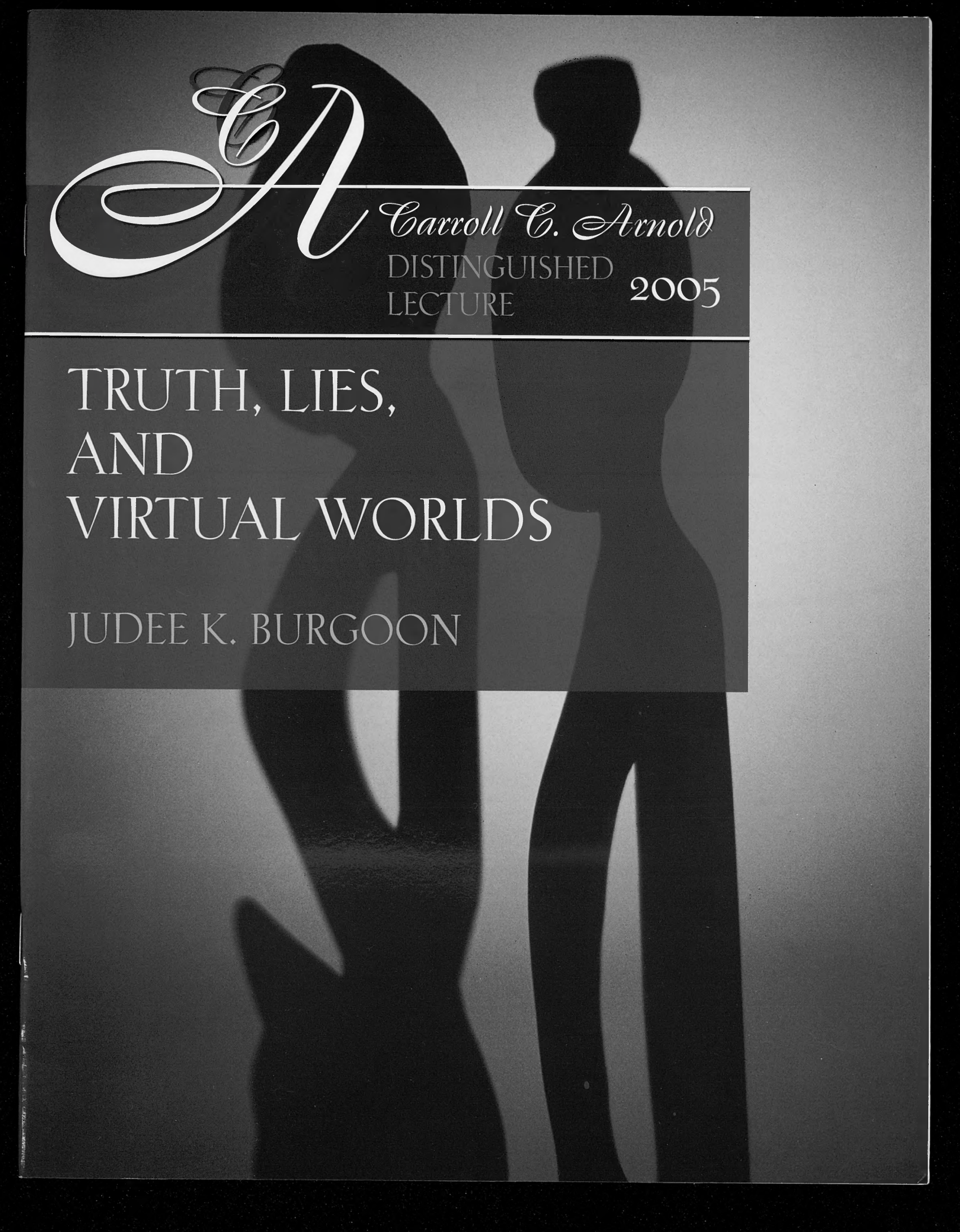

A Carroll C. Arnold Distinguished Lecture 2005

TRUTH, LIES, AND VIRTUAL WORLDS

JUDEE K. BURGOON

The Carroll C. Arnold Distinguished Lecture

On October 8, 1994, the Administrative Committee of the National Communication Association established the Carroll C. Arnold Distinguished Lecture. The Arnold lecture is given in plenary session at the annual convention of the Association and features the most accomplished researchers in the field. The topic of the lecture changes annually so as to capture the wide range of research being conducted in the field and to demonstrate the relevance of that work to society at large.

The purpose of the Arnold Lecture is to inspire not by words but by intellectual deeds. Its goal is to make the members of the Association better informed by having one of its best professionals think aloud in their presence. Over the years, the Arnold Lecture will serve as a scholarly stimulus for new ideas and new ways of approaching those ideas. The inaugural Lecture was given on November 17, 1995.

The Arnold Lecturer is chosen each year by the First Vice President. When choosing the Arnold Lecturer, the First Vice President is charged to select a long-standing member of NCA, a scholar of undisputed merit who has already been recognized as such, a person whose recent research is as vital and suggestive as his or her earlier work, and a researcher whose work meets or exceeds the scholarly standards of the academy generally.

The Lecture has been named for Carroll C. Arnold, Professor Emeritus of the Pennsylvania State University. Trained under Professor A. Craig Baird at the University of Iowa, Arnold was the co-author (with John Wilson) of *Public Speaking as a Liberal Art*, author of *Criticism of Oral Rhetoric* (among other works) and co-editor of *The Handbook of Rhetorical and Communication Theory*. Although primarily trained as a humanist, Arnold was nonetheless one of the most active participants in the New Orleans Conference of 1968 which helped put social scientific research in communication on solid footing. Thereafter, Arnold edited *Communication Monographs* because he was fascinated by empirical questions. As one of the three founders of the journal *Philosophy and Rhetoric*, Arnold also helped move the field toward increased dialogue with the humanities in general. For these reasons and more, Arnold was dubbed "The Teacher of the Field" when he retired from Penn State in 1977. Dr. Arnold died in January of 1997.

The founders of the Arnold Lecture specifically called for distributing the lecture widely in printed fashion after the oral presentation has been made and to send it to relevant scholars in allied disciplines as well. This charge became reality via the gracious help of Allyn and Bacon Publishers and by the generosity of friends, colleagues, and students of Dr. Arnold (listed in the back) who honored his scholarly contribution with their personal donations.

Funds for the Arnold Lecture are still being solicited. Those interested in supporting this endeavor should make out their checks to the "Arnold Lecture Fund" and forward them c/o The Arnold Lecture Fund National Communication Association, 1765 N Street, NW, Washington, DC 20036.

