Was That the Truth?
*Temporal Vocal Cues and the Perception of Deception*

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Abstract

This study examined the use of nonverbal cues in deception detection. A male and female actor recorded a scripted conversation between a dating couple that contained 32 question and response pairs. Latencies of the responses were manipulated to sound early, on-time, or late and speech rates were manipulated to sound normal or fast. Forty-four undergraduate students listened to the recording and rated each response as a truth or lie. It was predicted that instances in which latencies were early or late and speech rate was fast would be more likely to be perceived as lies. Results revealed that only late latencies were consistently perceived as lies. Additionally, gender of the speaker, participant gender, and lie type were found to interact with perceptions of deception. Implications for communication in close relationships and cross-gender conversations are discussed.
“Honey, do you like my dress?” asks a woman to her husband. “Yes sweetheart. That dress is so beautiful,” replies the husband. Merely from the verbal content of this sentence, it is difficult to tell whether the man really liked his wife’s dress. Did he genuinely think the dress was beautiful, or did he only say he liked the dress to avoid upsetting his wife? We can only know for sure how the man feels if we are able to use other cues to help us. For example, how quickly did the husband respond after the question was asked? What was his speech intonation? How fast or slow was he speaking? What were his facial expressions? Did he look his wife in the eye or gaze down at the ground? It is these, and other nonverbal cues that we use on an everyday basis to help understand and decipher the world around us. Without intonation, volume, speaking rate, pauses, hesitations, gestures, facial expressions, and countless other nonverbal behaviors, speech would be meaningless.

Much research has investigated the importance of nonverbal behavior in communication (e.g., DePaulo & Friedman, 1998; Krauss & Chiu, 1998; Siegman, 1987). Researchers have examined such issues as the ability to detect nonverbal behaviors, individual differences in displays of nonverbal behaviors, and the different situations in which nonverbal behaviors are used. Studies have begun to examine nonverbal behavior in specific types of communication. One of these is deception. The purpose of the present study is to extend our understanding of how nonverbal behaviors affect perceptions of deception.
Nonverbal Behavior

Before delving into the topic of nonverbal behavior, it is important to clarify the term “nonverbal”. DePaulo and Friedman (1998) define “nonverbal” as simply “not words”- that is, anything involved in an interaction that is not the actual words themselves. Thus, nonverbal behavior may include aspects of the voice as well as body language and facial expression. In their review of the literature on language and communication, Krauss and Chiu (1998) identified several nonverbal behaviors used in person perception.

The first behaviors are gestures. Gestures are described as hand movements, which may be used to amplify or underscore information conveyed in speech. It is unclear, however, whether all gestures serve a communicative function (Krauss & Chiu, 1998). Another nonverbal behavior is gaze direction. It has been found that people tend to look more at people they like. Therefore, watching the gaze of each participant in an interaction may provide a cue to how much the two participants like one another.

Facial expression is another important nonverbal cue in communication and has been found to be evident from early in life. Even infants have been shown to respond to different facial movements and expressions (Caron, Caron, & Myers, 1982). When discussing deception, however, facial expression is a much less reliable cue than people believe it to be. A meta-analysis by Zuckerman, DePaulo, and Rosenthal (1981) examined various studies in which perceivers were asked to detect deception using cues such as the face, the body, and tone of voice. It was found that perceivers were generally able to detect deception at greater-than-chance levels except in conditions in which they
had only facial cues to rely upon. Although the face may be closely attended to by interactional participants, it is not a reliable deception cue.

Finally, Krauss and Chiu (1998) explain that a great deal of nonverbal information is conveyed through the speaker’s voice. By listening to someone talk, we can easily discern their age and gender, and may be able to determine their country of origin, emotional state, or social class. Changes in a person’s speaking rate, volume, or pitch may also help decipher what the person is thinking or feeling while speaking.

Attunement to the nonverbal behavior of others is adaptive and can be used to form more meaningful relationships. Adjusting to the nonverbal behavior of the person with whom one is speaking helps to develop a connection and rapport between interactional participants (Condon, 1986). For example, a study by DiMatteo, Hays, and Prince (1986) found that doctors who were better at nonverbal encoding had more satisfied patients. It has also been found that students who are more nonverbally sensitive learn better than those who are not as sensitive. These students were better able to process and understand the nonverbal behaviors of their teachers (Bernieri, 1991).

Nonverbal cues can also be used by investigators when trying to determine the truthfulness of criminal suspects (Horvath, Jayne, & Buckley, 1993). Some lie detection instruments use inconsistencies in the voice to determine truthfulness (O’Hair, Cody, & Behnke, 1985). It is evident from these examples that interpreting nonverbal cues can be an advantageous and useful skill.

In most Western cultures, people are expected to speak fluently, confidently, and articulately (Krauss & Chiu, 1998). When these standards of nonverbal behavior are not met, the speaker is judged in a negative fashion or may be perceived as less competent.
There are, however, individual differences in the ways people speak. For example, certain personality traits have been shown to correlate with specific ways of speaking. One such trait, extraversion, has been associated with more fluent speech than introversion. Extraverts display shorter latencies, shorter silent pauses, and fewer hesitations in their speech (Siegman, 1987).

