Are You Lying to Me?
Using Nonverbal Cues to Detect Deception

Rebecca Dyer
Advisor: Marilyn Boltz
Haverford College
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Abstract

The present study was designed to investigate the relationship between response latency, speech rate accommodation, and judgments of deception. Participants listened to a recorded conversation between Jim and Claire, a dating couple. The conversation contained 32 question/answer pairs, with each speaker responding to 16 questions. Half of the responses were self-oriented (benefiting the self), and half were other-oriented (benefiting someone else). Each response was manipulated in terms of response latency and speech rate accommodation. Participants rated each response as either honest or deceitful, as well as confidence in their judgments and seriousness of each lie. Results showed that response latency was generally weighted more heavily than speech rate accommodation as a cue to deception. Early and on-time latencies were viewed as truthful, while late latencies were viewed as deceitful. In addition, several significant differences emerged as a function of type of lie (self- vs. other-oriented), gender of speaker, and gender of participants. Results are discussed in terms of cognitive models, sex differences in deception, relationship between the speakers, and gender expectancies/stereotypes.
Are You Lying to Me?
Using Nonverbal Cues to Detect Deception

– “Hey, do you want to go see a movie tonight?”
– “Sure, that sounds fine.”

Simply from reading the previous two sentences, what inferences can you make? Can you conclude anything about personality, gender, mood, etc.? What about honesty – does the second individual actually want to go to the movies, or is he/she simply willing to go along with the first person’s wish? Clearly, with just the physical words and no context, it is impossible to infer anything for certain. If we knew more about the speakers, if we could listen to them, if we could see them – that, however, would open up a whole new realm of possibilities.

Deception as an Everyday Occurrence

We may not want to admit it – we may not even be aware of it – but lying is a part of everyday life. While some deception can be very serious or significant, most lies are often small or inconsequential. Nonetheless, they are still lies. Two studies by DePaulo and colleagues (DePaulo & Kashy, 1998; DePaulo, Kashy, Kirkendol, Wyer, & Epstein 1996) used the format of a diary study to examine the existence of lies in everyday life (both studies used the same data sets, but examined them in different ways). For this study, participants (both undergraduate students and regular community members of all ages) were required to keep a diary over the course of a week. In this diary, participants were instructed to record all of their social interactions during the week, as well as all lies they told during these interactions.

For the purposes of the study, a social interaction was defined as “any exchange between you and another person that lasts 10 min or more…in which the behavior of one person is in
response to the behavior of another person” (DePaulo et al, 1996, p. 981). Participants were also told that “a lie occurs any time you intentionally try to mislead someone. Both the intent to deceive and the actual deception must occur” (p. 981, italics in original). For each lie they told, participants had to record the initials and gender of the person/people to whom they told the lie, briefly describe the lie and the reason why the lie was told, and rate the degree of planning the lie, the importance of not getting caught, their feelings while telling the lie, etc.

All social interactions and lies were coded, and results showed that, on average, college students tell two lies per day, and community members tell one lie per day. Undergrads reported lying in about one third of their social interactions, while people from the community lied in one fifth. Overall, participants thought that they were relatively successful in telling their lies (i.e. not getting caught). They also considered themselves to lie less frequently than others their age. In addition, participants generally did not consider their lies to be serious, but participants still felt more uncomfortable while telling a lie and immediately afterward, relative to how they felt immediately before telling the lie. Although this study is non-experimental, it offers a clear view of the common occurrence of deception in everyday life.

It is important to note that there are two sides to the study of deception: there is the speaker’s perspective, as well as the observer’s perspective. In other words, researchers have studied deception in terms of the person telling a lie (the DePaulo diary study mentioned above, for example), but also in terms of the person hearing a lie. Both perspectives are central to the study of deception, since both are commonly experienced on a regular basis. There is an almost constant appraisal of whether or not it is best to tell the truth, and whether or not it seems someone else is telling the truth. On an individual level, it is important to be able to make these decisions. Though lying comes with some amount of social stigma, it can serve important
purposes, whether in terms of self-preservation or protection of others. It is also important to be able to successfully detect deception in others, in order to avoid being victimized by others’ dishonesty.

**Different Types of Lies**

Studies on deception have shown there are various ways in which to categorize different types of lies. For example, lies can be categorized by their seriousness (major versus inconsequential), to whom the lies are told (strangers versus acquaintances versus close friends), or planning (planned versus spontaneous lies). One relatively common categorization relates to the actual content of the lie: it can involve an outright fabrication of information or an exaggeration of the truth (e.g. Lees Haley, 1984). Another common type of categorization relates to the motivation for lying. A study looking at lying on the internet, for example, categorized lies in terms of the motivation to conceal one’s identity, to make oneself appear more attractive, or to enact different roles not normally experienced (Utz, 2005). Somewhat related to the question of motivation, an increasingly common way of categorizing lies is through the distinction between self- and other-oriented lies. This distinction refers to the target of a lie, i.e. about what or to whom the speaker is lying.

**Self-Oriented vs. Other-Oriented Lies**

Do people lie primarily about themselves, about other people, or about impersonal issues such as objects or events? To examine this question, researchers have looked at the distinction between self-oriented and other-oriented lies. Self-oriented lies are lies that are told to make the self look better. Self-oriented lies are solely used for one’s own benefit (hence, they can also be called self-benefiting lies). For example, lying about the fact that you were the one who broke a
window is a self-oriented lie told to protect the liar from punishment or from looking bad (DePaulo et al., 1996). Conversely, other-oriented lies are lies told to make someone else look better. For example, saying that your friend’s cookies are really good when you don’t actually think so is an other-oriented lie told to protect your friend from feeling bad, or simply to make your friend feel good (DePaulo et al., 1996).

Another important difference between self-oriented and other-oriented lies is their respective seriousness. Self-oriented lies are viewed more negatively because they are purely self-serving. Other-oriented lies, on the other hand, are viewed more positively because the willingness to lie for someone else’s benefit actually reflects well on the self. It is important to note that, theoretically, a lie that belittles another person could be considered an other-oriented lie, because it is about someone else. However, using the classification of other-oriented lies as *benefiting* another person, this would actually be categorized as a self-oriented lie, since the derogation of others has the self-serving motivation of enhancing the self. Similarly, lies that are meant to avoid conflict or prevent others from becoming angry with you may also directly refer to another person, but actually benefit the self.

DePaulo et al. (1996) examined this distinction within their diary study. Results showed that participants generally told more self-serving than other-oriented lies. In fact, more than 80% of participants’ lies were, in part, about the participants themselves. Still, approximately one out of every four lies was considered other-oriented, in that they were told to benefit other people. With self-oriented lies, participants tended to use them for what DePaulo et al. called “psychological” reasons, as opposed to materialistic benefits. In other words, self-oriented lies were most often told for self-presentation and emotion regulation (e.g. making oneself appear smarter than what one actually is).
**Sex Differences**

The same DePaulo et al. study (1996) also revealed a number of interesting gender effects. This study examined gender within the reference of self- vs. other-oriented lies and found that women tell more other-oriented lies than men, while men tell more self-oriented lies than women. Similarly, women are told more other-oriented lies, while men are told more self-oriented lies. Within the undergraduate population of the study, 50.57% of lies told by men were self-oriented lies, but only 42.42% of lies told by women were self-oriented. Conversely, 15.25% of lies told by men were other-oriented lies, while 32.21% of lies told by women were other-oriented. Results also showed that interactions between two undergraduate females were especially likely to feature a high number of other-oriented lies and a low number of self-oriented lies. Conversely, in dyads that included men (either a man and a woman, or two men), there were significantly higher rates of self-oriented than other-oriented lies.

These results may be related to findings that women are generally more intimate, more self-disclosing, and more emotionally supportive than men (e.g. Holmstrom, Burleson, & Jones, 2005; MacGeorge, Gillihan, Samter, & Clark, 2003). Women seem to be more attuned to the needs of other people, and more appreciative of interpersonal relationships. This helps to explain why women tell more other-oriented lies, especially when they are talking with other women. In essence, women tell other-oriented lies because other people’s feelings are more important than the exact truth, especially concerning relatively unimportant issues. Thus, it seems that individuals tend to tell lies in order to impress men, and to protect the emotions of women (DePaulo et al, 1996).
Nonverbal Cues and Deception

Nonverbal Cues to Deception

Self-Regulation and Self-Presentation

So far, we have primarily considered deception from the liar’s perspective. However, what about the perceiver’s perspective? What makes someone think they are being told a lie? In general, people tend to rely more on nonverbal than verbal cues, which consist of the actual content of what people are saying. Clearly, verbal content is extremely open to self-control, in that what is said is entirely a matter of choice. When lying, people decide what they can say to sound as truthful as possible. Thus, monitoring verbal content is unreliable as a method of lie-detection; in general, it is very difficult to be able to tell the difference between a truthful statement and a lie by merely listening to the actual words.

Nonverbal cues, however, are much less straightforward, and when it comes to the attempt to accurately detect deception, that is generally a good thing. The early predominant theory was that nonverbal behavior is largely unregulated and uncontrollable. As Freud famously said, “if his lips are silent, he chatters with his fingertips; betrayal oozes out of him at every pore” (p. 94) (Freud, 1905, as cited in Zuckerman, DePaulo, & Rosenthal, 1981). Theorists argue that some types of people may be able to regulate their nonverbal behavior (such as actors or con men), but this ability is unusual (Schneider, Hastorf, & Ellsworth, 1979). Thus, the idea was that nonverbal behavior occurs spontaneously and without control, therefore making them particularly good cues to deception. Also, evidence has shown that there are direct links between the elicitation of some emotions and the triggering of the facial muscles that produce facial expressions of those emotions (Ekman, 1977). The theory held that words can be chosen with specific goals in mind, but nonverbal behavior cannot be faked. This theory was a generally held belief, both in the general population and among researchers.
However, more recent evidence has supported a new theory which argues that it is relatively easy to regulate one’s own nonverbal behavior. In fact, it has been argued that it is actually rare for nonverbal behavior to be completely unregulated (DePaulo, 1992). Now, the question arises of why anyone would want to regulate their nonverbal behavior in the first place. Here enters the idea of self-presentation, which is the monitoring of one’s own behavior in order to create a particular impression or communicate a certain image to others (DePaulo & Friedman, 1998). This could be considered, to a certain extent, lying. The idea of self-presentation implies that people have an internal sense of what it means to be “sincere,” or “attentive,” or “excited,” all possible emotions that one might wish to convey, even when they are not actually felt. Self-presentation can occur using either verbal or nonverbal behavior, and can be done both consciously and unconsciously (DePaulo, 1992).

Nevertheless, attempts at self-regulation are not always successful (DePaulo, 1992; DePaulo & Friedman, 1998), and in fact, there are a number of different ways in which attempts at self-presentation can go wrong. For example, it may be that people have an incorrect idea of how particular emotions are expressed, thus creating an ineffective impression. Or sometimes people might know exactly what they need to do, but they overcompensate, making their self-regulation salient to observers. In fact, motivation to succeed in telling a lie has an interesting effect on the ability to effectively control nonverbal behavior. One would think that if you were truly motivated to tell a lie in such a way that it would not be detected, you would be better at regulating your nonverbal behavior to support that lie, relative to someone with no such motivation. However, it has been shown that the exact opposite is true. When people are more motivated to get away with a lie, their nonverbal behavior is actually more likely to tip off the observer (e.g. DePaulo, LeMay, & Epstein, 1991).
Reliability of Specific Nonverbal Cues

As implied above, some nonverbal cues are “better” than others when it comes to effective self-presentation and getting away with lying. In general, people tend to overly rely on facial expression as an indication of lying (DePaulo & Friedman, 1998; DePaulo, Rosenthal, Eisenstat, Rogers, & Finkelstein, 1978). In fact, past studies have shown that facial expression is actually the most misleading cue to deception, as observers are most accurate at detecting deception when they do not have access to any facial cues (i.e. subjects are only exposed to body cues and/or vocal cues). In addition, vocal cues seem to increase accuracy more than body cues (Ekman, Friesen, O’Sullivan, & Scherer, 1980; Zuckerman et al., 1981).