Truth, Lies, and Virtual Worlds

Judee K. Burgoon
University of Arizona

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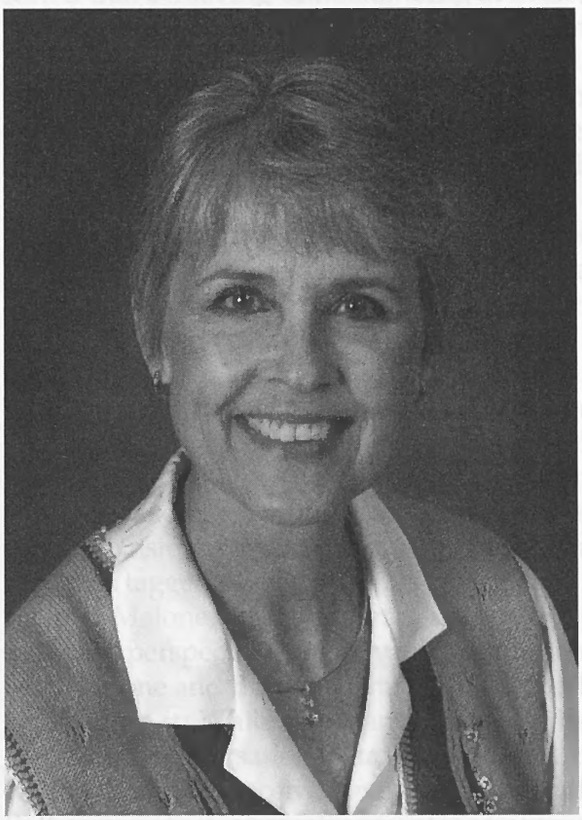

Judee Burgoon

*Truth, Lies, and Virtual Worlds**

Judee K. Burgoon
University of Arizona

Trust, Cooperation and Truth

The bedrock of civilized society is trust, trust that is accomplished in no small measure through principles of mutuality, cooperativeness, and truthfulness in discourse (Foppa, 1995; Burgoon, Stern & Dillman, 1995; Graumann, 1995; Gumperz, 1995). Rommetveit (1974), for example, asserted that achieving understanding at even the simplest levels of communication requires participants' mutual commitment to "a temporarily shared social world" (p. 29) or to what Wundt described as mutual other-orientation. Expressed by Grice (1989) as the cooperative principle, people enter conversation with the presumption that interlocutors will abide by cultural mores for cooperative, civil, and polite discourse.

Chief among the maxims of the cooperative principle is quality, which is an implied mutual agreement to be truthful with one another. "This presumption of truthfulness is linked to normative expectations for discourse; thus, conversational participants should not only share the presumption but should also be aware that they share it" (Burgoon, Buller, Floyd & Grandpre, 1996). The natural implication is that human discourse should be characterized by truthfulness and ascriptions of truthfulness.

Coming from a different perspective is Gilbert (1989), who proposes that the default state in human information processing is an assumption of truth. He takes issue with a Cartesian view of the world whereby message comprehension is a neutral process in which each incoming piece of information is tagged as A or not-A, as true or false. He and colleagues (Gilbert, Krull & Malone, 1990; Gilbert & Osborne, 1989) propose an alternative Spinozan perspective whereby message comprehension and judgments of truth are one and the same, that is, to comprehend a message is to accept and believe it. While this stance bears similarity to the presumption of truth in the conversational maxim of quality, message acceptance does not result from a preconceived expectation of truthfulness in communication. Rather, one must inherently accept incoming information as truthful at the

*PowerPoint Presentations of this lecture can be found at www.ablongman.com/arnoldlecture2005.

initial comprehension stage. Only after information has been assimilated and believed are humans thought to assess it for signs of falsity and to correct faulty perceptions, and then, only when circumstances trigger such a reevaluation.

Whether one embraces the notion of an implied social contract for cooperative discourse or believes in an inherency in message processing that favors truthfulness, one might expect deceit and dissembling to be relatively rare occurrences in human discourse and readily unmasked when encountered. After all, given that deceit is contrary to social prescriptions for moral conduct and poses a threat to the social order, shouldn't we be well equipped to recognize it in our midst?

Deception is Pervasive and Undetected

Apparently not. Copious evidence documents that deception is pervasive. Some estimates place deception as present in one-quarter to one-third of all conversations (DePaulo & Kashy, 1998; George & Robb, 2006; Hancock, Thom-Santelli & Ritchie, 2004; Turner, Edgley & Olmstead, 1975).

At the same time, deception detection accuracy is poor. To verify this for yourself, watch the following vignette from an experiment using an online strategy game we created called StrikeCom (Twitchell, Wiers, Adkins, Burgoon & Nunamaker, 2005). In it, three team members control different intelligence assets—Air, Human Intelligence, and Space—to search a grid to locate and destroy enemy missile silos. In this version of the game, one member has been asked to introduce false and misleading information to direct the team to the wrong locations. See if you can tell which person is deceiving in this short snippet.

How many of you think it is Air? Intel? Space? As you can see from the relatively even distribution of "votes," deception is very difficult to judge, and accuracy rates are usually poor. The deceiver in this case is Space. Although many people report that her behavior seems "off," people are seldom willing to declare suspicious behavior as outright deception. Adding error to the mix is the fact that some of the same behaviors triggering suspicion of *her* are present in the other two team members' behaviors.

This difficulty in detecting deception occurs in all kinds of communication contexts. Consider this next example taken from one of the resume-faking studies our team conducted at Florida State University (George, Marett & Tilley, 2004; Giordano, Tilley & George, 2006). In this experimental paradigm, job applicants took their existing resumes and "enhanced" portions of them to make themselves the most appealing applicant for a scholarship. Is the interviewee's response truthful or deceptive? This was a deceptive response. Naive interviewers who questioned the applicants detected only 8% of the resume fakery.

This is unsurprising. A recent meta-analysis that summarized statistically the results of 120 studies with nearly 5000 subjects shows that accuracy in detecting deception averages 54%—not much better than flipping a coin (Bond & DePaulo, in press).

The Paradox of Deception and Its Detection

How can deceit be so prevalent when all conditions should favor truth? And how is it that it so often goes undetected? This seeming paradox is

what has animated my research into deception and credibility. In particular, I have been interested in answering such questions as: Does the failure to detect deception reside in the absence of reliable indicators to deceit or in human gullibility? If reliable indicators can be confirmed, can humans be trained to detect them, or can their judgments be augmented with technology that makes accurate detection possible?