In addition to varying between individuals, nonverbal behavior may also change within a person depending on the situation one is in and to whom one is speaking (DePaulo & Friedman, 1998; Lauver, Kelley, & Froehle, 1971). One such example is the sex of a speaker relative to the sex of the listener. In a study by Steckler and Rosenthal (1985), effects of both sex and status on conversational interactions were examined. Male and female participants were asked to have a conversation with a peer, a subordinate, and their boss. These conversations were recorded and evaluated by a panel of judges. Results revealed that women were judged more competent when talking to their bosses and subordinates, while men were judged more competent when talking to their peers and subordinates. This study provides evidence that a speakers’ way of speaking may vary from one instance to another and these effects may be moderated by the speaker’s sex.

To summarize, nonverbal behaviors can manifest themselves in various ways throughout a conversation. These include characteristics of the voice as well as body language and facial expression. The way in which one’s nonverbal behavior is displayed may affect judgments of that person. People who are more attuned to the nonverbal behavior of others tend to be more successful and better at forming relationships. Individual differences between people, including those of personality and status, may
affect their nonverbal communication behavior. Additionally, a person’s sex may have an effect on the types of nonverbal behaviors they display.

Nonverbal behaviors add to the meaning of a message and provide information about the speaker. In these ways, nonverbal behaviors are constantly being used and interpreted in all types of conversational interactions. Next, we will discuss deceptive interactions, which are more prevalent in everyday encounters than one might think.

**Deception in Interpersonal Communication**

We may not like to admit it, but lying makes up a significant portion of our day-to-day interactions with others. In a study by DePaulo, Kashy, Kirkendol, Wyer, and Epstein (1996), it was found that college students told about two lies per day. In this study, participants were asked to record all of their social interactions and all of the lies they told during those interactions every day for a week.

The lie recordings were coded on four dimensions. The first referred to what the lies were about. Findings from DePaulo et al. (1996) revealed that people tend to lie most often about their feelings. Included in this category were affects, emotions, opinions, and evaluations. Participants were significantly more likely to fake positive feelings than negative ones as, for example, pretending to enjoy a family vacation. The second dimension examined whether people lied to benefit themselves (self-oriented) or others (other-oriented). Participants were found to tell significantly more self-oriented lies than other-oriented lies. An example of a self-oriented lie would be telling a friend you were still in a relationship with your boyfriend even after you broke up. The third dimension included 3 categories: (1) Outright lies, which were lies completely contradictory to the truth, as for example, a cheating husband telling his wife he was not
cheating. (2) Exaggerations, or lies in which the truth was overstated, as for example, exaggerating how much you love your friend’s new apartment. (3) Subtle lies that omitted relevant details as, for example, a teenage boy telling his parents he had been out late at a party, but failing to mention there had been alcohol present. Results indicated that outright lies were the most frequent types of lies told. The last dimension examined whether the lies referred to the lie-teller him or herself, the target of the lie, another person, or an object or event. The majority of lies told in this study were found to be about the liars themselves.

DePaulo et al. (1996) found that most of the lies told in everyday life are “light” lies that do not involve much rumination or distress. Despite this fact, interactions in which lies occurred were evaluated by participants as less pleasant, less intimate, and more superficial (DePaulo et al., 2003a).

In another diary study, DePaulo and Kashy (1998) found that lying behavior and the types of lies told varied depending on the relationship between the two interactional participants. Fewer lies were told to those people to whom the participant felt closer and, when lying did occur in these close relationships, the lies tended to be more other-oriented. Other-oriented lies serve as a type of relationship maintenance. As can be seen from the opening example, it was more advantageous to the relationship for the husband to tell his wife that he liked her dress even if he did not. These types of altruistic lies serve to increase relationship harmony.

Results from these studies point to the idea that lying can be advantageous in various social interactions. People lie to boost their own self-esteem, boost the self-esteem of others, and preserve harmony in a relationship. People may function better in
social environments in which they do not have to confront every aspect of the truth. Lies can offer protection from certain realities that a person may prefer not to know or deal with.

Being able to detect lies, however, is also a necessary part of social life. It may be dangerous and evolutionarily disadvantageous to believe everything we are told (Zuckerman et al., 1981). Therefore, it is important to have a healthy level of skepticism when interacting with others. How, then, are we able to tell if someone is lying to us? In other words, how are liars different from truth tellers?

In a meta-analysis of the lying literature, DePaulo et al. (2003a) revealed five categories of cues to deception. The first was that liars were seen as less forthcoming than truth tellers, in that they presented less detailed accounts of their stories. Secondly, liars’ stories were less compelling than those of truth tellers. Liars’ stories made less sense and were less plausible and logical. The third category revealed that liars tended to be slightly less positive and pleasant in their interactions than did truth tellers. The fourth category revealed that liars were generally more anxious than truth tellers. They tended to exhibit physical correlates of anxiety such as speaking in a higher pitch due to greater tension of their vocal cord and were found to have more dilated pupils. The final category offered evidence that liars may try to overcompensate for their deception by including fewer ordinary imperfections in their stories. Truth tellers were more likely than liars to make spontaneous corrections and to admit that they had forgotten something in their stories. The liar’s attempts to “cover up” their lies made their stories sound too perfect. Together, these five categories provide a general overview of the ways in which liars may act and sound differently than truth tellers.
DePaulo et al.’s (2003a) last category reveals that many people make a conscious effort to not sound like a liar when telling a lie. Greene, O’Hair, Cody, and Yen (1985) call this effort “attempted control”. According to Greene et al. (1985), “attempted control” involves changing or inhibiting one’s behavior in order to avoid displaying nonverbal cues to deception. For example, if one is very good at “attempted control”, it may be difficult to tell when he or she is lying or telling the truth. If one is poor at “attempted control”, his or her attempt at controlling his or her behavior may actually serve as a cue to deception. The behavior may appear overly planned or rehearsed (Zuckerman et al., 1981).

