	Duration of facial expression	Total duration of a facial expression
151	Hands together	Speakers' hands are clasped, folded, or otherwise touching or resting on their lap
152	Hands apart	Each hand rests separately on a different part of the body
153	Emblems	Hand movements with direct verbal translations
154	Changes in foot movements	Changes in the number of foot or leg movements over time (absolute value)
155	Pupillary changes	Changes in pupil size
156	Biting lips	Speakers are biting their lips
157	Facial reaction time	Time until the first facial movement
158	Neck muscles tightened	Neck muscles (typically the platysma muscle) are tightened

Note. RM = reality monitoring; AU = facial action unit (as categorized by Ekman & Friesen, 1978); CBCA = Criteria-Based Content Analysis.

^a Any given cue is included in Tables 3–7 only if there are at least three independent estimates of it, at least two of which could be calculated precisely. All other cues are reported in Appendix B.

(*Appendixes continue*)

Appendix B

Cues Based on a Small Number of Estimates (Organized by Category of the Self-Presentational Perspective) and Miscellaneous Cues

Cue	k_1	k_2	d	CI	Cue	k_1	k_2	d	CI		
Are Liars Less Forthcoming Than Truth Tellers?					Do Lies Include Fewer Ordinary Imperfections and Unusual Contents Than Do Truths?						
084	Number of segments	1	1	-0.47*	-0.73, -0.20	123	Admitted uncertainties	2	1	-0.63*	-1.00, -0.25
085	Idiosyncratic information	2	0	0.01	-0.41, 0.43	124	Details misunderstood	2	2	-0.22	-0.62, 0.18
086	Facial shielding	4	0	0.00	-0.35, 0.35	125	Pardoning the perpetrator	1	1	0.00	-0.62, 0.62
Do Liars Tell Less Compelling Tales Than Truth Tellers?					Miscellaneous Cues						
087	Realism	1	1	-0.42*	-0.74, -0.10	129	Brow raise	5	5	0.01	-0.10, 0.13
088	Intensity of facial expression	2	2	-0.32*	-0.52, -0.12	130	Lip stretch	4	4	-0.04	-0.15, 0.08
089	Face changes	7	1	-0.06	-0.24, 0.11	131	Eyes closed	3	3	-0.06	-0.19, 0.07
090	Indifferent, unconcerned	2	2	0.59*	0.31, 0.87	132	Lips apart	5	4	-0.08	-0.19, 0.03
091	Seems planned, not spontaneous	2	1	0.35*	0.05, 0.65	133	Jaw drop	3	2	0.00	-0.14, 0.14
092	Cognitively busy	1	1	0.61	-0.14, 1.36	134	Mentions responsibility	2	2	0.34*	0.13, 0.55
093	Serious	4	0	0.00	-0.35, 0.35	135	Claims qualifications and truthfulness	1	1	0.00	-0.50, 0.50
094	Pitch variety	2	1	0.12	-0.15, 0.39	136	Extreme descriptions	1	1	-0.16	-0.47, 0.15
095	Pitch changes	1	1	0.42	0.16, 0.68	137	Neutral descriptions	1	1	0.26	-0.06, 0.58
096	Rate change	1	1	0.12	-0.19, 0.43	138	Hypothetical statements	1	1	0.08	-0.24, 0.40
097	Loudness variety	1	0	0.00	-0.35, 0.35	139	Non-sensory based words	1	0	0.00	-0.44, 0.44
098	Clarity	1	0	-0.01	-0.32, 0.30	140	Provides standard description	1	1	0.18	-0.19, 0.55
099	Reconstructability	1	0	-0.01	-0.32, 0.30	141	Ratio of conclusion to introduction	1	1	0.12	-0.39, 0.63
100	Cognitive processes	1	0	0.01	-0.30, 0.32	142	Repetition of story elements	1	1	-0.65*	-1.17, -0.13
101	Modifiers	1	1	-0.52*	-1.03, -0.01	143	Comments and interpretations	1	1	-0.14	-0.65, 0.37
102	Verbally distal versus proximal	1	1	-0.10	-0.63, 0.43	144	Eye blink latency	2	2	0.21	-0.01, 0.44
103	Pronoun and tense deletion	1	1	0.24	-0.27, 0.75	145	Eye flutters	1	1	-0.08	-0.57, 0.42
104	Facial immediacy (eye contact, head orientation)	2	1	0.13	-0.04, 0.29	146	Eyelids tight	2	1	-0.02	-0.19, 0.15
105	Direct orientation	2	1	-0.20*	-0.38, -0.01	147	Eyelids droop	2	1	0.09	-0.14, 0.32
106	Proximity	1	0	0.00	-0.25, 0.25	148	Lip pucker	2	1	-0.08	-0.25, 0.09
107	Sentence changes	1	1	0.35	-0.15, 0.85	149	Tongue out	2	1	-0.16	-0.40, 0.07
108	Stutters	1	1	0.22	0.28, 0.72	150	Duration of facial expression	2	0	0.00	-0.22, 0.21
109	Intruding sounds	1	1	0.16	-0.34, 0.65	151	Hands together	2	2	-0.21	-0.66, 0.24
110	Subset of non-ah	1	1	0.38*	0.01, 0.74	152	Hands apart	2	2	-0.15	-0.59, 0.29
111	Interruptions	3	0	0.01	-0.24, 0.25	153	Emblems	1	1	0.01	-0.21, 0.23
112	Filled pause length	1	0	-0.01	-0.36, 0.34	154	Changes in foot movements	2	2	1.05*	0.60, 1.49
113	Silent pause length	1	0	0.00	-0.35, 0.35	155	Pupillary changes	1	1	0.90*	0.17, 1.63
114	Specific hand and arm movements	2	2	-0.36*	-0.54, -0.17	156	Biting lips	1	0	0.00	-0.52, 0.52
Are Liars Less Positive and Pleasant Than Truth Tellers?					Are Liars More Tense Than Truth Tellers?						
115	Competent	3	1	-0.08	-0.39, 0.22	121	Relaxed face	1	1	-0.29	-0.68, 0.10
116	Ingratiation	1	0	0.00	-0.49, 0.49	122	Hand, arm, and leg relaxation	1	1	-0.26	-1.19, 0.68
117	Genuine smile	2	2	-0.70*	-0.97, -0.43						
118	Feigned smile	2	1	0.31	0.00, 0.63						
119	Head shakes	5	1	-0.12	-0.27, 0.03						
120	Mouth asymmetry	1	1	0.14	-0.79, 1.07						

Note. Cue numbers are of the cues described in the current article as indexed in Appendix A. All independent effect sizes (d s) were statistically significant. k_1 = total number of d s; k_2 = number of d s that could be estimated precisely; CI = 95% confidence interval.

* $p < .05$.

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