Beyond general facial expression, however, there are still many different elements of nonverbal behavior which could be potentially taken as cues to deception. One cue that is particularly reliable is pupil dilation (DePaulo & Friedman, 1998). Nonetheless, this is highly impractical, as it is essentially impossible to actually monitor pupil dilation in the context of a normal social interaction. Blinking is another reliable cue, but again, it is difficult to keep track of this during the course of a conversation.

Gaze (i.e. maintaining eye contact), however, is another factor which is thought to be more reliable than it actually is. While perceivers tend to attach significant weight to gaze, it has been found that it does not, in fact, correlate reliably with actual deception (DePaulo & Friedman, 1998; Zuckerman et al., 1981). Some people may fit the stereotype of the “shifty-eyed liar,” but more successful liars will know to avoid such behavior. Smiling is also a potential nonverbal cue to deception, in that someone who smiles more tends to be viewed as more truthful. However, there is a caveat to that, since there is an important distinction to be made between “Duchenne” smiles (“true” smiles) and “fake” smiles. Duchenne smiles indicate actual
enjoyment, while fake smiles, which lack the tell-tale crinkling around the eyes, indicate faked enjoyment (Ekman, 1985). Observers are relatively accurate at telling the difference between them and more positively regard those who show true smiles (DePaulo & Friedman, 1998; Frank, Ekman, & Friesen, 1993).

There are also a number of nonverbal cues which relate more to what is heard than what is seen. For example, it has been shown that a higher pitch is associated with deception (DePaulo & Friedman, 1998; Siegman, 1987; Zuckerman et al., 1981), as is a greater frequency of pauses and hesitations (Zuckerman et al., 1981). For both of these cues, not only are they used by observers in judgments of deception, but they are both reliably linked to actual deception, in that people who are lying tend to have higher pitch than normal and hesitate more than they normally would (Zuckerman et al., 1981). Deception normally creates anxiety which results in greater tension of the vocal folds and hence a higher pitch. Hesitations can occur during the construction or planning of lies, which require cognitive effort. Clearly, there are many different behaviors that speakers must consider if they want to successfully relegate their nonverbal cues to deception, and which observers must consider if they want to accurately detect deception in others. There are two additional vocal characteristics that offer cues to deception and are of particular interest to the present study, namely, response latency and speech rate accommodation.

*Response Latency*

Response latency, within the context of a conversation and possible deception, is the amount of time it takes for one person to answer a given question posed by another. There are several theories as to how response latency is affected by deception. Perhaps the most prominent of such theories is Walczyk et al.’s cognitive model of deception (Walczyk, Roper, Seemann, & Humphrey, 2003). According to this model, there are three cognitive components to lying in
response to a question. When a question is asked, the first thing that happens is that the actual truth is activated. This is the “activation component.” Next is the “decision component,” in which individuals must decide whether to tell the truth or to lie. Finally, if individuals decide to lie, then they must decide and plan exactly what to say. This is the “construction component.” All three components occur before the actual lie is stated. Activation of the truth occurs automatically after a question is asked. However, only those who choose to tell a lie and then decide what the lie should be, go through the decision and construction components. Thus, it follows that response latency will be longer for lies than for true responses.

However, several important questions remain, such as whether observers are actually able to distinguish between response latencies for truthful statements versus lies, and how much time differentiates truthful and deceptive latencies. A key study by Boltz (2003) examined these issues. In this study, participants listened to monologues consisting of three statements, followed by a question that required a yes or no answer. Participants were instructed to give a “yes” response in a way they believed would indicate a positive or negative impression of one of four speech acts – honesty, compliance, certainty, or confidence. In other words, for the honesty condition (the condition of greatest interest here), half the participants were told to time their response to convey what they believed would sound truthful, and half the participants were told to time their response to convey what they believed would sound deceptive. In essence, they were asked to manipulate their response latencies in order to sound either truthful or deceitful. Across all subjects, results showed that, relative to the other speech acts, honesty yielded the smallest range of latencies considered to sound truthful. Dishonesty was found to be conveyed through latencies that were both shorter and longer than the “honest” latencies.
A second experiment confirmed these findings. In this experiment, participants listened to the same monologues as before, but this time including the response. Response latencies were manipulated to form seven conditions: “optimal” latency (equal to the mean value from the positive impression condition of Experiment 1), as well as two, four, and six times shorter and longer than that mean value. In the honest condition, participants had to rate the honesty of each response. In support of Experiment 1, results showed that honesty was rated highest for the intermediate response latency, while all the other six latencies were rated as dishonest (and there was no significant difference between any of the six non-optimal latencies). In addition, a third experiment went even further, demonstrating that optimal response latencies for honesty were essentially equal to the mean pause duration within the speaker’s monologue. Again, this effect is demonstrated both from a production and perception standpoint, showing that what a speaker believes will sound like a lie or the truth does in fact sound as such to listeners. This consistency increases the reliability of the study. These findings also confirm, with much greater detail, an earlier study by Baskett and Freedle (1974) which found that responses that are either too quick or too slow, as opposed to intermediate, are more likely to be perceived as untruthful.

Another important study relating to response latency and deception was done by Greene, O’Hair, Cody, and Yen (1985). This study aimed to examine the roles of cognitive effort and inhibitory control on the behavioral correlates of deception. For the experiment, subjects interacted with a confederate, each asking the other 12 questions. However, in the deception condition, subjects were instructed in advance to lie on one of the questions (same question for all subjects). During the interaction, the planned lie was followed immediately by an unscripted question by the confederate, meant to elicit a spontaneous lie from the subjects. After the remainder of the scripted questions was asked, the confederate added one more unexpected
question, eliciting a second spontaneous lie.

Results showed that response latencies were significantly shorter for a planned lie versus the truth. When comparing truth-telling with spontaneous lies, response latencies were not significantly different, but were in the direction of longer response latencies for spontaneous lies. The important finding from this study is the fact that, while response latencies that are both too short and too long sound deceitful, shorter response latencies primarily occur with lies that are planned beforehand. The logic behind this finding is that spontaneous lies require more cognitive effort than telling the truth, and therefore take longer. With planned lies, on the other hand, it may be that people overcompensate while trying not to take too long to answer, but end up answering too quickly. This makes sense in terms of Walczyk et al.’s cognitive model of deception (2003) because planned lies do not require the decision or construction components of telling a lie, as liars have already decided to lie and constructed what to say. However, it is also plausible that shorter response latencies are an effect of knowing the “right” answer, i.e. relying on what a listener wants to hear, regardless of whether or not it is true. In addition, people may begin formulating a lie even before a question is complete. In both of these cases, the lies are not quite planned, per se, but they involve less cognitive effort than a regular, spontaneous lie, thus reducing response latency.

However, it is also true that increases in response latency do not always yield greater perceptions of untruthfulness. In certain circumstances, actual verbal content will affect the interpretation of response latencies. For example, a study by Kraut (1978) found that greater response latencies made observers more suspicious of already self-serving answers, but more certain of the truth of answers that were already forthright. In this study, subjects listened to a five-minute clip of a simulated interview for a job as a dormitory counselor. The beginning of
the interview was meant to create either a positive or negative first impression of the candidate. The middle of the interview contained the key question, in which response latency was manipulated. Results showed that greater response latencies actually yielded higher ratings of honesty when subjects already had a positive impression of the candidate.

*Speech Rate Accommodation*

A second nonverbal cue of interest in the present study is speech rate accommodation. Speaker accommodation refers to the idea that, during a conversation, people tend to adopt similar speaking styles to become more like those with whom they are interacting (Street & Giles, 1982). As explained in one review article, “Dialect and speech style are not fixed elements of an individual’s language use; they vary depending on the social setting and the speech styles of the speaker’s conversational partners” (Krauss & Chiu, 1998). There are many possible manifestations of accommodation, including pitch, accent, amplitude, pause duration, and body language. Thus, if two people begin a conversation, and one of them is speaking significantly faster than the other, they will gradually accommodate to each other, such that the faster speaker slows down a bit, and the slower speaker speeds up, until their speech rates converge. On a social level, accommodation is a way of establishing a rapport between speakers. In fact, research has shown that accommodation is highly correlated with ratings of perceived similarity, persuasiveness, attractiveness, warmth, and enjoyableness (Giles, Coupland, & Coupland, 1991).

Some aspects of accommodation occur earlier than others. It has been shown that accommodation occurs earliest for the temporal aspects of speech, such as pauses, speech rate, and response latencies (Street & Giles, 1982). Of these, speech rate is of particular interest to the present study in that it is a timing parameter to which listeners are particularly attuned and exerts a significant influence on the perceived social competence and attractiveness of an individual
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Aspects of accommodation have not been studied in direct relation to deception, but theoretical links can be made through intermediary factors involving the concepts of anxiety/arousal and cognitive effort.

Studies have shown that deception is generally associated with feelings of discomfort and anxiety, especially when lies are told to people to whom individuals feel close (DePaulo & Kashy, 1998). Hence, the next relevant question is what effect anxiety has on speech rate. First, it has been found that higher levels of arousal yield faster speech rates (Buller, Strzyzewski, & Hunsaker, 1991). One such illustration comes from a study by Siegman and Boyle (1993) who examined the emotional correlates of speech rate and amplitude manipulations. Results showed that fast and loud speech were congruent with the emotions of fear and anxiety. In other words, when individuals feel frightened or anxious, it is normal for them to speak quickly and loudly.

However, it is also plausible that lying could result in a decrease of speech rate. One possibility is that liars know about the tendency to speed up when anxious, and thus will attempt to counteract that inclination, but will overcompensate, resulting in a decrease in speech rate. Another possibility relates more to cognitive effort than anxiety. As explained in the context of Walczyk et al.’s model on response latency, lying requires more cognitive effort than telling the truth, because liars are required to decide what they need to say. Conversely, truth-tellers do not have such a problem. Therefore, it is possible that this extra effort will require liars to speak slower, as they construct lies and speak them almost simultaneously.

A study by Apple, Streeter, and Krauss (1979) found that slow-speaking men were perceived to be more passive and less truthful, fluent, emphatic, serious, and less persuasive than men who spoke faster. However, there was no intermediate rate for comparison purposes. Thus, it appears that both slow and fast speech rate may be indications of deception. In fact, Siegman’s
(1987) review article on nonverbal behavior supports the idea that the same level of arousal can cause an increase in speech rate in some instances, but a decrease in speech rate in other instances. However, it is difficult to tease apart the possible reasons for slow speech rate – it may occur in order to try to cover up deception, or it may occur simply because even saying the truth requires significant thought and cognitive effort.

In addition, although speech rate accommodation has not been studied within the context of deception, it has been studied in terms of compliance. Buller and Aune (1992) studied compliance following a request for help. The request was presented with nine different speech rates. As they predicted, greater levels of speech rate similarity (essentially the same thing as speech rate accommodation) was associated with greater intimacy, immediacy, and sociability/character interpretations. The researchers emphasized that, to inspire compliance, establishing a relational connection may be more important than simply being sociable.

**Relationships and Deception**

*Truth Bias*

Previous research has shown that the detection of deception depends in part on the context surrounding the deception. There is a big difference between telling a lie to a complete stranger and telling a lie to your best friend, if only because your friend already has more knowledge about you. Thus, it may seem logical to assume that the people with whom individuals are closest would be the best at accurately detecting deception. However, this is not the case. This is because individuals in a relationship are particularly susceptible to what is known as a “truth bias,” which means that people tend to give the benefit of the doubt to those who are close to them, by assuming they will always tell the truth. It is true that people lie less often – and feel more uncomfortable when they do lie – to those with whom they feel close
(DePaulo & Kashy, 1998; DePaulo et al., 1996). Nonetheless, it is also true that, when lies are told within the context of a close relationship, they are actually less likely to be detected (Buller et al., 1991).

Third-Person Observers

Truth biases occur not only within the context of a close relationship, but also to a certain extent when comparing participants in a conversation with observers to that conversation. A study by Buller and colleagues (1991) examined this issue. Results demonstrated that simply being directly involved in a conversation elicits a truth bias, which creates the effect that third-person observers – people who listen to/watch a conversation but do not participate – are much more accurate at detecting deception. As the study explains, “observers have only to watch the source, but participants must watch the source, control self-presentation, sequence their conversation exchanges, assess the source’s and their own antecedent behaviors, and plan their future behaviors while simultaneously maintaining control over the immediate interaction” (p. 27). Therefore, observers have significantly more cognitive resources available for more thoroughly assessing a speaker’s nonverbal behavior.