Although DePaulo et al. (2003a) discuss a variety of both verbal and nonverbal cues to deception, it is characteristics of the voice that have been shown to provide the most reliable cues (Zuckerman et al., 1981). In a study by DePaulo, Lassiter, and Stone (1982), participants were asked to observe a videotape of individuals who were sometimes lying and sometimes telling the truth. Participants were told to pay close attention to the words, the visual cues, or the tone of voice of the individual in the videotape, or were not given any specific instructions. Findings revealed that participants told to attend to the tone of voice were the most accurate at differentiating truths from lies. Attending only to visual cues, on the other hand, was not beneficial for detecting lies. Results of this study reveal that the voice is a more reliable cue to deception than visual cues such as facial expression or eye gaze. Attention drawn to the vocal channel can help perceivers recognize changes in the voice that may be indicative of lying (Zuckerman et al., 1981).
The vocal channel may be the most reliable cue to deception because the voice is under less conscious control than other nonverbal behaviors (DePaulo & Friedman, 1998). The process of “attempted control” may focus primarily on lower-level behaviors such as facial expression and eye gaze causing higher-level behaviors such as pupil dilation, speech rate, and response latency to be ignored (Greene et al., 1985). Therefore, when trying to differentiate a truth teller from a liar, it is most advantageous to attend to the voice.

What, then, are the specific aspects of the voice that help distinguish truth tellers from liars? One facet of the voice, and the one examined in the present experiment, is the temporal pacing of speech. In conversations between two individuals, a phenomenon known as entrainment occurs. During entrainment, the body rhythms of the listener become synchronized with the rhythmic patterns of the speaker’s speech, establishing an overall conversational rhythm (Condon, 1986). This conversational rhythm influences the speech rate, turn duration, and pause length for each speaker, and fosters a smooth transition from one speaker to the other (Street, 1984). The failure of an interactional participant to achieve the necessary synchrony may indicate that something is wrong. Although asynchronous speech occurs for a variety of reasons, one possibility is that the speaker is being deceptive. Attending to the temporal characteristics of the voice may be especially helpful in differentiating truths from lies. Two specific temporal characteristics of the voice are response latency and speech rate. Changes in either one of these characteristics during a conversation may lead to perceptions of deception.
**Response Latency**

Response latency is the amount of time between when a question is posed and an answer is given. DePaulo et al. (2003a) found that across various studies, response latency appears to be a significant deception cue. A study by Baskett and Freedle (1972) investigated the effect of response latency on perceptions of deception. In this study, subjects were instructed to listen to stimulus recordings of individuals answering either “true” or “false” to whether or not certain adjectives applied to them. The time between when the adjective was heard and the participant's response was varied. It was found that responses made either too quickly or too slowly after the adjective was posed were perceived as deceptive.

This finding was replicated in a series of experiments by Boltz (2003). In the first of these experiments, participants were asked to vocalize a “yes” response after listening to a short monologue ending with a question. One group of participants was asked to time their response to convey the most positive impression while the other group was asked to time their response to convey the most negative impression. Response latency durations in the negative impression group were found to be significantly longer or shorter than those produced by the positive impression group.

The second experiment used a perceptual task in which subjects were asked to rate the truthfulness of a response in which response latency was varied. Response latency was manipulated to sound either “on-time”, “too late”, or “too early” based on the results from the first experiment. Boltz’s (2003) findings revealed that there was a certain acceptance range for response latencies that conveyed truthfulness. Acceptance range refers to the idea that when a question is asked, an answer is expected to be heard
within a particular span of time. The results of the second experiment found that if an answer comes either too early or too late, the respondent is likely to be perceived as dishonest.

As Boltz (2003) illustrates, one reason why “too late” or “too early” responses may be perceived as deceptive is that they defy expectations. The establishment of a conversational rhythm provides certain norms for the temporal pacing of an interaction. If a pause before a response is either too long or too short, it defies the conversational norm. An expectancy violation theory posited by Burgoon (1993) explains what happens when norms are violated. When an expectancy violation occurs in a conversation, it is arousing and distracting to the perceiver. The expectancy violation causes attention to be drawn away from the content of the conversation and toward the violator. The perceiver must then attempt to interpret and evaluate the violation as either positive or negative (Burgoon, 1993).

Using Burgoon’s (1993) theory, a “too late” or “too early” response to a question can be seen as an expectancy violation. When these types of responses occur within a conversation, they are arousing and distracting to the perceiver. The perceiver must evaluate the violation and, as evidenced in the preceding studies, often concludes that the speaker is being deceptive.

Answering a question too quickly may occur under different circumstances than answering too slowly. In a study by Greene et al. (1985), participants were put in a situation in which they had to tell both prepared and spontaneous lies. Prepared lies were lies that the participant was able to plan in advance while spontaneous lies were lies that were made up on the spot. Greene et al. (1985) found that liars had significantly shorter
response latencies when delivering a prepared lie. This shorter response latency may be explained by the fact that the liars were overly anxious to answer since their response was already planned out. Spontaneous lies were found to have longer response latencies, although not significantly so (Greene et al., 1985). Other studies, however, have replicated these findings and found significance (see DePaulo et al., 2003a, p.98). Why, then, might longer response latencies arise during spontaneous lies?