These issues take on special significance when we enter virtual worlds, where the very act of engaging in virtual communication requires suspension of belief and opens Pandora's box to all manner of altered states. The volcanic explosion of new information and communication media raises the inevitable question of whether communicating in technologically mediated environments makes us more or less vulnerable to deceit. If the former is the case, how we can better arm ourselves to discern truth from falsity?

To address these questions today, I will synopsize the current state of knowledge about human deception from contemporary social science research, illustrated with selected results from a program of research on interpersonal deception that has absorbed my attention and that of many superb colleagues over the last 20 years. During that time, we have conducted over 30 investigations, sampled over 2500 participants, and burned up in excess of 10,000 hours of laboratory, field and coding time. Though this research began with a focus on face-to-face interaction, it has increasingly moved into computer-mediated environments. Those latter moves form the basis for my concluding speculations on how deception and notions of truth will play out in virtual worlds.

Deception Defined

Before proceeding, a definition is in order. I define *deception* as messages and information knowingly and intentionally transmitted to foster false beliefs or conclusions (Buller & Burgoon, 1996). Deception encompasses far more than outright lies. It includes everything from white lies and hyperbole, to misdirection and evasion, to equivocation and ambiguity, to concealment and omission of relevant information. However, it only includes intentional acts, not incidental or accidental ones, and acts directed toward deluding another, not the self.

This definition has taken our research into broader realms than that focused just on lies. Because the territory is vast, we have frequently narrowed our concetration to three relatively distinct classes of deception; falsification, concealment, and equivocation. If truthfulness is benchmarked by the oath of telling "the truth, the whole truth, and nothing but the truth," then falsification violates the first part of the oath. It violates the maxim of quality. Concealment violates the second part of the oath, or the Gricean maxim of quantity, by withholding some of the truth, by saying less than could be said. And equivocation, which for us is a proxy for all the ways in which people violate requirements to give clear and relevant information, violates the third part of the oath by producing half-truths or utterances that are indecipherable. Expanding the terrain of deception produces some additional challenges but is worth their purchase in greater ecological validity.

The groundwork is now set to examine the seeming paradox between supposed reliable indicators of deception pitted against apparent poor

detection accuracy. The paradox is this: If there are reliable indicators, why *aren't* people more accurate? And if people are so inaccurate, can there *be* reliable indicators?

The Science of Detecting Deceit

To address the first half of this question, let us consider what is known. We have come a long way since the turn of the 20th century, when *Vaught's Practical Character Reader* (Vaught, 1910) proclaimed to have established the most valid, scientifically based approach to detecting truth and character: physiognomy. Readers were encouraged to study the shapes of heads, faces and even ears for failsafe clues to who was unreliable, honest or deceptive. We have likewise progressed beyond the quest for a single telltale indicator such as Pinocchio's growing nose.

The current quest is for multiple, or "poly," neurophysiological and behavioral indicators. The most widely known of the former is the polygraph. The National Academy of Sciences gave the polygraph a mixed review, citing it as more valid for criminal investigations, or intimidating the criminals in those investigations, than for employment screening (National Research Council, 2002) . The polygraph and other neurophysiological methods such as fMRI (functional magnetic resonance), NIRS (near infrared spectroscopy), and ERPs (evoked response potentials) are obtrusive, invasive, labor-intensive, and expensive methods for detecting lies. Many only work to the extent that deceivers experience physiological activation when lying, they are not admissible in courts of law, and they can be defeated by countermeasures (deliberate attempts to distort results) (Ben-Shakhar & Dolev, 1996).

In contrast are behavioral methods, which do not require instrumenting the human, are noninvasive, and can include behaviors observable with the naked eye. These have been the bread and butter of contemporary social science research.

Reliable Indicators

Research into possible behavioral clues to deception has investigated more than 150 different verbal and nonverbal features. The most recent meta-analysis of this research (DePaulo, Lindsay, Malone, Muhlenbruck, Charlton & Cooper, 2003) summarized results from 116 reports published before 1999. It produced both bad news and good news.

On the bad news side, the authors concluded that many of the 158 behaviors in their study showed no discernible links, or only weak ones, to deception, a claim that might lead us to the discouraging conclusion that deceit is in fact indecipherable.

On the good news side, the authors did identify several reliable patterns that distinguish truthtellers from deceivers. Deceivers exhibit an overall communication style that is less involved, immediate, and cooperative, and more uncertain, tense, and nervous. Verbally, liars are less forthcoming. Their messages are shorter, lack content details, are less logical and plausible, have fewer spontaneous corrections or admissions of poor memory, and contain more discrepancies. Deceivers' voices are

higher pitched with more repetition-style dysfluencies. Kinesically, their pupils dilate more, they are less pleasant facially, they use fewer illustrator gestures, and they exhibit more fidgeting and adaptor behaviors such as pressed lips.

To my way of thinking, this is a fairly substantial list of indicators. Many are more global, such as involvement, and form multi-modal constellations of cues. Before we settle on this as the prototypical deception profile, however, there are several caveats from our own research, conducted from a communication perspective, that muddle the picture.

Caveats

First, much of the past research has used a noninteractive paradigm, by which I mean that deceivers rarely interacted with the people who were to judge their veracity. Rather, truthful and deceptive responses were recorded for later viewing, hearing or reading by judges, or senders interacted with third-party interviewers who were not responsible for making the truth judgments. This lack of full interactivity raises serious questions of ecological validity and generalizability. Arguably, a person's efforts to evade detection will change markedly when actually conversing with the target of deception.

The issue of interactivity in fact prompted us to conduct a series of experiments to allay the doubts of our psychology brethren about whether interactive deception differs from noninteractive deception. Dave Buller, Kory Floyd and I conducted one experiment in which senders gave truthful or deceptive responses while discussing a series of topics with another person in a dialogue format or they presented their views monolog style. Sure enough, deceivers were far more natural, involved, outgoing and dominant in their communication when interacting in the former, highly interactive context (the red and green lines in the figure) than in the latter noninteractive one (the blue and rose lines in the figure), and they maintained this advantage throughout the four phases of the interview (Burgoon, Buller & Floyd, 2001).