Suspicion levels also add to the discrepancy between observers’ and conversational participants’ ability to detect deception. A study by McCornack and Levine (1990) demonstrated that people are most accurate at detecting deception when a moderate amount of suspicion has been aroused. This relates to the issue of third-person observers, in that observers are more likely to become suspicious, and to seriously consider those suspicions, than anyone experiencing a truth bias. This helps to explain why observers are more accurate at detecting deception than conversational participants.
The Present Study

Goals and Rationale

The purpose of the present research was to extend the existing literature by addressing three main issues. First, although vocal parameters, especially those involving the temporal dimensions of the voice, have been found to be reliable indicants of deception, it is not clear whether some cues are weighed more heavily than others. Of particular interest here are the relative contributions of speech rate accommodation and response latencies, and whether listeners (observers) rely more on one cue versus the other to infer deceptions. The second goal of this study was to determine whether the potential impact of these two parameters varies for different types of lies, namely, those that are self- versus other-oriented. Answering this question would add significantly to our general understanding of the perception of deception. The final goal was to systematically examine gender differences in order to examine the potential existence of gender stereotypes relating to deception. This last issue could potentially answer many questions regarding impression formation and the social relations between men and women.

It is important to note here the difference between speech rate and speech rate accommodation. Speech rate on its own refers to an individual’s tempo of speaking. When previous studies spoke about speech rate as a cue to deception, they were looking at changes in speech rate, but only compared within the one speaker’s tempo, with no reference to anyone else. Speech rate accommodation, however, necessarily refers to the relationship between the speech rates of two people. In the context of accommodation, when one speaker’s speech rate increases, the main point is not simply that the person is now speaking faster; the point is that the person’s speech rate no longer matches the conversational partner’s rate.
Examining the issue of the relative contributions of speech rate accommodation and response latencies, the present study aims to tease apart their respective roles in the perception of deception. The highest amount of consistency should exist (i.e. judgments of deceit should be easier) when response latency and speech rate accommodation both convey consistent or inconsistent information, meaning either they are both optimal (on-time latency, same speech rate), or are both non-optimal (e.g. late latency, faster speech rate). In such a situation, both cues point towards the same implication of either honesty or deceit.

However, what happens when one cue is optimal but the other is not? Here, cue information is less reliable because one conflicts with the other. It is not clear which cue is weighted more heavily in perceptions of deception. If one nonverbal cue is consistently weighted as more important, it may overpower any potential implications of the second cue. For example, when response latency is on-time, but speech rate is too fast, will listeners view this as truthful, as implied by the latency, or dishonest, as implied by the speech rate? According to Walczyzk et al.’s cognitive model of deception (2003), an on-time response latency means that extra time was not spent deciding what to say instead of the truth. A faster speech rate, however, could imply deception, as it may be a sign of anxiety (Buller et al., 1991). Examining honesty ratings in situations in which the two cues communicate conflicting information will help answer the question of which cue people rely on more.

It is possible, however, that the importance of each cue will depend on the type of lie (self vs. other) itself. In general, there is an implicit trust between individuals that each participant in the conversation will tell the truth. Violations of this trust can sometimes have serious implications and repercussions, especially when the lie is motivated by self-gain. Thus, there is likely to be a more restricted range of acceptable response latencies for self-oriented
responses. However, when people make other-oriented responses, those around them are more likely to avoid conflict by giving the benefit of the doubt. Accommodation is all about establishing a connection between speakers. It is important for creating a sense of rapport. Accordingly, it seems that speech rate accommodation may relate more to other-oriented responses, which are also geared towards a connection with someone else. Since self-oriented responses only revolve around one person, accommodation may not be as important of a cue in those cases. Therefore, it is possible that response latency will be weighted more heavily for self-oriented responses, while speech rate accommodation will be weighted more heavily for other-oriented responses.

The final goal of this research is to examine sex differences and the possible effects of gender stereotypes. There are a number of questions that arise here. As discussed earlier, there are definite sex differences in the types of lies that individuals tell and are told. Men tend to tell, and are told, more self-oriented lies, while women tell, and are told, more other-oriented lies. Are we consciously aware of these differences? If so, do we shape our perceptions to conform to these stereotypes of what men and women should say? Similarly, is one sex generally more likely to perceive lying in others, and does the type of lie have any effect on that perception? We aim to investigate such questions in the present research.

Overview

These various issues are addressed in a study in which participants are asked to listen to a prerecorded conversation between a male/female couple who are presumably intimately involved and living together. The conversation contains 32 questions and answers, with each member of the couple asking and responding to 16 questions. Across different responses, type of lie (self- or other-oriented), speech rate accommodation (faster or the same), response latency (on-time,
early, or late), and sex of speaker (male or female) are manipulated. In addition to these within-subject manipulations, sex of participant is manipulated as a between-subject factor.

Relative to on-time response latencies, which should be considered truthful, late latencies usually arise from spontaneous, unplanned lies. Evidence has shown that early response latencies only occur for lies which are planned and prepared ahead of time (Greene et al., 1985), but this manipulation is still being included, as early latencies may still indicate lying in cases where the speakers say what they know to be the “right” answer, without really thinking about it. For example, imagine someone quickly responding that, “Yes, you look great in that outfit,” regardless of what the speaker actually thinks. It is also reasonable to believe that such a process could be especially likely to occur in the context of a close relationship, as individuals learn to answer questions in a way that pleases their partner. For speech rate, relative to the “same” condition, which reflects accommodation and presumably greater honesty, the “faster” condition may reflect greater anxiety, which implies deceit. A slow speech rate manipulation, however, is not included in the present study because it could merely reflect a question which required more thinking and cognitive effort, regardless of actual truthfulness.

For each response within the conversation, participants are asked to rate the perceived honesty of the speaker’s response, their confidence of this judgment, and the perceived seriousness of any lies. At the end of the conversation, participants are also asked to answer several questions regarding their overall impressions of each speaker, as well as their method for determining truthfulness. It is important to note that in this study, it is the perception of deception that is being measured, not whether or not these perceptions are accurate. Based solely on the listener’s perspective, there is no way to say for sure whether or not the speakers are lying. Even as experimenters, we made no judgments regarding the actual truthfulness of the responses.
A unique feature of the present research is its attempt to portray a naturalistic situation within an experimental design. Most studies only reflect one type of methodology or the other. Some, such as those by DePaulo and colleagues (DePaulo & Kashy, 1998; DePaulo et al., 1996), are completely naturalistic in that they are measuring actual deception in the real-world. However, as non-experimental studies, there are limits to the types of conclusions that can be drawn. On the other hand, experimental studies on deception (e.g. Baskett & Freedle, 1974; Boltz, 2002) can make statements of cause and effect based on their findings, but they lose the natural element, as they are often set up in a contrived and unrealistic laboratory setting. The present study, however, attempts to create a relatively naturalistic context within a laboratory setting through the use of a long and detailed conversation as the stimulus material (as opposed to merely a few sentences); an attempt to make the conversation sound as realistic as possible; and the fact that the couple and the conversation were given an overall context by providing participants with some background information about the relationship between the individuals.

Predictions

Based on the past research and the rationale explained above, our first hypothesis is that a higher frequency of perceived lies and higher confidence ratings should be found in conditions in which both response latency and speech rate communicate consistent implications of deceit (i.e. early or late response latency and faster speech rate). Similarly, a higher frequency of perceived truths and higher confidence ratings should be found in conditions in which both response latency and speech rate accommodation communicate consistent implications of honesty (i.e. on-time response latency and same speech rate).

When, however, response latency and speech rate accommodation do not match in their implications of honesty and deceit, it is unclear which cue will be more important, and will be
relied on most consistently. There are three possibilities that could occur, presented here as alternate hypotheses. First of all, it is possible that response latency is always weighted as more important, serving as the primary cue over speech rate accommodation. Hence, responses with an on-time response latency will always be seen as truthful, while responses with an early or late latency will always be seen as deceitful, regardless of speech rate. It is also possible, conversely, that speech rate accommodation will play the stronger role, overpowering the effects of response latency. That is, “same” speech rate will always be rated as truthful and “faster” speech rate will always be rated as deceitful. Finally, it is also plausible that the relative strength of each nonverbal cue will vary according to a third factor, such as verbal context or type of lie. For example, response latency may be more important for self-oriented responses, while speech rate accommodation is more important for other-oriented responses.

In general, it is also expected that participants will identify more self-oriented lies than other-oriented lies. Because self-oriented lies are generally viewed as more serious than other-oriented lies, it is believed that listeners will use stricter criteria for judging the truthfulness of self-oriented responses. In addition, it is predicted that this will be especially true for responses made by Jim, because as a man, he will be expected to tell more self-oriented responses anyway.

With respect to type of lie and gender, it is predicted that female participants will show a greater confidence with other-oriented responses, while male participants will show greater confidence with self-oriented responses. This stems from the evidence of gender differences relating to type of lie, and the possibility that this will translate to a greater attunement to one type of lie or another, depending on sex.
Method

Participants

A total of forty-five subjects (25 females and 20 males) from Haverford and Bryn Mawr Colleges participated in this experiment. Each participant was either granted credit for an introductory psychology course or entered into a lottery for a $25 prize. Subjects ranged in age from 18 to 20 years old and had normal hearing ability. Data from one male participant was not included in analysis because he exhibited excessive confusion with the procedure and instructions.

Design

The design for the experiment was a 2 (type of lie) x 3 (response latency) x 2 (speech rate accommodation) x 2 (sex of speaker) x 2 (sex of participant) mixed factorial. All participants listened to a pre-recorded conversation between a male and female speaker, which contained a total of 32 questions and answers (16 for each speaker). Each answer was manipulated in terms of type of lie (self-oriented or other-oriented), response latency (early, on-time, or late), accommodation (faster or the same), and sex of speaker. The only between-subjects variable was sex of the participants. A summary of the design is shown in Table 1.

Stimulus Materials

A script was written to represent a conversation between a man and a woman in a dating relationship, while they were doing the dishes. The dialogue initially contained a total of forty-three questions and answers. To narrow it down to sixteen responses per speaker, a pretest was conducted. Six participants were given definitions of self-oriented (only benefiting the self) and other-oriented (benefiting someone else), and then listened to the entire dialogue. Participants
Table 1: The experimental design of the study, reflecting the within-subject manipulations

<table>
<thead>
<tr>
<th>Speech Rate Accommodation</th>
<th>Response Latency</th>
<th>Type Of Lie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same</td>
<td></td>
<td>Self</td>
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<tr>
<td>Faster</td>
<td></td>
<td>Other</td>
</tr>
<tr>
<td>Same</td>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Faster</td>
<td></td>
<td>Female</td>
</tr>
</tbody>
</table>

were told to categorize each response in the dialogue as either self-oriented or other-oriented, as well as their confidence in the rating, using a 7-point Likert scale (1 = very unsure and 7 = very sure). Participants were also asked if they found anything particularly offensive or unnatural regarding the dialogue. For the final dialogue, question/answer pairs were removed if they were consistently rated as the opposite type of lie as was intended. Of the responses that were categorized as intended, those with the lowest confidence ratings were removed, leaving us with 32 question/answer pairs. In addition, participants found the dialogue to be inoffensive and realistic.

The questions were interspersed with regular conversation (non-questions) to ensure a realistic-sounding dialogue. Half of the questions were self-oriented and the other half were other-oriented, with each speaker asking/receiving eight of each type of question. Throughout the conversation, an attempt was made to keep both self- and other-oriented lies low in cognitive
effort. The conversation began as a simple exchange between the two speakers, without any questions asked, to give time for speech rate accommodation to occur, and to allow participants to get used to the couple’s normal speaking styles. See Appendix A for a transcript of the final dialogue.