Anyone who has ever lied knows that devising a lie is not a simple task. The Activation-Decision-Construction Model (ADCM) proposed by Walczyk, Roper, Seeman, and Humphrey (2003) explains why the process of telling a lie is so difficult. There are three main steps within this cognitive model: the activation component, the decision component, and the construction component. In the activation component, a question is heard and the information from the question is encoded into semantic and episodic memory. As this encoding occurs, the true answer to the question is automatically activated. Whereas the activation component is automatic, the decision and construction components of the model are intentional. The decision component involves determining whether telling the activated truth is in the respondent’s best interest. In other words, a person must decide whether to tell the truth or lie. If the truth is decided upon, the answer is given and no construction component is necessary. If, however, the person decides that telling a lie is in his or her best interest, the construction component comes into play. In this phase of the model, a person must construct a plausible lie to tell. This extra construction stage requires greater cognitive effort and thus longer response latency.
As previously discussed, “attempted control” can offer an explanation as to why “too early” responses are perceived as deceptive. Liars who are overly anxious to appear to be telling the truth may overcompensate by answering too soon after a question is posed.

In sum, response latencies that are both too long and too short have been found to be perceived as deceptive. While “too long” latencies may occur during unplanned lies, “too short” latencies often occur during planned lies. These types of inconsistencies in response latency disrupt conversational rhythm and violate speech expectations. The expectancy violation attracts attention, resulting in a negative evaluation of the speaker as a liar.

**Speech Rate**

As stated earlier, entrainment occurs during conversations when the body rhythms of the two interactional participants begin to synchronize. This synchronization causes the speech of the participants to converge such that the two conversational partners end up speaking in a similar way (Street & Giles, 1982). This similarity in speech allows conversational participants to more easily identify with one another and creates a sense of rapport between speakers (Giles et al., 1991). Speech convergence has, in fact, been associated with positive evaluations of the speaker. Speakers who display convergence (also known as accommodation) tend to be seen as more competent and more socially attractive than those who do not converge (Street, 1982). The greater the accommodation, the more the interactional participants will like each other and the smoother the flow of the conversation will be.
Interactional partners tend to accommodate to a variety of nonverbal behaviors including vocal intensity, turn duration, pause duration, and accent (Street, 1984). One of the first behaviors to which partners accommodate is speech rate. Throughout a variety of studies, convergence has consistently been found to occur for speech rate (Street, 1984).

Although there has been little research on speech rate accommodation and deception, there is reason to believe that changes in speech rate could have an effect on the perception of deception. First, accommodating to speech is associated with making a positive impression. Street (1984) found that people who do not accommodate their speech rate to that of their partner’s are perceived unfavorably. Burgoon’s (1993) theory of expectancy violations can also be applied to speech rate. A sudden change in speech rate during a conversation will be arousing and distracting to the perceiver. The perceiver will be forced to attend to, and evaluate, the violation. A negative evaluation can lead to the conclusion that the speaker is lying.

Secondly, speech rate accommodation may be important for deception detection because changes in speech rate are associated with heightened anxiety (Siegman, 1987; Siegman & Boyle, 1993). Since lying is associated with anxious feelings, changes in speech rate are also likely to occur during lie-telling (Siegman, 1987).

In his review of nonverbal behaviors in speech, Siegman (1987) discusses the fact that anxiety and stress can cause both an increase and a decrease in speech rate depending on the situation. He presents the inverted U hypothesis which posits that mild to moderate levels of anxiety arousal tend to accelerate speech, while very high levels of anxiety arousal tend to decelerate speech. This can be applied to lying if we adopt the
assumption that lying is anxiety-arousing (Siegman, 1987). Those who are moderately
aroused when telling a lie should increase their speech rate while those who are highly
aroused when telling a lie should decrease their speech rate.

Previous research on lying behavior, however, has been inconclusive concerning
what effect lying may have on speech rate. Diverse findings make it difficult to point to
one specific pattern of how speech rate manifests itself during the telling of a lie. Some
studies have found that lying causes an increase in speech rate, some a decrease, while
others have not found a significant relationship (Siegman, 1987). One possible
explanation for these diverse findings is that many studies have been done in laboratory
settings where telling a lie might not be as anxiety-provoking as it would be in the real
world (Siegman, 1987).

A study by Siegman and Boyle (1993) chose to examine the idea that moderate
anxiety is related to an increase in speech rate. In this study, participants were asked to
speak about anxiety-provoking events in a voice that was fast and loud, normal, or slow
and soft. It was found that when participants spoke about an anxiety-provoking event in
a fast and loud voice, they had the largest affective and physiological response. Affect
was measured through a self-rating scale completed by the participants after each task
and physiological response was measured by gauging changes in the participants’ blood
pressure and heart rate throughout the telling of their stories. When speaking about an
anxiety-provoking event in either a normal or slow and soft way, participants did not
show the same responses. The way they were speaking, not just the content of what they
were speaking about, affected their reactions both physically and emotionally. This study
is useful when looking at lying behavior in that it offers evidence that anxiety can be associated with speaking at a faster pace.

As a set, this research suggests that changes in speech rate may occur during deception. Since lying often causes anxiety, the speech correlates of lying should be similar to those found in anxiety. Research on anxiety and deception has found that lying may be associated with an increase or a decrease in speech rate.

The nonverbal cues of changes in response latency and speech rate may help to identify when someone is lying or telling the truth. These cues, however, may be more or less important depending on what type of lie is told. In the next section, the differences between self-oriented and other-oriented types of lies will be examined.