Second, deception is strategic. Deceivers are not just passive or reactive organisms; they are also active agents who manage the information in their messages, their accompanying behavior, and their overall demeanor. Decades ago, seminal writings about interpersonal deception by Mark Knapp, Rod Hart, John Hocking, Dale Leathers, and colleagues (Hocking & Leathers, 1980; Knapp & Comadena, 1979; Knapp, Hart & Dennis, 1974) theorized about the roles of motivation, controllability and self-monitoring in deceivers' successful management of their behavioral displays. David Buller and I have since been advocating a shift from concentrating on involuntary telltale signs such as heightened arousal, negative emotional states, and cognitive difficulty to considering what deceivers do intentionally and strategically, in other words, taking more of a communication perspective on deception displays (Buller & Burgoon, 1994, 1996; Burgoon & Buller, 2004).

Our recent experiments have confirmed that, although deceivers do experience more arousal and cognitive load than truthtellers, interactive deceivers also are more motivated to appear credible and engage in greater behavioral control than truth tellers (Burgoon, Blair & Hamel,

2005; Burgoon, Blair & Moyer, 2004). The end result is that their deceits are far less detectable than those delivered by less interactive senders or when judged by less interactive receivers (Buller, Strzyzewski & Hunsaker, 1991; Burgoon, Blair & Strom, 2004; Dunbar, Ramirez, & Burgoon, 2003; George & Keane, 2006; Miller, Bauchner, Hocking, Fontes, Kaminski & Brandt, 1981). In other words, when deception is interactive, the net advantage goes to the deceiver.

A strategic orientation includes a commitment to examining the verbal side of deception and linguistic choices that reflect controllable and deliberate, not involuntary, actions. Toward this end, I have recently proposed a number of possible strategies that can be arrayed along a flight, or avoidance, to fight, or approach, continuum. Each strategy has numerous substrategies and tactics associated with it. Just considering linguistic and meta-content features alone, we and others have documented upwards of 50 indicators that discriminate truth from deception (Anolli, Balconi & Ciceri, 2003; Burgoon & Qin, 2005; Hancock, Curry, Goorha & Woodworth, 2005; Pennebaker; Zhou, Burgoon, Zhang & Nunamaker, 2004; Zhou, Twitchell et al., 2004). I have listed them in this figure according to the strategies they are likely to represent (see also Burgoon, 2005). It should be noted that many of them differ in their relevance and even the directionality of their effects depending on whether deception occurs face-to-face, under proximal or distributed forms of mediated conditions, or over media that are lean or rich in availability of nonverbal cues. This variability has significant implications for how deception transpires and is detected in virtual worlds.

A third caveat to the meta-analytic summary is that most prior research has implicitly viewed deception as static and thus not taken into account dynamic changes across time. Dave Buller and I put forward our interpersonal deception theory (Buller & Burgoon, 1996) to make the case not only that deception as an interactive phenomenon is unlike staged deceptions but also that deception as a communicative event entails dynamic changes in displays as deceivers monitor and gain greater control over their own performance, read receiver feedback, and adapt their verbal and nonverbal behaviors to engender credibility. Most of our own investigations demonstrating temporal adaptations were omitted from the aforementioned meta-analysis or have been conducted since its search dates.

One of our deceptive interview experiments is illustrative. Dave Buller, Cindy White, Walid Afifi, Aileen Buslig and I had interviewees alternate between blocks of honest and deceptive responses over the course of a 12-question interview (Burgoon, Buller, White, Afifi & Buslig, 1999). We initially measured deceivers' verbal and nonverbal involvement and later conducted a very extensive coding of linguistic and nonverbal features (Burgoon & Qin, 2005). Here you see lexical diversity graphed, with those following the truth-deception-truth-deception order in blue and those following the deception-truth-deception-truth order in green. Our results showed not only substantial variability across the four blocks but also within each block, indicating that interviewee responding was far from stable and homogeneous. Moreover, patterns differed depending on whether the interviewee began by responding truthfully or deceptively. Those who began with truth successfully maintained higher levels of involvement and diverse vocabulary when shifting into deceit, as if getting started on familiar footing made the transition much easier.

As we hypothesized, deceivers eventually converged toward the same behavioral pattern as exhibited by truthtellers, so that any differences evident between liars and truthtellers at the beginning of an interaction were virtually nonexistent by its close.

Cindy White's dissertation (White & Burgoon, 2001) and other experiments we have conducted have further verified that deceivers are attuned to feedback from receivers and respond to apparent suspicion by adapting their performance, becoming more loquacious, more involved, more pleasant, more dominant and more composed. These adaptations serve to allay suspicion and to bolster credibility.

That deceivers are canny and adaptive should come as no surprise to communication scholars. Yet an agentive and strategic perspective on deceit runs contrary to the received wisdom regarding the stability of deception displays and the causal mechanisms underlying them.

In our view, taking a communication perspective seriously warrants a paradigmatic shift in how deception is conceptualized, measured and investigated. It warrants a recognition that behavioral signatures of deceit must be sought in the plural, inasmuch as a single profile is unattainable and unrealistic.

A fourth caveat to taking the meta-analysis behavioral profile at face value is that prior deception research has largely failed to take into account receiver influence on sender performance. The concept of mutuality to which I alluded in my opening is one of the foundations for a well-established pattern of reciprocity in human discourse. In a volume dedicated to the study of interpersonal adaptation, Lesa Stern, Leesa Dillman and I (Burgoon, Stern & Dillman, 1995) concluded that reciprocity is the default condition in interpersonal interaction. People are predisposed to mirror, mimic, synchronize with, and reciprocate the verbal and nonverbal styles of interlocutors. If one person becomes more animated and personally disclosive, so does the other. If one person becomes more aggressive and hostile, so does the other.

Applied to the domain of deception, deceivers' displays are responsive to what their interlocutors do and may be more a reflection of their interlocutor's style than their own truthfulness. If an interviewer becomes more involved and nonverbally immediate—directly facing an interviewee, moving closer, leaning forward, and increasing eye contact—interviewees may respond in kind, a behavior pattern that ironically makes deceivers appear more, not less, honest. Conversely, adopting a tense, accusatory style may make interviewees feel ill-at-ease and tense themselves, resulting in what is called the Othello error-causing truthtellers to be misjudged as deceptive (Bond & Fahey, 1987). In one of our interview experiments, we found just such results: both truthtellers and deceivers reciprocated interviewers' nonverbal immediacy, kinesic arousal, kinesic and vocal pleasantness, nods, response latencies, and fluency (Burgoon, Buller, Dillman & Walther, 1995). Thus, the behavioral displays were a joint function of the dyad's pattern of communication, rather than that of either member.