Two actors (one male, 24 years old, and one female, 21 years old) were then hired to act out the final script. The actors were instructed to speak as naturally as possible, but were also instructed to intentionally adopt similar speaking styles, especially with regards to response latency and speech rate. The actors practiced until these two dimensions were approximately equal, and were then recorded. In order to determine the mean response latencies for each speaker, twelve random samples from the recording were chosen and measured. “Jim’s” mean latency was 0.70 seconds (SD=0.32), and “Claire’s” was 0.66 seconds (SD=0.15). When all 32 latencies were measured, the overall mean response latency was 0.64 seconds (SD=0.24 seconds). Any latency that was more than one standard deviation away from the mean was adjusted to 0.64 seconds. This mean was then designated as the “on-time” response latency. Mean speech rate was also measured. Mean speech rate was determined to be 4.15 syllables per second for Claire (SD=1.27) and 4.39 syllables per second for Jim (SD=1.13). There was no significant difference between speakers.

In order to determine the appropriate timing for each manipulation, a second pretest was conducted. Eight participants listened to four different clips of a question and answer from the dialogue, with seven trials for each clip. Each trial consisted of hearing a question (un-manipulated), followed by the response (either un-manipulated, or 15%, 20%, 25%, 30%, 35%, or 40% faster). For each trial, participants recorded whether they believed the response was a faster speech rate, the same speech rate, or a slower speech rate as was the question. For response
latency, participants listened to eight clips (question/answer pairs), with nine trials for each. The clips were manipulated in order to display response latencies equal to, or two, three, four, or five times shorter and longer than the mean. Participants rated each trial as either a lie or the truth. Participants were not told specifically to pay attention to response latency or speech rate.

The appropriate timing manipulations were determined based on the results from this pretest. Trials in which speech rate was manipulated to be less than 35% faster than the mean were consistently rated as sounding the same as, or even slower than, the baseline. Therefore, 35% faster was adopted as the “faster” speech rate. Trials in which response latency was manipulated to be less than five times shorter or longer were consistently rated as truths. Therefore, five times shorter was adopted as the “early” latency, and five times longer was adopted as the “late” latency. Thus, the final dialogue contained a total of thirty-two questions and answers, distributed such that each member of the dyad answered sixteen questions from the other individual. Of those, eight responses were self-oriented, and eight were other-oriented. For each of these two types of lies, four responses displayed an on-time latency, two displayed an early latency (5 times shorter), and two displayed a late latency (5 times longer). Within each of these latency conditions, half of the responses displayed the same speech rate as the baseline value, and half were 35% faster.

Four different versions of the dialogue were created (all using the same exact script) so that one question was not always associated with the same set of manipulations. Thus, any potential results could not be attributed to the actual content of each question and answer. Of the four within-subject factors – speech rate accommodation, response latency, type of lie, and sex of speaker – type of lie and sex of speaker remained constant, as they were content-specific. Speech rate accommodation and response latency, on the other hand, have no direct link to the
verbal content of the response and varied consistently across the four different versions of the dialogue.

Consider, for example, the first response in the dialogue, “Of course [my mother] liked you!” This response is said by the female speaker and is an other-oriented response. The response latency and speech rate, however, will vary according to version, such that four out of the six possible combinations will be used: (1) early response latency and same speech rate; (2) on-time response latency and same speech rate; (3) late response latency and same speech rate; (4) early response latency and faster speech rate; (5) on-time response latency and faster speech rate; (6) late response latency and faster speech rate. See Appendix B for an outline of all manipulations for each of the four versions.

Apparatus

The dialogue was initially recorded directly onto a Dell (Dimension 4500) computer, using a Realistic 33-992C microphone. All manipulations of the conversation’s timing characteristics were performed using the Audacity computer program (manufactured by Verilogix, Inc.). For the actual experiment itself, the manipulated dialogue was presented to participants through Windows Media Player (manufactured by Microsoft Corporation) on four Dell (Dimension 4500) computers. Participants wore headphones (Sony MDR CD-180) while listening to the recorded conversation.

Procedure

Participants were randomly assigned to one of the four versions of the conversation and tested in groups of one to four people. After signing an informed consent form (Appendix C), participants filled out a demographics form which asked for age, native language, and whether
they had any hearing problems (Appendix D). Two subjects were non-native English speakers (Spanish and Hindi), but each had been speaking English since three years of age or less. Subjects without normal hearing were excluded from the study.

Participants were told the purpose of the study was to investigate how we form impressions of other people. Instructions (Appendix E) included a brief description of the couple, “Jim” and “Claire” in order to create a background context for the dialogue. As they listened to the conversation, participants were instructed to answer the following questions for each response (defined as the first question after a posed question): (1) “Do you think the respondent was lying or telling the truth?”; (2) “Please indicate how confident you are in your judgment” (Likert scale, where 1 = Not at all, 7 = Very); (3) “If you believe the respondent was lying, please indicate how serious you think this lie is” (Likert scale, where 1 = Not at all, 7 = Very). In order to signal participants and give them sufficient time to make their ratings, a 0.5-second tone was inserted immediately after each response to a question, followed by fifteen seconds of silence. This procedure was repeated for the entire conversation. See Appendix F for the first page of the rating sheet.

At the end of the entire dialogue, participants then answered three open-ended questions (Appendix G): (1) “What aspects of the conversation helped you to decide whether you thought the respondent was lying or telling the truth?”; (2) “Which speaker, if any, did you like better? If so, which one and why?”; (3) “Which speaker, if any, did you think was more honest? If so, which one and why?” Once all the questions were completed, participants were awarded credit and participants were debriefed by email after the data was analyzed. The duration of an entire experimental session was approximately forty minutes.
Results

Lies vs. Truth

The primary question of interest in this study is the frequency of perceived truths versus lies, as a function of the experimental manipulations. To address this, a chi square analysis was conducted for each of the latency x speech rate x type of lie x speaker conditions of the experiment. In each case, the expected value of a truth or lie was .50. Results are shown below in Table 2, which depicts the proportion of perceived truths for all experimental conditions, along

<table>
<thead>
<tr>
<th></th>
<th>Claire Other</th>
<th>Claire Self</th>
<th>Jim Other</th>
<th>Jim Self</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAME RATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Latency</td>
<td>.68*</td>
<td>.80*</td>
<td>.73*</td>
<td>.82*</td>
</tr>
<tr>
<td>$\chi^2=5.82$</td>
<td>$\chi^2=15.36$</td>
<td>$\chi^2=9.09$</td>
<td>$\chi^2=17.82$</td>
<td></td>
</tr>
<tr>
<td>p &lt; .05</td>
<td>p &lt; .001</td>
<td>p &lt; .01</td>
<td>p &lt; .001</td>
<td></td>
</tr>
<tr>
<td>On-time</td>
<td>.68*</td>
<td>.83*</td>
<td>.64</td>
<td>.55</td>
</tr>
<tr>
<td>$\chi^2=5.82$</td>
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<td>$\chi^2=3.27$</td>
<td>$\chi^2=.82$</td>
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</tr>
<tr>
<td>p &lt; .05</td>
<td>p &lt; .001</td>
<td>NS</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Late</td>
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<td>.48</td>
<td>.20*</td>
<td>.30*</td>
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<td>NS</td>
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<td>p &lt; .01</td>
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</tr>
<tr>
<td>FASTER RATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Latency</td>
<td>.66*</td>
<td>.80*</td>
<td>.68*</td>
<td>.41</td>
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<tr>
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<td>p &lt; .001</td>
<td>p &lt; .05</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>On-time</td>
<td>.81*</td>
<td>.76*</td>
<td>.59</td>
<td>.56</td>
</tr>
<tr>
<td>$\chi^2=15.36$</td>
<td>$\chi^2=13.09$</td>
<td>$\chi^2=1.46$</td>
<td>$\chi^2=.82$</td>
<td></td>
</tr>
<tr>
<td>p &lt; .001</td>
<td>p &lt; .001</td>
<td>NS</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Late</td>
<td>.16*</td>
<td>.41</td>
<td>.32*</td>
<td>.14*</td>
</tr>
<tr>
<td>$\chi^2=20.46$</td>
<td>$\chi^2=1.46$</td>
<td>$\chi^2=5.82$</td>
<td>$\chi^2=23.27$</td>
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<tr>
<td>p &lt; .001</td>
<td>NS</td>
<td>p &lt; .05</td>
<td>p &lt; .001</td>
<td></td>
</tr>
</tbody>
</table>

* $p < .05$; NS (not significant), $p > .05$
Table 3: Proportions of perceived truths, as a function of type of lie and timing manipulations (n=44)

<table>
<thead>
<tr>
<th></th>
<th>Other</th>
<th>Self</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SAME RATE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Latency</td>
<td>.71*</td>
<td>.81*</td>
</tr>
<tr>
<td>On-time</td>
<td>.66*</td>
<td>.69*</td>
</tr>
<tr>
<td>Late</td>
<td>.22*</td>
<td>.39</td>
</tr>
<tr>
<td><strong>FASTER RATE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Latency</td>
<td>.67*</td>
<td>.61*</td>
</tr>
<tr>
<td>On-time</td>
<td>.70*</td>
<td>.66*</td>
</tr>
<tr>
<td>Late</td>
<td>.24*</td>
<td>.28*</td>
</tr>
</tbody>
</table>

* p < .05

with their respective chi square values ($\chi^2$) and significance levels. Overall, a minimal value of .15 above or below .50 was required for significance at p< .05, meaning that proportions greater than or equal to .65 and less than or equal to .35 indicate a significant frequency of perceived truths and lies, respectively. In addition to serving as the difference criterion from the expected proportion of .5, the .15 value was also used as the minimal difference required when conducting post hoc comparisons between the different experimental conditions.

Given the complexity of this table and the fact that results vary by gender of speaker (Jim versus Claire), it may be useful to first examine the pattern of results for the latency and speech rate manipulations, as a function of type of lie, collapsed across speakers. This is shown in Table 3. Notice there is a consistent pattern of response latency effects, such that both early and on-time latencies tend to be perceived as truthful, while late latencies are perceived as dishonest. This pattern generalizes to both self- and other-oriented responses, and at both the same and faster speech rate.

A second notable finding is that the pattern of results is very similar in the faster versus same speech rate conditions. There are, however, two exceptions to this trend. First, unlike the
fast rate condition, the condition of self-oriented responses with same rate and late response latency was not significant (.39). This means that responses which fit that condition were not significantly more likely to be judged as either true or a lie. Secondly, an effect of speech rate is evidenced in the difference between self-oriented responses with early response latencies. When the speech rate was the same for the two speakers, responses were viewed as honest 81% of the time \((p < .05)\). When the speaker showed a faster speech rate, however, responses were still viewed as honest, but to a significantly smaller extent (61%, \(p < .05\)). That is, there was less agreement between participants as to the truthfulness of the response in the faster rate condition. However, in general, speech rate did not seem to have an effect on perceptions of truthfulness.

**Jim vs. Claire.** This overall pattern of results, however, depends on speaker gender, as shown in Table 2. First, consider the results for the perception of Claire. The general pattern of response latencies is evident here as well, such that the proportion of perceived truths is approximately equal for early and on-time response latencies, and is consistently greater than the proportion of perceived truths for late response latencies. When Claire’s results are broken down by type of lie, results show that, as expected, Claire is perceived to commit more other-oriented than self-oriented lies, across all three levels of response latencies and both levels of speech rate. The only exception to this trend is that there is no significant difference between perceived truths of self- and other-oriented responses in the condition of faster speech rate and on-time response latency.

A somewhat different pattern of findings is observed for Jim. First of all, the same pattern of perceived truths as a function of response latency occurs such that early and on-time latencies are both perceived as more truthful than late latencies. However, the difference between self- and other-oriented responses was not nearly as large as it had been with Claire. There was only a
significant difference between self and other responses in two, out of a possible six conditions (while there was a significant difference in five conditions for Claire). In addition, fewer conditions were likely to be significantly perceived as either truthful or dishonest (significantly above or below a proportion of .50). This means that there was less agreement between participants regarding the truthfulness of these non-significant conditions. Put another way, self-oriented responses by Jim were more likely to be rated as deceitful than self-oriented responses by Claire. In contrast, Claire was perceived to commit more other-oriented lies than Jim. It is interesting that the type of response rated the most dishonest for Jim was self/faster/late ($\chi^2 = .14 = p < .001$), but for Claire, the other/faster/late condition was rated the most deceitful ($\chi^2 = .16, p < .001$).