**Types of Lies**

Deception is an act that is intended to foster in another person a belief which the deceiver considers false (Zuckerman et al., 1981). DePaulo et al. (1996) found that deception could be categorized into two main types of lies: self-oriented and other-oriented. Self-oriented lies are told to enhance the liar psychologically or protect the liars’ interests (DePaulo et al., 1996). Self-oriented lies are evaluated as more serious and tend to be viewed more negatively because they are told only to benefit the self. An example of a self-oriented lie would be a man telling a potential date that he is the star of his football team although he actually never plays. This lie would benefit the lie-teller because it makes him appear more athletic than he is, and therefore more appealing to the woman in whom he is interested. Other-oriented lies are lies told to benefit another person. This other person can be the person with whom the liar is speaking, or a person who is not involved in the conversation. Other-oriented lies are told to protect or enhance
another person psychologically or protect the interests of others (DePaulo et al., 1996). Other-oriented lies are evaluated as less serious and are viewed more positively because they are unselfish. An example of an other-oriented lie would be telling a friend you love her cooking although you actually do not. This lie benefits your friend rather than yourself because it makes her feel good about her cooking.

As was discussed earlier, DePaulo et al. (1996) found that in everyday interactions, participants told more self-oriented lies than other-oriented lies. However, Kashy and DePaulo (1996) found that the telling of self-oriented and other-oriented lies varies depending on certain characteristics of individuals. Their study found that people with more gratifying same-sex relationships told relatively more other-oriented lies. Manipulative people and people with less gratifying same-sex relationships told more self-oriented lies. Additionally, DePaulo et al. (1996) found that gender plays a role in the types of lies one tells and the types of lies one is told.

**Gender Differences.** Relative to males, females tend to give and receive more intimacy, more emotional support, and more friendly nonverbal behaviors. Women in general are more attuned to interpersonal relationships and emotions than are men (DePaulo et al., 1996). In accordance with these characteristics, DePaulo et al. (1996) found that women tend to tell more other-oriented lies and less self-oriented lies than men. This finding was especially true when women were speaking to other women. The number of other-oriented lies decreased and self-oriented lies increased when women interacted with men. Men told relatively more other-oriented lies and relatively fewer self-oriented lies when interacting with women, but tended to tell more self-oriented lies when interacting with other men.
Why do these patterns occur? According to DePaulo et al. (1996), one possible reason for these gender differences is the idea that males and females are socialized differently. A theory by Maltz and Borker (1982) explains that from a young age, girls learn to interact with other girls by using language to develop close interpersonal bonds. Girls learn to acknowledge each other’s feelings and to express agreement with one another. When a girl is faced with a situation in which she does not agree with her girlfriend, a conflict develops. In order to remedy this conflict she learns to lie (DePaulo et al., 1996). This is easiest to understand through an example: Molly is at her friend Hannah’s birthday party. Molly thinks the party is boring and is not having fun. Hannah walks up to Molly and asks if she likes her party. Instead of honestly telling Hannah how she feels, Molly tells Hannah that the party is great and she is having a wonderful time. This example shows the willingness of females to lie for the benefit of another person.

As DePaulo et al. (1996) explain, for women, the feelings of others may matter more than the truth. Since boys are not socialized in this same way, they may be less concerned with other people’s feelings and more willing to tell others the truth. DePaulo et al.’s (1996) findings show that relatively more self-oriented lies are told to men while relatively more other-oriented lies are told to women. Stemming from the differences in socialization between genders, lies may be told to men in order to impress them while lies may be told to women in order to protect them (DePaulo et al., 1996).

In addition to the different types of lies told, do males and females also differ in the ways in which they perceive deception? Zuckerman et al. (1981) suggest that women may be socialized to not detect deception, especially when relying only on vocal cues. Zuckerman et al. (1981) explain that those who wish to catch people in a lie attend
closely to the vocal channel because it seems to provide the most reliable cues to deception. Women however, have often been found to not attend to the vocal channel to avoid detecting concealed information. In this way, women are able to protect the feelings of others by simply not closely attending to deception cues in the first place. This allows a woman to maintain a good interpersonal relationship with the person with whom she is speaking. Women may be better than men at reading nonverbal cues of people who have nothing to hide, but the more covert a communication becomes, the worse women become at reading these cues (DePaulo, Wetzel, Sternglanz, & Walker Wilson, 2003b).

Lying in Close Relationships. Along with gender, another factor that can affect lying behavior is the relationship between two individuals. In the diary study by DePaulo and Kashy (1998), recall that participants told fewer lies to those people with whom they felt closest and participants felt most uncomfortable when having to lie to a close relationship partner.

Self-oriented lies are more commonly told to strangers or acquaintances, while other-oriented lies are more commonly told to close friends or partners (DePaulo & Kashy, 1998). Self-oriented lies may be easier to tell to people to whom one is less accountable, while other-oriented lies are useful in maintaining close relationships. Involvement in a close relationship often demands the sacrifice of putting your partner’s needs above your own and the telling of other-oriented lies can make a relationship partner feel better about him or herself.

In close relationships, as intimacy between partners’ increases, their degree of trust for one another increases, meaning that more intimate partners may actually be less
accurate at detecting deception (McCornack & Levine, 1990). It has been found that people in general tend to exhibit a truth bias. That is, when presented with an equal number of true and false statements, people tend to believe that more of the messages are truths than are lies (DePaulo et al., 1985). This is especially true in close relationships. A study by McCornack and Levine (1990) found, however, that arousing a moderate amount of suspicion improved the detection of lies between close relationship partners. In this study, one member of the dyad was asked to judge the truthfulness of statements made by his or her partner. The judge was either told nothing about the statements (low suspicion), was made aware that some of the statements could be lies (moderate suspicion), or was told that some of the statements were definitely lies (high suspicion). Those partners in the moderate suspicion group were the most accurate at detecting lies. The low suspicion group failed to recognize many of the lies and the high suspicion group identified too many of the statements as lies. Thus, a moderate amount of suspicion proved to be the most useful in negating the truth bias and allowing individuals to detect deception in their partners.