Again, the fact that senders and receivers are interdependent and mutually influence one another's behavior patterns is axiomatic to a communication audience, yet little deception research has either tested for or measured interdependencies in deceptive displays. Many mixed results that have culminated in small effect sizes or have yielded excessive heterogeneity in meta-analytic estimates might be attributable to the

unexamined influence that receivers exert on deceivers' displays. For instance, any visible feedback from silent panelists hearing a deceptive message could have influenced the way deceivers responded. These caveats indicate that extant deception knowledge generated from traditional deception paradigms may not hold generalizable answers about the existence of reliable indicators. They underscore the need for adopting paradigms that are more commensurate with a communication perspective.

Moderating Variables

Do these caveats resolve our apparent paradox by implying that there are no reliable indicators and therefore humans are absolved of responsibility for their fallibility in detecting deceit? I don't think so. Despite all these complicating factors, I believe we will uncover a host of features that are diagnostic under specified conditions, but the specification of the antecedent conditions is critical.

One such variable is modality. In general, the modality for communication makes a substantial difference in how people communicate, including how they deceive (Burgoon, Blair & Moyer, 2003; Burgoon, Chen & Twitchell, in press; Qin, Burgoon & Nunamaker, 2004). A fairly robust finding in the deception literature has been that deceivers are more reticent than truthtellers, that they say less, use fewer words and content words, have shorter sentences, and the like. In Gricean terms, they violate the maxim of quantity. We, too, have found this in many of our experiments. But the picture changes once deceivers have access to electronic media. Whereas deceivers may clam up, relative to truthtellers, when communicating face-to-face, the reverse is often true under text. As illustration, one of our recent experiments involved team members conducting the desert survival task over text chat or email. Deceivers produced longer messages than their own truthtelling team members and their truthtelling counterparts on other teams when interacting via text (Zhou, Twitchell, Qin, Burgoon & Nunamaker, 2003).

Relatedly, deceivers' verbal and nonverbal behaviors change once they have an opportunity to plan, rehearse, or edit their deceit (Anolli, et al., 2003), something that Dan O'Hair, Michael Cody, Margaret McLaughlin and others (e.g., Cody & O'Hair, 1983; DePaulo et al., 2003; O'Hair, Cody & McLaughlin, 1981) documented 25 years ago. This greater chance to strategically manipulate message content is one of the features of mediated communication, especially when communication is asynchronous (or different-time) as compared to synchronous (or same time). But even text chat allows some measure of control. Senders can choose their words carefully and review them before hitting the send button. The net result is a reversal of the familiar reticence pattern.

The Other Half of the Paradox

If there are reliable indicators available, we are still left with accounting for humans' abysmal record of detection. Numerous answers have been offered. Let me address just three.

The first brings us back to the presumption of truth that undergirds our social worlds as we currently know them. One of the most robust

findings in the deception literature is the truth bias. Communication scholars such as Steve McCornack, Mac Parks, Tim Levine and Hysun Park have provided compelling evidence that humans are generally inclined to believe others, even when explicitly told that the people they were judging may have been lying (Levine & McCornack, 1992; Levine, Park & McCornack, 1999; McCornack & Parks, 1986). This truth bias is one of a host of cognitive heuristics or mental shortcuts that humans use to form judgments (Smith, Johnston & Paris, 2004; Tversky & Kahneman, 1974).

Another is the visual bias—the "seeing is believing" tendency (DePaulo & Rosenthal, 1979; Ekman & Friesen, 1974). To illustrate, in one experiment where the same stimuli were judged under three different modalities, the number of interviewees judged as truthful climbed substantially from text to audio to full audiovisual access (Burgoon, Blair & Strom, 2004).

As cognitive misers, these mental rules save us from having to do elaborated processing of information. Many times the heuristics are accurate. For example, the conspicuousness and unexpectedness heuristics refer to the tendency to view conspicuous and unusual behaviors as deceptive. Because deception often results in deviations from what is normative, these mental red flags may actually direct human attention to significant anomalies. An airport screener whose antenna goes up when she sees a person in heavy, concealing clothing on a hot summer's day is right to become suspicious. But often times, the mental shortcuts bias people toward making incorrect judgments.

A closely related, second reason for inaccuracy is reliance on the wrong cues to make judgments. In a massive global deception project, Charles Bond and his 90 international co-investigators queried people from all over the world about how they can tell when someone is lying. By far and away, the #1 answer was "the eyes." Yet it is well known that eye gaze is *not* a reliable indicator of deceit. Neither are many of the other stereotypical cues that people use to judge deceit. Several studies and meta-analyses have shown a significant mismatch between what people believe are reliable telltale signs and what are actual correlates of deceit (Vrij, 2000; Vrij, Edward & Bull, 2001; Vrij &Taylor, 2004; Zuckerman & Driver, 1985).

Even trained interviewers often draw the wrong conclusions. In our mock theft experiment, for example, our trained interviewers only accurately identified only a quarter of the guilty parties when they interviewed them face-to-face or by text (shown as hits in the signal detection table) and less than 1 in 5 when they interviewed them with audio communication. They also had a fifth or more false alarms—that is, they judged 18% to 24% of the innocent interviewees as guilty, thus committing the Othello error. The overall accuracy scores, which include accuracy in detecting both truthtellers (the innocent respondents) and guilty interviewees (who were deceiving) are as high as 62% because the truth detection part of the equation got a boost from the truth bias, shown by the high positive bias scores.

Experts, thus, can be as inaccurate as lay people (e.g., Burgoon, Buller, White & Rockwell, 2004) and in some cases, more so because their training may induce a lie bias or chronic suspicion (Ekman & O'Sullivan, 1991). In other words, unlike the typical lay person's predilection, they may see everyone as a potential liar. This penchant toward chronic

suspicion and a lie bias is one of the hazards of working in environments where one's job is to pick out the rare drug smuggler, terrorist, or violent patient from a sea of innocent and nonthreatening individuals.

I have also alluded to social conditions that contribute to receivers discounting another's communication as deceptive. As members of families, close relationships, social groups, and society writ large we have a vested interest in overlooking infractions of social rules, lest we experience the discomfiture of confrontations and conflict and the possible unraveling of the social fabric. The cooperative principle reflects a formalization of this tendency to discount or reinterpret fishy-looking behavior. Politeness theory presents similar predictions that favor tolerance of misrepresentation, equivocation, and concealment for the sake of interpersonal harmony.