Related to these findings is an apparent “truth bias” for Claire’s self-oriented responses. This is seen in that none of Claire’s self-oriented responses were consistently rated as dishonest. In the early and on-time latency conditions for both speech rates, the proportion of perceived truths was very high and ranged between .76 and .83. Even with late response latencies, which were an indication of deceit in most conditions, the proportion of perceived truths did not differ significantly from 50%. With regards to Jim, there was no such evidence for a truth bias. If anything, participants actually seemed to be biased towards rating Jim’s self-oriented responses as deceitful. In only the same/early condition ($\chi^2 = 17.82, p < .001$) did participants consistently rate Jim’s self-oriented responses as strongly truthful.

**Male vs. female participants.** A set of chi square analyses was also conducted, using gender of participants as a between-measures variable. Table 4 and Table 5 show the percentage of the trials in which responses were rated as truthful by male and female participants, respectively. First, consider the perceptions of Claire. Both male and female participants
Table 4: The proportion of perceived truths for male participants (n=19)

<table>
<thead>
<tr>
<th></th>
<th>Claire Other Self</th>
<th>Jim Other Self</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAME RATE</td>
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<td></td>
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<tr>
<td>Early Latency</td>
<td>.58</td>
<td>.79*</td>
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<td>On-time</td>
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<tr>
<td>Late</td>
<td>.32</td>
<td>.42</td>
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<tr>
<td>FASTER RATE</td>
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<td></td>
</tr>
<tr>
<td>Early Latency</td>
<td>.63</td>
<td>.74*</td>
</tr>
<tr>
<td>On-time</td>
<td>.74*</td>
<td>.82*</td>
</tr>
<tr>
<td>Late</td>
<td>.16*</td>
<td>.37</td>
</tr>
</tbody>
</table>

* p < .05

Table 5: The proportion of perceived truths for female participants (n=25)

<table>
<thead>
<tr>
<th></th>
<th>Claire Other Self</th>
<th>Jim Other Self</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAME RATE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Latency</td>
<td>.76*</td>
<td>.80*</td>
</tr>
<tr>
<td>On-time</td>
<td>.74*</td>
<td>.82*</td>
</tr>
<tr>
<td>Late</td>
<td>.16*</td>
<td>.52</td>
</tr>
<tr>
<td>FASTER RATE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Latency</td>
<td>.68*</td>
<td>.84*</td>
</tr>
<tr>
<td>On-time</td>
<td>.86*</td>
<td>.72*</td>
</tr>
<tr>
<td>Late</td>
<td>.16*</td>
<td>.44</td>
</tr>
</tbody>
</table>

* p < .05

displayed an identical pattern of results, except in the other-oriented/same speech rate condition. Male participants were much less consistent in their ratings of Claire, as manifested by the fact that perceived truthfulness was not significantly different from .5. Female participants, however, displayed the same common trend of results, where early and on-time latencies were perceived as truthful, while late latencies were perceived as deceitful.

Next, consider the perceptions of Jim. Here, there was less agreement between male and
female participants. For Jim’s other-oriented responses, both male and female participants were relatively inconsistent in their ratings, as most proportions are non-significant. However, there is some variation, as a function of participants’ gender. In the condition of same rate/early latency, the proportion of perceived truths for male participants (.58) did not differ significantly from .5. Female participants, conversely, were significantly likely to rate such responses as truthful (.84). For Jim’s self-oriented responses, male participants in particular showed a very low level of agreement, as only the condition of faster rate/late latency was found to be significant (.11). There was a slightly greater agreement among female participants, who rated the same/early condition as strongly truthful (.92), and the same/late and early/late conditions as highly deceitful (.20 and .16, respectively).

Confidence

The confidence ratings of participants’ judgments, which varied on a 7-point Likert scale (1 = Not at all sure, 7 = Very sure) were determined for each experimental condition and analyzed through an overall ANOVA. Recall that these ratings refer to the confidence of any given judgment, regardless of whether it was perceived as a lie or truth. In general, there was not much variance across conditions, with all ratings ranging from 4.56 to 5.33. Only two significant effects emerged. First, as shown in Table 6, there was a significant interaction between speaker and response latency (F(3, 105)=3.89, \( p < .01 \)). A set of Tukey HSD comparisons revealed no significant differences but in general, participants were equally confident at all three levels of latency for Jim. In contrast, participants tended to be more confident on early and on-time latencies than late ones for Claire.

The second effect was a significant three-way interaction between gender of participant, latency, and type of lie (F(1,35)=3.45, \( p < .05 \)), shown in Table 7. Tukey post hoc
Table 6: Mean confidence ratings (7=very sure) as a function of response latency and speaker gender (n=43)

<table>
<thead>
<tr>
<th></th>
<th>Early</th>
<th>On-time</th>
<th>Late</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jim</td>
<td>4.98</td>
<td>4.88</td>
<td>5.03</td>
</tr>
<tr>
<td>Claire</td>
<td>5.15</td>
<td>5.09</td>
<td>4.76</td>
</tr>
</tbody>
</table>

Table 7: Mean confidence ratings (7=very sure) as a function of response latency, type of lie, and gender of the participants (n=43)

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th></th>
<th>Females</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Other</td>
<td>Self</td>
<td>Other</td>
<td>Self</td>
</tr>
<tr>
<td>Early Latency</td>
<td>5.16</td>
<td>5.21</td>
<td>4.96</td>
<td>4.95</td>
</tr>
<tr>
<td>On-time Latency</td>
<td>5.07</td>
<td>5.05</td>
<td>4.97</td>
<td>4.85</td>
</tr>
<tr>
<td>Late Latency</td>
<td>5.05</td>
<td>4.95</td>
<td>4.77</td>
<td>4.79</td>
</tr>
</tbody>
</table>

analyses revealed no significant differences but in general, male participants were more confident than female participants, especially with early response latencies. Female participants showed the least confidence on late responses. Although it was initially hypothesized that male and female participants would vary in their confidence judgments of self- vs. other-oriented lies, no support for this prediction was observed. Female participants did not exhibit a greater confidence with other-oriented responses, and male participants did not exhibit a greater confidence with self-oriented responses.

**Seriousness**

There were fewer data points for seriousness, measured on a 7-point scale (1 = Not at all serious, 7 = Very serious), since it was rated only in those instances in which statements had
Table 8: Mean seriousness ratings (7=very serious) and standard deviations (in parentheses) as a function of the experimental conditions (n=44)

<table>
<thead>
<tr>
<th></th>
<th>Claire Other</th>
<th>Claire Self</th>
<th>Jim Other</th>
<th>Jim Self</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SAME RATE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Latency</td>
<td>2.57 (1.22)</td>
<td>2.78 (1.39)</td>
<td>3.82 (1.40)</td>
<td>2.50 (1.60)</td>
</tr>
<tr>
<td>On-time</td>
<td>2.18 (1.30)</td>
<td>2.93 (1.10)</td>
<td>2.90 (0.97)</td>
<td>2.49 (1.08)</td>
</tr>
<tr>
<td>Late</td>
<td>2.97 (1.40)</td>
<td>2.87 (1.22)</td>
<td>3.46 (1.42)</td>
<td>2.84 (1.46)</td>
</tr>
<tr>
<td><strong>FASTER RATE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Latency</td>
<td>2.53 (1.30)</td>
<td>2.67 (1.23)</td>
<td>3.07 (1.07)</td>
<td>2.65 (1.38)</td>
</tr>
<tr>
<td>On-time</td>
<td>3.59 (1.31)</td>
<td>2.30 (0.96)</td>
<td>2.95 (1.25)</td>
<td>2.64 (1.18)</td>
</tr>
<tr>
<td>Late</td>
<td>2.57 (1.28)</td>
<td>2.54 (1.27)</td>
<td>3.30 (1.21)</td>
<td>3.22 (1.44)</td>
</tr>
</tbody>
</table>

been judged to be dishonest. The means and standard deviations for seriousness ratings, as a function of all experimental conditions, are shown in Table 8. An overall ANOVA revealed no significant effects. In general, all mean ratings were less than 4 (a high of 3.82), indicating that none of the lies were considered to be particularly serious.

Open-ended questions

Basic coding of the final three open-ended questions revealed no significant effects ("What aspects of the conversation helped you to decide whether you thought the respondent was lying or telling the truth?"; "Which speaker, if any, did you like better? If so, which one and why?"; "Which speaker, if any, did you think was more honest? If so, which one and why?"). Truthfulness was judged using a combination of both verbal and nonverbal cues, with some, but not all, participants consciously noticing response latency as a cue. Speech rate was rarely mentioned as a factor that was used in deciding truthfulness. There was also a slight trend
towards participants rating Claire as more honest than Jim, but it was not significant.

Discussion

The primary goal of the present research was to investigate the differing effectiveness of response latency and speech rate accommodation as potential nonverbal cues to deception. We presented three alternate hypotheses as to the relative weight of each cue when making judgments of truthfulness: (1) Speech rate accommodation is always weighted as more important, serving as a more primary cue than response latency. (2) Response latency is always weighted as more important, serving as a more primary cue than speech rate accommodation. (3) The relative importance of speech rate accommodation and response latency is dependent on a third factor, such as type of lie. Results from the present study offer support for the second hypothesis, with response latency generally overpowering any effect of speech rate.

The effects of response latency on judgments of deception that were observed here largely converge with past research. A number of studies, such as those by Baskett and Freedle (1974) and Boltz (2003), found that there was a restricted range of “acceptable” response latencies; latencies intermediate in duration were perceived as truthful, while longer response latencies were perceived as dishonest. These findings were replicated in the present study, with conditions of “on-time” response latency consistently yielding judgments of truth, and conditions of “late” response latency consistently yielding judgments of lies. This effect was a relatively robust one that generalized to both speech rates, both speakers, both types of lies, and both male and female participants. However, our results differed from the studies mentioned above, in that we found no significant difference between the conditions of on-time latencies and the conditions of early latencies. That is, while it was predicted that early response latencies would imply deception, this (with a few exceptions) did not seem to be the case. There are at least two
possible explanations for this effect.

Past research has found that while late response latencies are usually associated with lies because of cognitive effort and the construction of the lie (Walczyk et al., 2003), early latencies are usually associated with lies because of planning and overcompensating (Greene et al., 1985). In their study on planning and deception, Greene et al. found support for the idea that planned lies involve early response latencies, while spontaneous lies involve late response latencies. The rationale behind this finding was that spontaneous lies require more cognitive effort than telling the truth, and therefore take longer. Planned lies, conversely, may involve overcompensation, such that people try not to take too long to answer, but end up answering too quickly. As was noted earlier, attempts at self-regulation often result in overcompensation (DePaulo & Friedman, 1998).

These findings converge with the cognitive model of deception developed by Walczyk et al. (2003), as well. According to this model, spontaneous lies involve several cognitive steps: the activation of the truth, the decision of whether to tell the truth or to lie, and the construction of the actual lie. Each step adds time to response latency, which explains the connection between late latencies and deceit. With planned lies, however, the decision and construction components are not necessary, as they have already been completed even before a question is asked. Thus, it follows that planned lies will involve shorter response latencies. In the present study, the conversation between Jim and Claire was intended to reflect a spontaneous exchange between Jim and Claire, and our pretest participants agreed that this seemed to be the case. Hence, participants may have been less likely to perceive early latencies as planned lies.

There is also evidence to suggest that early response latencies may have been perceived instead as more sincere and more enthusiastic responses. In the present study, some participants’
answers to the open-ended questions regarding the likeability and honesty of each speaker made reference to the speakers’ positive tone as being an indication of truthfulness. Specifically, a number of participants used words such as “sincere,” “genuine,” and “enthusiastic” to describe speakers whom they thought sounded more honest and likable. This idea is consistent with findings from Boltz (2003), where early latencies for the qualities of confidence, compliance, and certainty were perceived to be the most positive. This may also be especially true in a close relationship, where people are likely to give greater latitude (the benefit of the doubt) to their partner. A different pattern of results may have occurred if the two speakers were strangers or new acquaintances. Early response latencies may have been perceived as lies in such a context.