McCornack and Levine (1990) showed that when no suspicion was aroused, intimates tended to trust that their partner was telling the truth. Is this truth bias present even when a person is not directly involved in the conversation? In other words, is accuracy in detecting deception different for outside observers? A study by Buller, Strzyzewski, and Hunsaker (1991) addressed this question. In this study, observers were found to be more accurate in detecting deception than conversational participants. Additionally, observers were found to have relied more on vocal cues to judge deceit whereas conversational participants relied more on facial cues. Observers may be better
at detecting deception because they are not as invested in the interaction as the conversational participant. Observers may be more likely to attribute inconsistencies in the speaker’s behavior to dispositions rather than situational factors, leading the observer to evaluate the speaker more negatively (Buller et al., 1991). Conversational participants may be less likely and less willing to attribute negative dispositions to the person with whom they are speaking.

Differences in cognitive tasks can also explain why observers are better deception detectors. Whereas the conversational partner has to encode and decode messages; stay on topic; provide feedback; and maintain conversational continuity, the observer is only responsible for watching and listening to the speaker (Buller et al., 1991). This allows the observer to allocate more of his or her cognitive energy to detecting deception and to pay closer attention to the hidden nonverbal cues, especially vocal ones, displayed by the speaker.

**The Present Study**

The purpose of the present research was to extend the existing literature on lying behavior by addressing three main issues. First, although vocal parameters, especially those involving the temporal dimension of the voice, have been found to be reliable indicators 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 and response latencies, and whether listeners are more attuned to one dimension versus the other. Secondly, this study sought to determine whether the potential impact of these two parameters varies for different types of lies, namely, those that are self versus other-oriented. The final goal of this study was to systematically examine gender differences in
order to determine the role that gender may play in the perception and detection of lie-telling. Both the gender of the perceiver and the gender of the perceived were examined.

The previous literature has found that attending to vocal cues is the most advantageous means by which to detect deception (Zuckerman et al., 1981). Zuckerman et al. (1981), by examining previous studies on deception, found that judges relied on auditory over visual information when expecting a deceptive message. Specifically, it has been found that temporal aspects of the voice may be the most helpful in determining the truthfulness of speakers (DePaulo et al., 2003a; Street, 1984; Zuckerman et al., 1981). As previously discussed, the two temporal dimensions of particular interest here are response latency and speech rate accommodation. Response latency has been shown to directly vary with perceptions of deception (Baskett & Freedle, 1972; Boltz, 2003; Greene et al., 1985). Studies by Baskett and Freedle (1972) and Boltz (2003) found that response latencies that came too early or too late were perceived as deceptive. Greene et al. (1985) concluded that “too early” latencies are likely to result from prepared lies while “too late” latencies are likely to result from spontaneous lies. Both prepared and spontaneous lies are likely to occur in everyday conversation. A respondent may have to devise a lie “on the spot” as they are speaking with another person or, the respondent may have anticipated the question and thus may already have a lie prepared.

There is less direct evidence linking speech rate accommodation with deception. Extrapolating from evidence connecting increases in speech rate to moderate anxiety (Siegman, 1987; Siegman & Boyle, 1993) however, can help to form a hypothesis linking speech rate to deception. When people are lying, they are often anxious. Therefore, lying can cause anxiety, which in turn can cause an acceleration of speech rate. Although
Deceleration of speech rate has also been associated with anxiety, it is not examined in the present study because it is difficult to differentiate from answers that require a great deal of cognitive effort. In other words, slow speech may result when someone is trying to devise a lie as they are speaking, but may also result when a question is difficult, or takes a great deal of thought to answer. Additionally, slower speech is typically associated with extreme, life-threatening anxiety, which is unlikely to apply in the present context (Siegman, 1987).

Responding too early or too late to a question and speaking too fast during one’s response are both ways of disrupting conversational rhythms. Burgoon’s (1993) theory shows that these disruptions violate the expectations of the perceiver, which may lead to evaluations of a speaker as deceptive. In answers in which both response latency and speech rate violate conversational expectations (i.e. fast speech rate in conjunction with either an early or late response latency), perceivers should evaluate the speaker as lying. In answers in which both response latency and speech rate confirm expectations (i.e. normal speech rate with an “on-time” latency), perceivers should evaluate the speaker as telling the truth. What is less clear is whether one temporal dimension is granted greater weight than the other in deception perception. If evaluations of the speaker as lying occur only when response latency violates expectations, and not when there is an increase in speech rate, it is reasonable to conclude that response latency carries more weight in causing deceptive evaluations. Alternatively, if evaluations of the speaker as lying occur only when speech is accelerated, and not when response latency is too early or late, it is reasonable to conclude that speech rate carries more weight in causing deceptive evaluations.
The effects of response latency and speech rate accommodation, however, may depend on the type of lie being told. DePaulo et al. (1996) determined that one way of categorizing everyday lies was to divide them into self-oriented and other-oriented lies. Boltz (2003) found that the acceptance range for response latencies was greater for responses that were other-oriented than it was for responses that were self-oriented. In other words, long or short response latency was not viewed as negatively during the telling of an other-oriented lie as it was during the telling of a self-oriented lie. The present study sought to examine whether a similar interactive effect would be found between type of lie and the nonverbal cues of response latency and speech rate accommodation. Since self-oriented lies are usually seen as more serious, there should be a smaller acceptance range for these types of lies.