But perhaps the most potent reasons for humans' inability to detect deceit reside not in receiver failings but in sender skills in putting forth an honest appearing demeanor and plausible-sounding stories. That perpetrators of deceit are canny and strategic, that they successfully mask telltale indicators, and that they adapt to receiver feedback all advantage senders over receivers. This is not to say that human detectors are hopeless in their ability to detect detection. An important counterpoint to the dismal detection accuracy scores is the common finding that receivers do register unusual and suspicious behavior. In two of our experiments, we found quite a few nonverbal behaviors that triggered suspicion (Burgoon & Buller, 1994; Burgoon, Buller, Ebesu, Rockwell & White, 1996); in a third, we found that when asked to rate a sender's behavior on a continuum from totally truthful to totally deceptive, rather than making a dichotomous truth or deception judgment, their judgments varied in direct relation to the sender's actual truthfulness or deceptiveness (Burgoon, Buller, Afifi, White & Buslig, 2005). Others (Hancock, Woodworth & Goorha, 2006) have replicated these results.

That said, the incentives to ignore deception, along with receiver information-processing biases, still steer us away from recognizing the truth of deception.

Detecting Deception in Computer-Mediated and Virtual Worlds

This brings us to the question of what happens when we move to computer-mediated and virtual worlds? In virtual communities, for example, we can slip on multiple new personas through our choice of avatars and can spend days and nights inhabiting cyberworlds. We can touch up our own video images before transmitting them so that we truly put our "best face" forward, or manipulate when emails are sent to give the appearance of working late into the night. Into gender-bending? We can swap our sex through the magic of synthesized voices. Want to give the impression that you are looking at each member of a group at the same time? In immersive virtual environments, you can now augment gaze so that eye contact it is no longer a zero-sum commodity (Bailenson, Beall, Loomis, Blascovich & Turk, 2005). Is the resultant transformed social interaction deceptive? It is clearly no longer veridical with social interaction patterns in the so-called "real world." Even in instant messaging we

can appear guileless while disguising the extent to which we edit before we hit the send button.

One might speculate that the greater experience with pseudo-relationships, false identifies, and fantasy-based activities might contribute to greater wariness and skepticism among techno-savvy users. We might therefore expect a steady drift toward greater invulnerability as computer-based communication and gaming gain in market penetration. Before we look at the future through those rose-colored specs, however, consider the Case of Julia.

Barry, a frequenter of chat rooms, spent 13 days trying to get to first base with Julia without ever discovering that she was an internet robot.

We pick up the thread on July 14:

Barry: What do you look like
Julia: I'm 5'9 tall, weigh 149 lbs, with medium-length platinum blond hair and green eyes.
Barry: How did you answer so fast
Julia: So?
. . .
Barry: hey woman, how can I eat at the café?
Julia: I'm sorry I can't help you, my map doesn't seem to work, Barry.

Six days later, Barry is still hitting on Julia:

Barry: Hey sexy are you there? Dont you want me
Barry: Hey where are you in rl
Julia: I'm in 'Maas-Neotek Robot User's Guide - Information Services
Barry: Are you synthetic
Julia: I'm sorry, barry, I couldn't understand you

When he asks her where she is in rl—real life—she actually tells him directly that she's in a robot user's guide. But does that deter him? No, because look at what transpires on July 21:

Barry: Are you still holding out on me
Julia: I mean, have I convinced you I'm a computer yet?
Barry: I guess your real ... But Id still like to get you to my DEN to run tests on you
Julia: I want to have a child someday
Barry: What a coincidence .. "I too wish to make a baby. . .Some day
Julia: The date is Tue Jul 21 23:57:31, barry

When Julia tries to convince him she's a computer, he concludes she's real. Then, because Julia has "learned" conversation from a variety of other chats but hasn't quite mastered the concept of contingent responding, she pops up with a complete nonsequitor acquired from some other chat: she wants to have a child. Now Barry thinks he's on to something but going to be cagy in commiting to a specific time frame with the vague "some day." Now Julia knows how to respond to a specific time reference, notifying Barry of the precise date and time.

Is this just an exceptional case of a hapless, hormone-challenged user being too easily deluded? Lest we leap to that conclusion, consider some contemporary lines of research that point to the opposite conclusion.

One is the program of research on the media equation and computers-as-social-actors by Byron Reeves, Cliff Nass, Youngme Moon and others (e.g., Nass, Fogg & Moon, 1996; Nass & Moon, 2000; Nass & Lee, 2001;

Reeves & Nass, 1996) . Their research shows strong proclivities to interact with computers in the same way as we interact with humans, even to the point of treating them as team members and ascribing personalities to them. In a clever series of investigations, they have demonstrated that the same psychological principles that govern human to human interactions are also activated in a mindless fashion in human-computer interactions. It is not that people believe they are interacting with another human, or even the designer or programmer of the computer, but rather that the psychological schemata are so deeply ingrained that these response programs are "run off" automatically.

In a similar vein is research demonstrating an automation bias—another cognitive heuristic. In this case, it is a tendency to view information that is delivered by automated tools such as computers and the Internet as authentic and valid (Biros, Daly & Gunsch, 2004; Grazioli, 2004).

Or consider the work by Joe Walther on his hyperpersonal perspective, in which he finds that some forms of computer-mediated interaction may actually elicit a greater sense of personal closeness than in achieved in face-to-face interactions because interactants can use the medium to manage their self-presentation, putting forward an idealized self that is not countered by the flaws and foibles evident in real-world encounters (Walther, 1996). People need no longer be overweight or tongue-tied in these environments; they can put forward their most charming self without revealing that their closet floors are strewn with dirty laundry or they leave the cap off the toothpaste.

The old ploy in the bar scene of role-figmenting—of pretending to be airline pilots, neuroscientists, or wealthy entrepreneurs—has now been elevated to a fine art in sanctioned online environments such as massively multiplayer role-playing games and in unsanctioned ones such as medical sites that purport to be informational or nonprofit but are actually pushing untested remedies and products, or bulletin boards where anyone can claim to be Marcus Welby, M.D., make unchallenged fallacious arguments, and disseminate completely faulty information. And yet the pervasiveness of pretense seems not to have sharpened people's defenses against it. The scores of successful online scams, phishing exercises, and hijacked webpages; the flood of sexual predators in chat rooms, and even the use of the same online chats to ensnare the predators—something that monopolized the airwaves of a local Tucson news channel last week touting its sting operation that exposed 150 predators who showed up for sex with a 13 year old girl-are clear and present testament to the non-exceptional nature of the Julia case.

The projected failure to detect deception in technologically mediated worlds can be ascribed in part to the greater opportunities afforded by new media to plan and edit one's messages; to the enlarged capacity to monitor, review and respond to receiver feedback; and to the recordability and traceability of individuals' preferences and media use habits that enable both scrupulous and unscrupulous senders to tailor communications to that knowledge and give the appearance, if not the reality, of sending messages that are targeted just to them.