In contrast to response latency, there was little evidence indicating that speech rate accommodation was used as a cue for deception. Research has shown that faster speech rates can be indications of anxiety (Buller, Strzyzewski, & Hunsaker, 1991), which may in turn imply deception. However, speech rate accommodation – whether or not two speakers use the same speech rate as each other – has not been studied within the context of deception. While we hypothesized that a lack of speech rate accommodation, as exemplified by a faster-than-normal speech rate, would serve as a cue to deception, it appears that speech rate accommodation has no major effect on perceived truthfulness. Even when response latency was on-time, and speech rate alone varied, changes in speech rate had no effect on perceived truthfulness. There are two small exceptions, however, to this finding. An effect of speech rate did appear with regards to Jim’s self-oriented responses, but only with early and late response latencies. In both of these cases, the proportion of perceived truths was significantly higher in the conditions of same speech rate, as opposed to faster speech rate. This is the type of effect that was expected to be more prevalent.

There are several possible reasons for this lack of an effect of speech rate
accommodation. First, it is reasonable to believe that, just as early response latencies may have been indicative of greater enthusiasm and sincerity, the same may be true for faster speech rates. It is possible that participants associated early latencies and faster speech rate together, as both could be generally indicative of thinking more quickly. If so, then the two manipulations may have been evaluated similarly. Another possibility is simply that the given scenario was not perceived to be particularly anxiety-arousing. The rationale behind the link between faster speech rates and deception comes from the assumption that accelerated speech rate is an indication of anxiety, which is in turn an indication of deception (e.g. Buller et al., 1991). However, if participants did not expect that the speakers would be anxious during the conversation, then it is possible that speech rate in general was not very salient. This may have been enhanced by the fact that Jim and Claire had been dating for a significant amount of time, and therefore would likely be less anxious around each other.

Beyond examining the relative contributions of speech timing variables as cues to deception, a second primary goal of this study was to examine the perceived truthfulness of self-oriented versus other-oriented responses in an empirical setting. Previously, research has only addressed this distinction in the context of diary studies (e.g. DePaulo & Kashy, 1998). To date, no empirical research has been conducted to examine the potential interaction between type of lie and timing manipulations, such as response latency and speech rate accommodation.

In the present study, there were two main issues of interest, relating to type of lie. First, it was predicted that there would be a more restricted acceptance range of response latencies for self-oriented responses, relative to other-oriented responses. Because self-oriented lies are generally viewed as more serious than other-oriented lies, it was believed that listeners would use stricter criteria for judging the truthfulness of self-oriented responses. There was mixed
evidence concerning this prediction. For Claire, self-oriented responses were significantly more likely to be judged as truthful than other-oriented responses (with two small exceptions). This goes against the hypothesis that participants would use stricter criteria of truthfulness when judging self-oriented responses. With Jim, results showed much less of a difference between perceived truths of self- and other-oriented responses. A difference did exist in the faster/early and faster/late conditions, where self-oriented responses were more likely to be perceived as lies. This is the only instance that does match the hypothesis that participants would use a stricter range of truthfulness when judging self-oriented responses.

The fact that this prediction was not largely supported may have been an effect of the lack of variation in the participants’ seriousness ratings. The main rationale behind this prediction stems from the idea that self-oriented lies are more serious than other-oriented lies. Thus, if there was no difference in seriousness, then the rationale is no longer applicable. Although the differing seriousness of lies, according to type (self vs. other), has been strongly established in previous research (e.g. DePaulo et al, 1996), this lack of results is not too surprising, given the actual verbal content of the dialogue. In the grand scheme of a committed relationship, none of the lies are particularly damaging.

Second, an interaction of gender and type of lie was also predicted. It was hypothesized that female participants would show a greater confidence with other-oriented responses, while male participants would show greater confidence with self-oriented responses. The rationale for this prediction stems from previous research examining gender differences relating to type of lie. Evidence has shown that women tend to tell, and be told, more other-oriented lies, while men tend to tell, and be told, more self-oriented lies (DePaulo et al., 1996). Researchers have theorized that this trend relates to the finding that women are more concerned with interpersonal
relationships than men are, as manifested in the greater amount of intimacy, self-disclosure, and emotional support that is provided by women, relative to men (Holmstrom et al., 2005; MacGeorge et al., 2003). However, participants’ confidence ratings showed no evidence for this prediction. Confidence did not vary as a function of gender of participant. Regardless, the frequency data did show that Claire was perceived to have committed more other-oriented lies, while Jim was perceived to have committed more self-oriented lies. This effect was especially strong for Claire. This finding converges well with the previous research noted above. It appears that the idea of women as more interpersonal than men was manifested in an interaction between type of lie and gender of speaker, not gender of participant.

Although our prediction concerning gender of participants and confidence was not supported, there were still several significant differences between the sexes. Results showed that females were more likely than males to perceive Claire as lying in the conditions of same speech rate and late response latency. At the same time, females were also more likely to perceive Claire as telling the truth in the conditions of early and on-time response latencies. In addition, there was generally less agreement on speakers’ truthfulness among male participants than among female participants. Both male and female participants, however, displayed more agreement with regards to Claire, relative to Jim. Type of lie appears to have had a larger effect on the agreement of male participants, as their judgments were most consistent for Claire’s self-oriented responses and Jim’s other-oriented responses. Female participants rated truthfulness more similarly across type of lie.

It makes sense that female participants were most consistent with each other in the conditions of Claire’s other-oriented responses. This could be due to a greater empathy with Claire, as they are better able to relate to her than to Jim. Since women tend to tell more other-
oriented lies, this would be the most familiar to female participants. However, if this logic is true, it does not make sense for there to be so little agreement between male participants, concerning Jim’s self-oriented responses. Interestingly, it appears that male participants were simply more skeptical overall, than female participants. For both Claire and Jim, and both self- and other-oriented responses, male participants tended to judge the responses as less truthful than did female participants. It is unclear why this may have occurred, and future research should further investigate this issue.

This set of differences between Jim and Claire, as well as the differences between male and female participants raise several questions about gender stereotypes. As noted earlier, there are general trends regarding the types of lies generally associated with men and women: men tend to tell, and are told, more self-oriented lies, while women tell, and are told, more other-oriented lies. However, what does this mean in terms of our perceptions of other people? The results of the current study found that Claire was perceived as telling more other-oriented lies, while Jim was perceived as telling more self-oriented lies. This fits in perfectly with the usual sex differences relating to deception, as supported by past research (e.g. DePaulo et al., 1996).

There appears to be a definite truth bias regarding Claire’s self-oriented responses. Not once is she consistently perceived as lying for her own benefit. This striking finding implies that participants were making their judgments of truthfulness with the assumption (either conscious or unconscious) that women generally do not lie to make themselves look better than they actually are. The opposite effect was true for Jim; in the Jim/self/faster conditions, participants seemed biased towards thinking that Jim was lying. This can be explained through the idea of confirmation bias: if we are expecting that Jim will lie for his own benefit, because that is what men are supposed to do, then we are more likely to find evidence to back up our expectations. It
is easier to find something when you are specifically looking for it to be there.

Does this mean that women can “get away with” lying for their own self-benefit? It’s possible. In a study by Wilson and LaFleur (1995), results found that individuals who analyze why they would or would not perform a specific behavior were more likely to predict (and were more confident in their predictions) that they would, in fact, behave in such a way. However, predictions were not correlated with accuracy, as analysis did not lead to changes in actual behavior. Although this procedure is quite different from that of the present study, there are several key concepts of note. First, even though this study relates to predictions in relation to the self, it is reasonable to believe that similar findings would arise with regards to expectancies concerning others’ behavior. This study also points to the idea that expectancies can be completely separate from actuality. Thus, Claire is seen as not lying for her own benefit because she is not expected to do so, not because she does not actually do so. According to Burgoon’s theory of expectancy violations, expectancies “denote an enduring pattern of anticipated behavior” (Burgoon, 1993, p. 31), and they stem from societal norms for what is typical behavior. Based on this definition, it fits that individuals would have expectancies concerning what types of statements/lies men and women should say.

This implies that people have internalized these gender stereotypes, and that they affect the ability to objectively engage in the perception of others. If people are consciously aware of the gender differences in patterns of deception, it is possible that social perception is shaped to conform to these stereotypes of what men and women are “supposed to” say. The implication of this is that our perceptions of others may be largely formed based on what we already expect from them. This internalization of gender expectancies could possibly generalize to other areas beyond deception, as well.
The next logical question is, where do these gender stereotypes come from? The most overarching possibility is that they come from general ideas about gender roles, which are often socialized since early childhood development. Stereotypes are often formed through social learning. Family, friends, and the media, are three common sources for the internalization of social norms. In general, we learn how we are supposed to act, and how others are supposed to act, according to what we observe around us, as well as what we are told. Thus, from childhood, girls are usually encouraged to play with dolls, while boys are encouraged to play with trucks. This simple difference can affect the way the girls and boys see themselves, as well as each other.

It has also been argued that gender stereotypes originated as a collective way of rationalizing the traditional division of labor between men and women. In a study by Hoffman and Hurst (1990), participants learned about fictional social groups called “Orinthians” and “Ackmians,” which were defined by the typical employment of that group (either child-care workers or city workers). Participants would then tend to attribute psychological characteristics to each group, according to what was “appropriate” for the typical employment. That is, all “Orinthians,” regardless of whether or not their employment matched what was typical, were viewed as being naturally more considerate and nurturing, while all “Ackmians” were viewed as being naturally more assertive and forceful. It is reasonable to believe that this same process can be applied to gender stereotypes of men and women’s social roles.

Tying this back into the present study, it appears that, at least to a certain extent, judgments of truthfulness are made with an underlying sense of expectations, based on typical gender stereotypes. Consider, for example, the participants who, when asked whether they liked Jim or Claire better, and which speaker seemed more honest, replied that Jim was “confident”
and “a bit egotistical and self-centered,” while Claire was more “naïve” and concerned with “gain[ing] others’ approval.” One participant even admitted, “I thought Claire seemed more honest. I think it was mostly because I expected Jim to be lying about certain questions purely based on what the question was, rather than how he answered it.” These comments show Jim and Claire to match stereotypical representations of men and women. Type of lie also fits nicely into these representations, with other-oriented lies being more stereotypically “female,” and self-oriented lies being more stereotypically “male.” All of this implies that perceived honesty for each speaker was affected by the expectations of how men and women are supposed to act. There were, however, a few exceptions to participants’ tendency to characterize Jim and Claire in such stereotypical ways. For example, one participant wrote that she thought that “even though I felt like [Jim] lied more, it was only to make Claire happy.” This participant apparently saw Jim as being more other-oriented as well, which does not match the male stereotype.

The present study may also have been particularly likely to elicit gender stereotypes because of the procedure. Research has shown that stereotype activation is a relatively automatic process (Brewer, 1989). This process is especially likely to occur when participants have limited cognitive resources available to them. For example, Gilbert and Hixon (1991) found that in conditions of high cognitive load, which involved mental rehearsal of an eight-digit number, participants were more likely to use stereotypes when asked to make a judgment about others. Because participants were limited in available cognitive resources, they relied on stereotypes to make their decisions.

Similar results occur when participants have to make their judgments under a time limit. It has been shown that, when judging an out-group member, subjects are more likely to use stereotypes concerning that out-group when they are under a time pressure (Dijker & Koomen,
In addition, a study by Kunda, Davies, Adams, and Spencer (2002) found that stereotypes were more likely to be activated after 15 seconds of exposure to an interview with an African-American, relative to 12 minutes of exposure. This demonstrates that stereotypes have greater effects when there is limited information for consideration. Given all of the above research, the fact that participants in the present study were only given 15 seconds to record their judgments, and were making judgments based on single-sentence responses, may have caused participants to rely somewhat on gender stereotypes.

However, when do these gender stereotypes develop? It has been argued that “women speak and hear a language of connection and intimacy, while men speak and hear a language of status and independence” (Tannen, 1990, p. 42). But is this always the case? Gender differences in ways of talking and interacting have been observed in children as young as three years old (Sheldon, 1990). However, simply because girls and boys this young behave differently, it does not mean that they are necessarily likely to use gender stereotyping to judge others. It would be very interesting to study this issue, investigating the age at which individuals internalize gender stereotypes and begin using them in their perceptions of others.