In addition to type of lie, gender may also play a role in how lies and liars are perceived. Recall that DePaulo et al. (1996) found that gender differences existed in the types of lies told by males and females. Males were found to tell, and were told, more self-oriented lies, while females were found to tell, and were told, more other-oriented lies. These differences in lie-telling are thought to be due to socialization differences between males and females (DePaulo et al., 1996). Whereas females are socialized to form close interpersonal bonds by expressing agreement with their peers, this same pressure does not exist for males. Therefore, males may be less socialized into lying for the benefit of others and more willing to tell lies that benefit the self.

These various issues were addressed in the present research by systematically manipulating response latency and speech rate in the context of an everyday interaction.
Sex of the participants was also examined in order to determine whether sex differences exist in how these manipulations are perceived and interpreted.

Participants were instructed to listen to a conversation between a dating couple (a man and a woman) that contained question and answer pairs of both self and other-oriented types of responses. Response latencies and speech rates of the recorded answers were manipulated. Speech rate was either accelerated or spoken at a normal pace, while response latency was manipulated to sound on-time, too late, or too early.

The participant’s task was to listen to the recording and decide after each response whether the speaker was lying or telling the truth, and indicate how confident they were in their answer. Additionally, if they indicated the respondent was lying, they were asked to report how serious they believed the lie to be. The purpose of the study was to measure participants’ beliefs and perceptions about each response as opposed to accuracy in identifying lies.

By using a conversation between a dating couple this study attempted to create a relatively naturalistic and true-to life scenario within a controlled, experimental setting. In this way, we were able to combine the “everyday life” aspect of the DePaulo and Kashy (1998) study with a more experimental approach such as that used in Boltz (2003), Greene et al. (1985), and Siegman and Boyle (1993). Additionally, the use of participants as outside observers in this study was important because of the results found in Buller et al. (1991) showing the inferiority of conversational participants in detecting deception. Since our participants were not directly involved in the conversation they were judging, they were less likely to hold a truth bias and were able to devote more of their cognitive energy to recognizing nonverbal cues.
**Hypotheses**

Based on the previous research, we developed three main hypotheses for our experiment. Predictions are made about the nonverbal cues of response latency and speech rate, types of lies, and gender.

**Hypothesis 1.** The first hypothesis is that conditions in which response latency is too late or too early and speech rate is accelerated will be the most likely to be perceived as deceptive. Conditions in which response latency is on time and speech rate is normal will be the most likely to be perceived as truthful. In both of these cases, participants will also be most confident in their responses. It is less clear what the results will be in conditions in which only response latency or only speech rate is manipulated. If more lies are perceived in conditions in which only response latency is manipulated, we can conclude that response latency holds more weight when deciding on the truthfulness of a speaker. If more lies are perceived in conditions in which only speech rate is manipulated, we can conclude that speech rate accommodation holds more weight when deciding on a speaker’s truthfulness.

**Hypothesis 2.** The effect of response latency and speech rate, however, may depend on the type of lie being told. Since self-oriented lies are more serious than other-oriented lies, it is predicted that participants will attend more to the vocal violations during self-oriented responses and thus perceive more self-lies as being deceptive. Boltz (2003) found that a smaller acceptance range exists for self-oriented lies. Therefore, we expect participants to perceive more self-oriented than other-oriented lies.

**Hypothesis 3.** The third hypothesis is that confidence levels for female participants will be higher for other-oriented responses while confidence levels for male
participants will be higher for self-oriented responses. This is predicted based on the findings by DePaulo et al. (1996) showing that females tell, and are told, more other-oriented lies while males tell, and are told, more self-oriented lies. Since females have more experience with other-lies, they should be more confident in recognizing them. Males, on the other hand, should be more confident in recognizing self-lies.

By examining these three hypotheses, we were able to study the interactions between nonverbal behavior, type of lie, and gender. Although various studies have looked at these three areas separately, there is less research on their joint presence. As a whole, this study hopes to further the understanding of lie-telling and the perception of lies in everyday communication.

**Method**

**Participants**

Forty-four Haverford and Bryn Mawr college students participated in the experiment for credit in an introductory psychology course. There were 19 males and 25 females ranging in age from 18-21. All participants were native English speakers and had normal hearing abilities.

**Design**

The design was a (2 x 2 x 2 x 3) x 2 mixed factorial. All participants listened to a recorded conversation between a female and male whose responses to certain target questions were manipulated for type of lie (self or other), speech rate (same or fast), and

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1 Four participants were not Introductory Psychology students and were instead entered into a monetary lottery for their participation.
2 Two participants indicated that English was not their native language; however, both began learning English before age 3.
response latency (on time, too early, or too late). The single between-subjects variable was sex of the participant.

**Stimulus Materials**

A conversation between a dating couple was written by the experimenters. The couple consisted of a man (Jim) and a woman (Claire), who had been living together for about one year. The conversation takes place as Jim and Claire are cleaning up from a lunch they had just hosted where they had each met the others’ parents for the first time.