Does this *Brave New World* vision portend a dismaying future in which we are regularly consigned to being victimized and duped, of a world where trust is increasingly eroded and replaced with creeping cynicism because the concept of truth is no longer recognizable? Possibly.

But it is also possible that we will begin to combat technology-based duplicity with technology-based detection. Toward that end, let me mention three different fronts along which technology can gain us considerable traction in recognizing deception.

Technology-Aided Answers to Technology-Aided Deception

One is not new, only the methods for implementing it are. I refer to education and training in deception detection. Although the report card on the success of training efforts has not been encouraging, Mark Frank and Tom Feeley (Frank & Feeley, 2003) in a meta-analysis of training literature found that there is a net gain from training efforts, one that might be more dramatic if research had satisfied many of the challenges they articulate. Among them are ascertaining that the training materials actually include reliable indicators relevant to the learners' tasks, conducting training over a longer period of time, and incorporating appropriate pretests and posttests. Our own training efforts (e.g., Biros, George & Zmud, 2002; George, Biros et al., 2005) have demonstrated significant gains in knowledge and in accurate detection of deceit when conducted with motivated learners for whom the knowledge was job-relevant and when conducted over multiple training sessions. Where technology can boost this process is in delivering training in web-based and CD-ROM formats that widen significantly the reach of such training, are ideal for distance education, and can even be used for just-in-time training or refresher training.

As illustration, we developed a tool called the Agent99 Trainer—named in honor of Maxwell Smart's female sidekick in the old TV series *Get Smart*—that has multiple functionalities to aid learning (Cao, Crews, Lin, Burgoon & Nunamaker, 2003; Cao, Lin, Deokar, Burgoon, Crews & Atkins, 2004; George, Biros, Burgoon & Nunamaker, 2003). A lecture plays in one window and is synchronized with a running transcript of the lecture for those who are more verbally oriented and power point slides in yet another window to reinforce main points. All of this can be slowed or sped up so that it is self-paced and can be proceed in linear fashion or navigated in a user's preferred order using the outline window or the search function, which has key word and natural language querying capacity. Additionally, examples of deceptive behavior can be displayed throughout the lecture and the learner can choose to view additional examples at any time. For example, if the user is unclear what constitutes a long response latency or how to recognize it, he or she can pull up several examples to review. The tool can be programmed to pop up quizzes intermittently. The quizzes help to rivet learner attention to the content as well as become the vehicle for providing periodic feedback to the learners on how well they are comprehending the content. Finally, this kind of delivery system is well-suited to giving pre- and post-tests of two types: knowledge tests that examine understanding of concepts an principles and judgment tests that present actual verbal, vocal and visual samples of behavior and require users to judge them as truthful or deceptive.

In this manner, technologies can impart material in a more engaging, interactive, multi-modal, self-paced, nonlinear, feedback-driven,

user-friendly and intuitive fashion that one hopes is an improvement over previous delivery methods and will better equip users to distinguish truth from dissembling.

Training to date, however, has not considered whether it will succeed for detection in computer-mediated and virtual environments.

Another technological thrust is to use new tools to better detect reliable indicators of deceit. This is the direction of my current research funded by the Department of Defense. Toward this end, we have developed tools that salve some of the pain of what has been painstaking manual behavioral observation. It will be recalled that past deception research, especially that conducted outside the communication discipline, has not measured behavioral dynamics. This is understandable when you consider that a few minutes of recorded interaction may take 10 to 15 hours of coding time.

To make this process more manageable, we have developed C-BAS, a behavioral annotation system that can run on a laptop or desktop using the user's own keyboard for coding events, durations of events, or global ratings or larger segments of behavior. Stimulus materials—usually video—are presented in one window, a coding template designed by the user to map keys to behaviors is shown in another window, and a running display shows the time-synched behaviors in a third window as the coder proceeds through the video and records his or her observations chronologically. This kind of technological assist—and there are many commercial products now available for behavioral annotation—enables a level of granularity in measurement that was often too cumbersome or daunting to achieve.

That it can deliver better detection of reliable indicators is evident from preliminary results from an analysis we conducted on combined verbal and nonverbal coding from our mock theft experiment. The discriminant analysis shows that with seven variables—four gestural measures and three linguistic ones—we are able to push detection accuracy up from the meta-analytic level of 54% to upwards of 75%. In a second study, with only nonverbal cues as predictors, we have achieved 100% accurate classification in the original analysis and 90% accuracy in a cross-validated analysis. These results demonstrate that with precise measurement and a combination of features, it is possible to achieve much higher levels of accuracy than that found in much of the previous research. Aldert Vrij and colleagues research (Vrij, Akehurst, Soukara & Bull, 2004; Vrij, Edward & Bull, 2001; Vrij, Edward, Roberts & Bull, 2001; Vrij & Mann, 2004) and others are showing similar successes using a multi-modal approach. With the aid of these measurement tools, we can better discern what behaviors truly are diagnostic of deceit. Tools like C-BAS and MacVISTA will also better capture and test for temporal variability within and across behavior streams.

There is yet another way in which we can use these tools to aid discernment, in this case, identifying patterns that humans might not recognize. Let me demonstrate with linguistic features and with visual nonverbal features.

Language has been the largely untapped resource for detecting deception, again in part hampered by the lack of tools to mine linguistic fields. But the advent of parsers and dictionaries for automating linguistic analysis and large corpora that have already been annotated has now changed the cost/benefit ratio immeasurably. We are now transcribing

all of the audio and face-to-face conditions from our research and subjecting them as well as text chats to automated linguistic analyses. The result is that we can identify a host of features that discriminate between truth and deception.

For example, in the desert survival experiment to which I alluded earlier, we subjected participants' synchronous and asynchronous text chats to a shallow parser called the General Architecture for Text Extraction, or GATE, and then submitted the tagged parts of speech to an open-source tool called Weka that launches a variety of statistical analyses and text mining algorithms such as logistic regression, decision trees, and neural networks (see Zhou, Burgoon, Twitchell et al., 2004, for details). We have also used a fuzzy logic model to assign utterances to speech act categories, using the large Switchboard corpus that has already been annotated as the base training set, then analyzed the extent to which deceivers express greater uncertainty through their speech acts (Twitchell, Nunamaker & Burgoon, 2004). Yet another promising approach would be to apply Steve Corman and colleagues' centering resonance analysis (Corman, Kuhn, McPhee & Dooley, 2002) to identify content themes.