Moving away from gender expectations and stereotypes, it is also important to consider the possible implications of the dialogue’s context. The results from this study may have been very different if, for example, Jim and Claire were not dating each other. When two people are involved in a close, romantic, relationship, it is assumed that they do not lie to each other on a consistent basis, even if the lies are relatively trivial. The present study used participants as third-person observers, in an attempt to minimize the truth bias that comes from the context of a close relationship. While third-person observers do tend to be more accurate in detecting deception than people directly involved in a conversation (Buller et al., 1991), that does not mean,
however, that a truth bias no longer exists. The relationship between the two conversational participants affects not only the two of them, but also anyone perceiving the two of them.

The results of the present study suggest several avenues for future research. One concerns this question of different contexts. What would happen if Jim and Claire were just meeting for the first time? Or what about a therapist/patient relationship? Or a same-sex friendship? All of these contexts would involve a different kind of dynamic between the speakers and would most likely lead to different results. For example, it is possible that it would be more acceptable and more expected for Claire to say self-oriented lies if she was on a first date with Jim, trying to make a good impression.

This also ties into the possibility that the relationship status (single, or in a committed relationship) of participants could play a role in detection of deception. In terms of evolution, it was important for individuals not in committed relationships to be more skeptical when judging truthfulness of potential mates. Men looking to spread their genes by finding as many short-term mates as possible would likely use a strategy of self-enhancing deception. The reproductive consequences of failing to detect such deception would be particularly negative for single women. Thus, it follows that single women would benefit more from being able to detect male deception than would women who no longer need to worry about mate selection. A study by Johnson, Barnacz, Constantino, Triano, Shackelford, and Keenan (2004) found support for this theory, as women who were not in a committed relationship were significantly better at detecting men’s self-enhancing lies, when compared to women in committed relationships.

A second question that should be addressed in future studies is the notion of accommodation. As mentioned earlier, it is possible that the reason for the lack of an effect of speech rate accommodation was a result of the fact that none of the lies should have been very
anxiety-provoking. Because faster speech rates have been associated with increased levels of anxiety (Buller et al., 1991; Siegman & Boyle, 1993), future research should also examine whether speech rate accommodation would have more of an effect on perceived truthfulness in a scenario where lying would be more likely to arouse higher levels of anxiety. In addition, there are so many different facets of accommodation. It would be interesting to examine whether other types of accommodation, such as pitch, have a larger effect on deception detection. Changes in pitch may be more easily noticeable, and therefore, may have a larger effect. Examining the perception of truthfulness in these different contexts would greatly expand the understanding of the generalizability of the findings from the present study.
References


Appendix A
Transcript of Final Dialogue

[Starts off with the sound of people doing the dishes.]

Jim: I’m so glad we got through that. Ever since you said your parents wanted to meet me I’ve been so worried about what they’d think of me.

Claire: I know what you mean, especially after that story you told about what your dad thought of your last girlfriend.

Jim: Sorry, I didn’t mean to scare you, I just thought it was funny.

Claire: Yeah, you and your sense of humor. At least you didn’t try any jokes with my parents this afternoon. They tend to take things way too seriously.

Jim: Yeah, things went well. I didn’t realize our fathers grew up 10 miles away from each other.

Claire: Seriously, that was weird. I always forget that western Mass hits upstate New York. I didn’t realize that Milton, New York was so close to the border.

Jim: Your mom was kind of quiet though. Do you think she liked me?

Claire: Of course she liked you! She’s always kind of shy around people she’s never met before. Why, did you get a bad feeling from her or something?

Jim: No, not at all. It was just hard to read her.

Claire: I see how you can feel that way, but I’m sure it’ll be that much easier next time.

Jim: Next time? I’m still recovering from this time! I put a lot of preparation into this you know…after not cooking for 6 months. Were you happy with the steak?

Claire: Yeah, it was really good.

Jim: Are you sure it wasn’t too well done?

Claire: No, I liked it. Was it your own recipe for the marinade?

Jim: Yeah, it was. It’s one that I’ve been trying to perfect over the years.

Claire: Impressive! I guess you have a few tricks up your sleeve. Now that you’re all into cooking, do you think we could switch off who makes dinner each night?
Jim: Sorry, but now’s not a good time. It’s a great idea, but I’ve just been swamped at work lately so maybe we can push it off for a month or so. Besides, I love your cooking! Don’t you think that we’ll eat much better with you cooking?

Claire: Yeah, I’ve always been told that I’m a good cook. But I get tired of it. And food always tastes better when I’m not the one cooking it.

Jim: Well I guess we could just order out more often.

Claire: Yeah, that would be nice.

Jim: Hey, I just realized we have been so caught up in our parent’s visiting that we haven’t had a chance to really talk today. Did your exam go well this morning?

Claire: I feel good about it. Grad school exams, though, are so different from what we had to do in college.

Jim: Yeah, it always takes a while to get used to a new way of doing things. High school to college, college to grad school…and now it’s so weird getting used to not even being in school for the first time in 20 years.

Claire: Did you have a lot of trouble at the beginning of grad school?

Jim: No, not really. I made the adjustment pretty easily, but I knew people who had trouble at first, but it got a lot easier. I’m definitely glad not to have tests anymore though.

Claire: I’ll admit that I’m kind of scared about actually having to find a full-time job. But you really like your new job, right?

Jim: Yeah, I do. It’s going really well. And don’t worry, you still have plenty of time before you graduate. By the way, I know you just started looking into internships. Should it be easy to find one?

Claire: Yes, I think so. There are really a lot of options in the area, and I think I can get some really good recommendations, so with any luck, it shouldn’t be too hard. I’m kind of worried about having enough time for everything, though. Do you think I can handle it all?

Jim: Yes, I totally think you can manage. You’re usually really good about organizing your time. But it’s really about how you feel. I don’t want you to feel too overwhelmed with everything. If you think you won’t have enough time to devote to school and the internship, then you could always quit your job at the restaurant. I’d still be working.

Claire: I guess I could. But do you really think you make enough money?
Jim: Yeah, I definitely think so. I’m getting a pretty good salary, and I may even be getting a promotion soon. So I don’t think it would be too bad. I mean, don’t you think that I’m earning enough for us to live pretty comfortably?

Claire: Of course, you’ve been doing great. I just don’t want you to feel too pressured. Plus, I’d feel weird being completely dependent on you.

Jim: Ok, I understand that. And like I said, I do think you can handle all of it.

Claire: Yeah, thanks. In any case, I’ll think about it.

[Pause – participants just hear them doing the dishes]

Claire: This drain still seems clogged. Do you think you can fix it yourself, or do I need to call a plumber?

Jim: No, I can definitely do it myself. I’ll work on it tomorrow.

Claire: By the way, I know we’re still in the middle of cleaning up from the big parents visit, but I wanted to ask Kim and Steve over for dessert sometime later in the week. It was Kim’s birthday a couple of days ago and I completely forgot and want to make it up to her. Does that sound ok?

Jim: Sure, that sounds great. You’re always so on top of birthdays though, how did you forget this one? Have you just been too busy?

Claire: Yeah, I have. I feel like an awful friend, especially with everything they’ve been going through lately. The least I could do would be to remember her birthday. Has Steve said anything to you about Kim being pissed off that I missed it?

Jim: No, he hasn’t said anything. I’m sure she’s not angry and she probably realizes that you have a lot of work.

Claire: I hope so. Is Steve still depressed about his dad’s death?

Jim: No, he’s doing a lot better.

Claire: That’s good. We still haven’t written that condolence card to Steve’s mom. I’ll try and do that tomorrow.

Jim: Oh! I’m going to need the car tomorrow morning because I have an early meeting. Do you need it too?

Claire: No, that should be fine. I’m actually not gonna go to my morning class so you can definitely use it.
Jim: Thank you so much sweetie. I meant to ask you earlier and just completely forgot. I don’t mean to be annoying, but you were just talking about how grad school is so different. Will you still do ok in the class if you skip?

Claire: Yeah, I’ll be fine. I really feel confident about this stuff. Plus, the syllabus shows it’s just going to be a review of stuff I already know so I figure it’s a good day to sleep in. I’ve been really tired lately so I need to catch up on sleep.

Jim: Sounds great, then. Man, I wish I could sleep in tomorrow! Maybe I’ll just call in sick. Would you be up for a late breakfast tomorrow?

Claire: Yeah, sure. As long as you promise not to wake me up before my alarm goes off.

Jim: [laughs] Oh, don’t worry, I would never dream of such a thing.

Claire: Well in that case, we’ve got ourselves a date.

[Pause]

Claire: By the way, I don’t think I’ll be up for dinner tonight seeing as I just ate enough for two, but maybe we can go out somewhere and grab some coffee and a light snack later on so that we don’t have to worry about cleaning up the kitchen again. Sound good?

Jim: Yeah, that sounds nice. You know I’m pretty much hungry all the time. Should we ask the new neighbors to come along?

Claire: Yeah, definitely. Good thinking. We keep telling them we’re going to show them the neighborhood and we haven’t gotten around to it yet. I’ll give them a call after we clean up. You know when I ran into them in the elevator the other day Greg told me he plays basketball. I bet he’d love to join your pick-up games. Why don’t you invite him Wednesday?

Jim: That’s a good idea. I talked to him about it a few days ago as well. He played in a really serious league in Florida and was on his college team too.

Claire: Are you intimidated by him?

Jim: No, not at all. I mean, I’m younger and probably in better shape than him. Plus, it’s just a pick-up game anyway so it doesn’t matter that much.

Claire: [laughs] Tell your friends that. When they came over here after last week’s game they seemed pretty pissed. Not a fun crowd to be around. You didn’t invite them back again this week, did you?

Jim: No, I didn’t. I figured you probably had enough of them to last you a little while.
Claire: Thanks, hon. I guess our luncheon made you miss your run with Paul again this afternoon. This won’t affect Wednesday’s game, will it?

Jim: No, I’m still in great shape. I’ll just make sure that I go for a run in the next few days. Are you going to the gym tomorrow?

Claire: Yeah, I’ve been planning on it. I was thinking about going right before dinner so that I can reward myself with food.

Jim: Do you feel like buying that gym membership for yourself was worth it?

Claire: Oh yeah, definitely. I mean, I don’t go everyday, but I try and go at least every other day. Sara bought one as well. You know, as part of her whole “get into shape for the summer thing”. So we’ve been going together sometimes.

Jim: Wow, good for Sara. Is her getting into shape thing working?

Claire: Yeah, she looks good. She’s been doing a good job with it.

[Pause]

Claire: Back to tonight’s plans, can we get a movie as well?

Jim: Sure, sounds good. Should we get “Pirates of the Caribbean” since apparently we’re the only people who haven’t seen it?

Claire: Yeah, that sounds great. I can’t believe that both of our parents’ have seen it and we haven’t!

Jim: I know. It’s kinda funny. I can run down the street and get it while you guys are at the coffee place.

Claire: Sounds good…as long as they don’t accuse us of having any more late fees. Did you return “Silence of the Lambs” the other night?

Jim: Yeah, I did.

[Pause]

Claire: My sister asked us to baby-sit for Maura again on Tuesday evening, but I told Katherine from my neuro class that I would study with her so you’ll have to be alone with Maura for a couple hours before I get home. Sometimes she can be a bit wild, but you can handle her, right?

Jim: Yeah, I’ll be fine. Although the only time I’ve seen her that wild was the last time you weren’t there. Do all kids like you that much?
Claire: Yeah, it seems like they do. I don’t know why, really, but I certainly don’t mind it. Just so you know, I’ll be taking the car to get to Katherine’s apartment, so my sister will drop Maura off here.

Jim: Do you feel ok driving again, so soon after the accident?

Claire: Yes, I’m not worried about it. It totally wasn’t my fault, anyway.

Jim: Oh and this is kind of random, but I just remembered. I know we usually reserve Thursdays for chilling out together at home, but some of my college friends were thinking about going to play pool at O’Reilly’s this Thursday night. Would you be ok if we postpone our time together until Saturday?

Claire: Yeah, that’s fine. I love pool. Do you think I could come along and join you guys?

Jim: Yeah, that should be fine. I’ll ask just to check, but it should be ok. I didn’t know you knew how to play pool. Are you any good?

Claire: Yeah, I am. I used to play all the time with my dad. Why, do I not seem like someone who’d be any good at pool?

Jim: No, it’s not that. I’m just surprised we’ve never played together before.

Claire: Yeah, that is surprising. Well, there’s a first time for everything.

[Pause]

Claire: Oh, I just remembered my professor is supposed to email an assignment. I’ll be right back.

[Pause]

Claire: Jim, guess what? My friend Julie just emailed. Her dog just had puppies! She wants to know if we would consider taking one. What do you think? Does that sound good to you?

Jim: Sure, that sounds great! I’ve never had a dog before, though. Did you do a lot of the work taking care of your dog when you were a kid?

Claire: Yeah, I did. I was responsible for feeding him and making sure he had water and my sister was supposed to take him out on walks, but somehow I ended up doing that most of the time.

Jim: Alright then, maybe we can look more into what we need to get tomorrow. Looks like all the dishes are finally done. I’m about ready for a nap.

Claire: Yeah, me too.
Appendix B
Randomization scheme for each of the 32 responses in the 4 versions

<table>
<thead>
<tr>
<th>Question</th>
<th>Type</th>
<th>Response</th>
<th>V1</th>
<th>V2</th>
<th>V3</th>
<th>V4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1CO</td>
<td>Of course she liked you.</td>
<td>f</td>
<td>h</td>
<td>b</td>
<td>d</td>
</tr>
<tr>
<td>2</td>
<td>2CO</td>
<td>Yeah, it was really good.</td>
<td>b</td>
<td>d</td>
<td>f</td>
<td>h</td>
</tr>
<tr>
<td>3</td>
<td>3CO</td>
<td>No, I liked it.</td>
<td>e</td>
<td>g</td>
<td>a</td>
<td>c</td>
</tr>
<tr>
<td>4</td>
<td>1JS</td>
<td>Yeah, it was.</td>
<td>c</td>
<td>e</td>
<td>g</td>
<td>a</td>
</tr>
<tr>
<td>5</td>
<td>2JS</td>
<td>Sorry, but now’s not a good time.</td>
<td>f</td>
<td>h</td>
<td>b</td>
<td>d</td>
</tr>
<tr>
<td>6</td>
<td>1CS</td>
<td>Yeah, I’ve always been told that I’m a good cook.</td>
<td>d</td>
<td>f</td>
<td>h</td>
<td>b</td>
</tr>
<tr>
<td>7</td>
<td>2CS</td>
<td>I feel really good about it.</td>
<td>e</td>
<td>g</td>
<td>a</td>
<td>c</td>
</tr>
<tr>
<td>8</td>
<td>3JS</td>
<td>No, not really.</td>
<td>d</td>
<td>f</td>
<td>h</td>
<td>b</td>
</tr>
<tr>
<td>9</td>
<td>4JS</td>
<td>Yeah, I am.</td>
<td>g</td>
<td>a</td>
<td>c</td>
<td>e</td>
</tr>
<tr>
<td>10</td>
<td>5JS</td>
<td>Sure, no problem.</td>
<td>a</td>
<td>c</td>
<td>e</td>
<td>g</td>
</tr>
<tr>
<td>11</td>
<td>1JO</td>
<td>Sure, that sounds great.</td>
<td>b</td>
<td>d</td>
<td>f</td>
<td>h</td>
</tr>
<tr>
<td>12</td>
<td>3CS</td>
<td>Yeah, I have.</td>
<td>c</td>
<td>e</td>
<td>g</td>
<td>a</td>
</tr>
<tr>
<td>13</td>
<td>2JO</td>
<td>No, he hasn’t said anything.</td>
<td>e</td>
<td>g</td>
<td>a</td>
<td>c</td>
</tr>
<tr>
<td>14</td>
<td>4CO</td>
<td>No, that should be fine.</td>
<td>a</td>
<td>c</td>
<td>e</td>
<td>g</td>
</tr>
<tr>
<td>15</td>
<td>5CO</td>
<td>Yeah, sure.</td>
<td>h</td>
<td>b</td>
<td>d</td>
<td>f</td>
</tr>
<tr>
<td>16</td>
<td>3JO</td>
<td>Yeah, that sounds nice.</td>
<td>f</td>
<td>h</td>
<td>b</td>
<td>d</td>
</tr>
<tr>
<td>17</td>
<td>4JO</td>
<td>That’s a good idea.</td>
<td>d</td>
<td>f</td>
<td>h</td>
<td>b</td>
</tr>
<tr>
<td>18</td>
<td>6JS</td>
<td>No, not at all.</td>
<td>h</td>
<td>b</td>
<td>d</td>
<td>f</td>
</tr>
<tr>
<td>19</td>
<td>7JS</td>
<td>No, not at all.</td>
<td>b</td>
<td>d</td>
<td>f</td>
<td>h</td>
</tr>
<tr>
<td>20</td>
<td>4CS</td>
<td>Yeah, I’ve been planning on it.</td>
<td>f</td>
<td>h</td>
<td>b</td>
<td>d</td>
</tr>
<tr>
<td>21</td>
<td>5CS</td>
<td>Oh yeah, definitely.</td>
<td>h</td>
<td>b</td>
<td>d</td>
<td>f</td>
</tr>
<tr>
<td>22</td>
<td>6CO</td>
<td>Yeah, she looks good.</td>
<td>d</td>
<td>f</td>
<td>h</td>
<td>b</td>
</tr>
<tr>
<td>23</td>
<td>5JO</td>
<td>Sure, sounds good.</td>
<td>g</td>
<td>a</td>
<td>c</td>
<td>e</td>
</tr>
<tr>
<td>24</td>
<td>7CO</td>
<td>Yeah, that sounds great.</td>
<td>c</td>
<td>e</td>
<td>g</td>
<td>a</td>
</tr>
<tr>
<td>25</td>
<td>8JS</td>
<td>Yeah, I did.</td>
<td>e</td>
<td>g</td>
<td>a</td>
<td>c</td>
</tr>
<tr>
<td>26</td>
<td>6CS</td>
<td>Yeah, they seem to.</td>
<td>a</td>
<td>c</td>
<td>e</td>
<td>g</td>
</tr>
<tr>
<td>27</td>
<td>8CO</td>
<td>Yeah, that’s fine.</td>
<td>g</td>
<td>a</td>
<td>c</td>
<td>e</td>
</tr>
<tr>
<td>28</td>
<td>6JO</td>
<td>Yeah, that should be fine.</td>
<td>c</td>
<td>e</td>
<td>g</td>
<td>a</td>
</tr>
<tr>
<td>29</td>
<td>7CS</td>
<td>Yeah, I am.</td>
<td>b</td>
<td>d</td>
<td>f</td>
<td>h</td>
</tr>
<tr>
<td>30</td>
<td>7JO</td>
<td>No, it’s not that.</td>
<td>a</td>
<td>c</td>
<td>e</td>
<td>g</td>
</tr>
<tr>
<td>31</td>
<td>8JO</td>
<td>Sure, that sounds great.</td>
<td>h</td>
<td>b</td>
<td>d</td>
<td>f</td>
</tr>
<tr>
<td>32</td>
<td>8CS</td>
<td>Yeah, I did.</td>
<td>g</td>
<td>a</td>
<td>c</td>
<td>e</td>
</tr>
</tbody>
</table>

**Key:**
- **CO** = Claire, other
- **CS** = Claire, self
- **JO** = Jim, other
- **JS** = Jim, self
- **a** = early latency, same speech rate
- **b** = on-time latency, same
- **c** = late latency, same
- **d** = early latency, faster speech rate
- **e** = on-time, faster
- **f** = late, faster
- **g** = on-time, same
Appendix C

Informed Consent Form

**Purpose and Procedure** – The purpose of this research is to investigate issues relating to person perception and deception. You will listen to a pre-recorded conversation through a set of headphones and at certain target locations, asked to decide whether you think a given conversational participant is lying or telling the truth. It is anticipated that about 48 students will participate in this study.

**Credit** – The duration of the experiment is approximately 50 minutes. If you complete the study, you will receive 1 hour of experimental credit.

**Benefits/Risks** – Based on feedback from similar studies conducted in the past, many participants find this task engaging. We do not anticipate that you will experience any risks or discomfort. Although this research is not designed to benefit you directly, it is hoped that the results will provide some insight into the psychological mechanisms mediating social perception.

**Confidentiality** – The data collected in this study will be confidential and anonymous. Although you are providing your name on this form, this information will be kept separate from your data which will only be identified by a subject number. Your name and identity will not be revealed in any publication or presentation of this research.

**Voluntary Nature of Participation** – Your participation in this research project is entirely voluntary. In addition, you can decline to answer any question you feel uncomfortable answering, and you may discontinue your participation at any time without penalty.

**Contact Information** – If you have any questions about this research project or your rights as a research participant, please contact Professor Marilyn Boltz (mboltz@haverford.edu). You may also address your concerns to Professor Rob Scarrow (rscarrow@haverford.edu) who is the chairperson of the college’s IRB (a committee with oversight on human subject research).

You have been informed about this study’s purpose, procedure, possible benefits and risks. By signing this form, you voluntarily agree to participate in this study. By doing so, you are not waiving any of your legal rights.

________________________________________
Your name (please print)

________________________________________   Date___________
Signature
Appendix D

Subject #________

Demographics

*Please answer the following questions:*

1) How old are you? _______

2) Do you have normal hearing abilities? Yes _____ No _____
   If you have indicated “No”, please explain.

3) Are you a native English speaker? Yes _____ No _____
   If no, what is your native language? ______________________
   If no, at what age did you begin learning English? _________
Appendix E
Experiment Instructions

In this experiment, you will be listening to a conversation between Jim (age 26) and Claire (age 22) who are involved in a romantic relationship. They have been living together for one year. They first met a little over four years ago when they attended college together; she was a freshman and he was a senior. They became friends and remained so until two years ago, when they started dating. Jim recently got a new job as a legal consultant. Claire has just begun her first year at graduate school. This conversation begins after Jim and Claire have each met the other's parents for the first time. They had lunch together at Jim and Claire's apartment. As the conversation begins, the parents have just left, and Jim and Claire are doing the dishes.

Throughout this conversation, you will notice there are several occasions (32 of them) in which one conversational participant (Jim or Claire) asks a question to which the other responds. We'd like you to decide whether the response to each of these questions seems truthful or deceitful.

The procedure is as follows. After a response has been given to a given question (which we define as the first sentence after a question), you will hear a musical tone followed by a period of silence. During this silent period, we would like you to make three types of judgments: first, whether the response given by Claire or Jim seems to be a truth or a lie; how confident you are of this decision; and third, if the response seems dishonest, how serious this lie is. A serious lie is one that, if discovered, is particularly hurtful and may disrupt harmony in a relationship.

Please indicate your judgments on the response sheet we've provided for you. Please look at this sheet now. This overall procedure will repeat itself until we've reached the end of the conversation. To help you keep track of each question, we've provided the name of the individual (Jim or Claire) making the response to that question. We also ask that you do not change your response once the conversation resumes.

There will only be 15 seconds to make your three judgments about each response so please work quickly and go with your first instinct.

After completing all 32 ratings, please make sure to answer the 3 additional questions at the very end. Thank you!
Appendix F
Rating Sheet – Page 1

Subject #________

Rating Sheet

Please indicate your sex: □ Male □ Female

(1) Respondent: Claire

a) Do you think the respondent was lying or telling the truth? □ Lie
   □ Truth

b) Please indicate how confident you are in your judgment (1 = Not at all, 7 = Very):
   1   2  3   4   5   6   7

c) If you believe the respondent was lying, please indicate how serious you think this lie is
   (1 = Not at all, 7 = Very):
   1   2  3   4   5   6   7

(2) Respondent: Claire

a) Do you think the respondent was lying or telling the truth? □ Lie □ Truth

b) Please indicate how confident you are in your judgment (1 = Not at all, 7 = Very):
   1   2  3   4   5   6   7

c) If you believe the respondent was lying, please indicate how serious you think this lie is
   (1 = Not at all, 7 = Very):
   1   2  3   4   5   6   7
Appendix G
Open-Ended Questions

(33) What aspects of the conversation helped you to decide whether you thought the respondent was lying or telling the truth?

______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

(34) Which speaker, if any, did you like better? If so, which one and why?

______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

(35) Which speaker, if any, did you think was more honest? If so, which one and why?

______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________