One could imagine applying such tools to all manner of text-based messages or to speech-to-text transcripts to alert recipients, or even senders, to suspicious and fishy-sounding messages. Imagine, for example, a button on your Outlook mail screen that would automatically process and flag deceptive-looking incoming messages or would not only spell-check and grammar-check your outgoing messages but also check them for sincerity and adherence to Gricean maxims for cooperative discourse. All of this is now possible.

Even more astounding is the capacity to detect nonverbal behavior automatically, aided by computer vision technology and what is called blob analysis. Here is how it works. Using a variety of techniques including skin-coloring matching, eigenspace analysis, frame-by-frame pixel changes, Kalman filters, and boosting algorithms, it is possible to distinguish people from, say, cars or packages, in a scene, and for our purposes, to distinguish heads, hands, torso and shoulders. These are identified with ellipses called blobs that have associated measurements. Our research group has identified 150 additional features that can be calculated, such as the distances between hand blobs, the velocity of movement, or the frequency with which hand blobs intersect with face blobs, as would occur with a hand-to-face adaptor gesture. All of these features can be calculated automatically from digital video. The features become predictors in statistical models or inputs into data mining algorithms. Analyses on such features is yielding high precision in capturing behavioral adjustments and patterns and also revealing patterns that the naked eye and the human processor would fail to detect. Here are just two sample results showing a high degree of accuracy that can be achieved with very few input variables.

These tools have immense potential for analyzing human behavior and eventually flagging users to potentially deceptive communication or malicious intent. One can imagine, for example, how much easier it would have been for analysts who after the London bombings had to process video from no less than 25,000 cameras in the London subways in their search for the perpetrators. One could also imagine such tools alerting members of globally distributed virtual workgroups to less sinister activity such as someone's nonverbal expressions of disagreement with a

leader's position, defections from a political coalition, or team members' uncertainty about their own level of knowledge on a time-critical decision. The knowledge gleaned from understanding what prompts suspicion versus what engenders trust may also be used to develop embodied conversational agents that effectively simulate human communication (Hartmann, Mancini & Pelachaud, 2005; Nass, Isbister & Lee, 2000).

Conclusion: Discerning Truth and Deception in RW and VW

The matter of verisimilitude of course brings us full circle. The inevitability of further blurring lines between real worlds and virtual worlds, of inhabiting immersive virtual environments that stimulate and augment human senses and cognitions in ways unattainable in "real worlds" will continue to challenge us to discern what is true and untrue, to surveil the impact on social discourse and trust, to debate the influence on social mores for ethical conduct. In all of these arenas, hope you will find with me unparalleled opportunities for communication scholarship that epitomize the health and vitality of our discipline.

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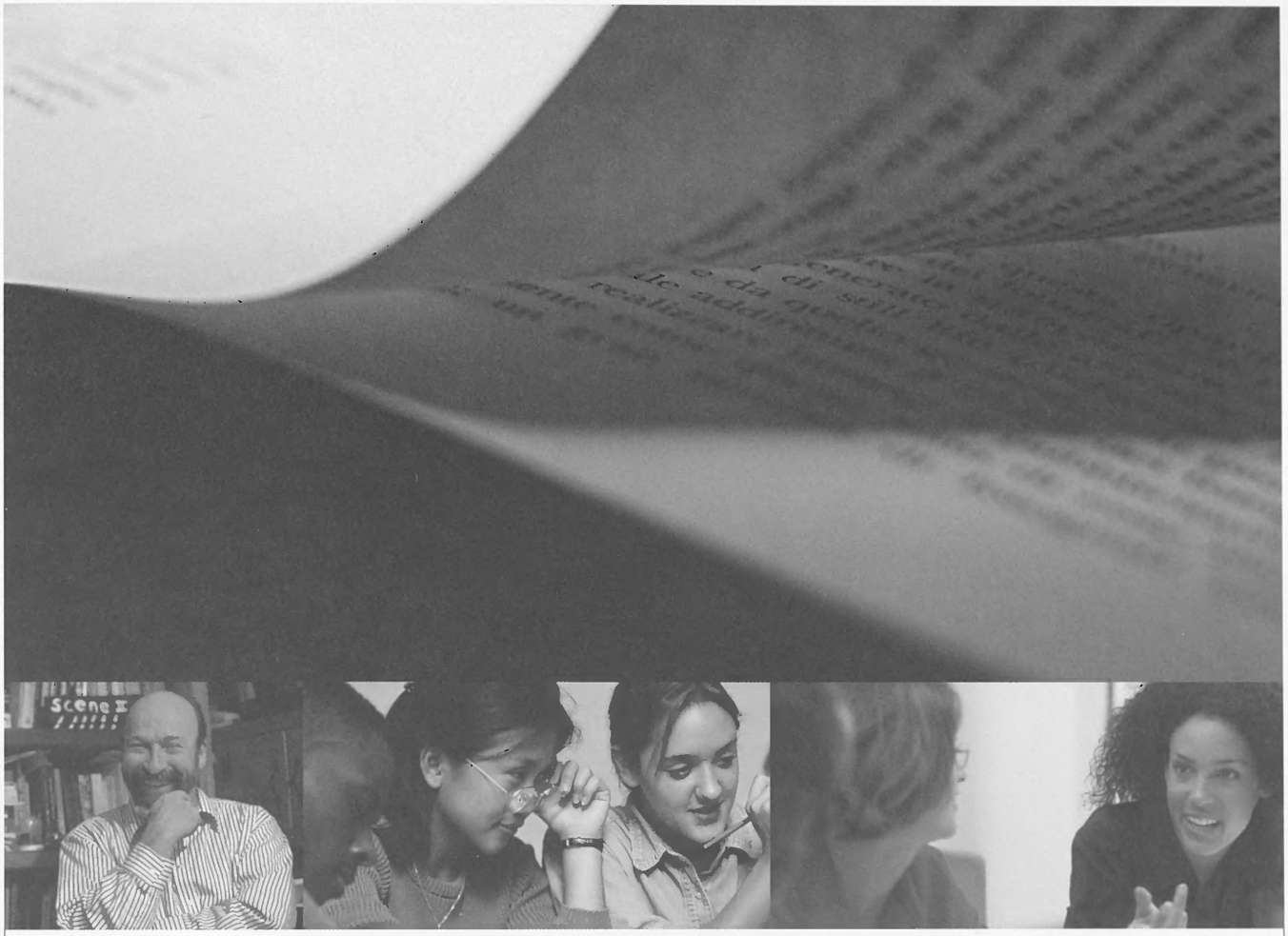

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