The first version of the script contained 43 question and response pairs that were divided into four types: other-oriented responses spoken by Claire, self-oriented responses spoken by Claire, other-oriented responses spoken by Jim, and self-oriented responses spoken by Jim. A self-oriented response was defined as one that benefits the self, while an other-oriented response was defined as one that benefits someone else. Efforts were taken to ensure that all the self and other-oriented responses, and responses made by Jim or Claire were evenly distributed throughout the conversation so that no one type of response predominated a certain section of the dialogue. All responses contained only one proposition (i.e. idea unit), and all involved a “yes” or “no” answer, or some variation on “yes” or “no” (i.e. “of course”, “sure”, “oh yeah”). Additionally, attempts were made to make all responses low in cognitive effort.

To ensure the construct validity of our self and other definitions, a pretest was conducted on the first version of the script. Eight pretest subjects (4 males and 4 females) were asked to read the conversational script and decide whether each response to a question, representing a potential lie, was either self or other-oriented. Subjects were asked to indicate their choice on a rating sheet and indicate how confident they were in
their answer. Responses that showed a high degree of variability or those that yielded low confidence ratings were not used in the final version of the conversational script. The 32 responses used in the final version of the script represented those that pretest subjects had rated most strongly as self or other-oriented. Within the final conversation, Jim and Claire each asked and answered 16 questions. Of the 16 answered by each, half were identified as self-oriented responses and half were identified as other-oriented responses. Examples of question/response pairs from the final script can be found in Table 1. The final script in its entirety can be found in Appendix A.

Table 1

<table>
<thead>
<tr>
<th>Type of Response</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Oriented</td>
<td>Jim: “Do all kids like you that much?”</td>
</tr>
<tr>
<td></td>
<td>Claire: “Yeah, they seem to.”</td>
</tr>
<tr>
<td></td>
<td>Claire: “Are you intimidated by him?”</td>
</tr>
<tr>
<td></td>
<td>Jim: “No, not at all.”</td>
</tr>
<tr>
<td>Other-Oriented</td>
<td>Jim: “Your mom was kind of quiet; do you think she liked me?”</td>
</tr>
<tr>
<td></td>
<td>Claire: “Of course she liked you!”</td>
</tr>
<tr>
<td></td>
<td>Claire: “…can we get a movie as well?”</td>
</tr>
<tr>
<td></td>
<td>Jim: “Sure, sounds good.”</td>
</tr>
</tbody>
</table>

A male actor and female actor, ages 24 and 21, respectively, were hired to record the voices of Jim and Claire. The actors were told to speak naturally, but to try to adopt similar latencies and speech rates. The actors were given three practice opportunities to allow the response latency and speech rate between them to become approximately equal. For the final recording, the response latency for Claire ($M = .66$, $SD = .15$) did not differ
significantly from the response latency for Jim ($M = .70, SD = .32$), resulting in an overall mean response latency value of .68 seconds ($SD = .24$). The articulation rate for Claire ($M = 4.15, SD = 1.27$), defined as the number of syllables per second, also did not differ significantly from that of Jim ($M = 4.39, SD = 1.13$), resulting in an overall mean articulation rate of 4.27 syllables per second ($SD = 1.15$). Before instantiating the set of experimental manipulations, all response latencies ($n = 9$) and speech rates ($n = 2$) that were more than one standard deviation from the mean were adjusted to become equal to the mean value. This enhanced the overall degree of temporal accommodation between the two conversational participants.

A second pretest was conducted in order to determine the just noticeable difference (JND) for speech rate and response latency. The JND was defined as the smallest difference in response latency and speech rate that could be perceived by the subjects. Six subjects (5 females and 1 male) participated in this pretest. For speech rate, the subjects listened to a question and then a response. The subjects’ task was to decide if the respondent was speaking at the same rate, faster, or slower than the questioner. This process was repeated for four different responses (2 made by Claire and 2 by Jim). It was found that subjects began noticing a significant difference when speech rate was increased by 35%.

For response latency judgments, the same six subjects listened to eight different question/response pairs varying only in pause duration between the end of the question and the beginning of the response. The subjects’ task was to indicate whether they thought the respondent was lying or telling the truth. This process was repeated using eight different question/response pairs (four made by Claire and four made by Jim). It
was found that subjects began noticing a difference in response latency, and judging the respondent as lying, when latencies were made to sound 5 times faster or slower than normal. These particular JND values for speech rate and response latency were then used in manipulating the final recording.

Manipulations were made on a Dell Dimension 4500 computer using the Audacity software program (manufactured by Verilogix, Inc.). The “late” response latency condition was made by manipulating the response interval so that it occurred 5 times later than the original value of a given question. The “early” response latency condition was made by manipulating the response interval so that it occurred 5 times earlier than the original value of a given question. For speech rate, the “fast rate” condition was made by increasing the natural speech rate value by 35%. Additionally, a tone followed by 15 seconds of silence was inserted after each response was made. This silence was inserted to allow participants enough time to make their ratings on the response sheet. The final recorded conversation was approximately 17 minutes in total duration.

The final conversation began with approximately 40 seconds of normal dialogue (no questions or responses) to get the participants used to the actors’ ways of speaking (i.e. their normal pause duration and speech rate) so that any deviations from this norm could be recognized. Other sections of normal dialogue were also dispersed throughout the conversation and the sound of dishes being washed provided background noise.

Each speaker (Jim and Claire) responded to a question posed by the other on 16 occasions- 8 self-oriented responses and 8 other-oriented responses. For each of the eight responses to a given type of lie, four displayed a normal speech rate and four displayed a
fast speech rate. Lastly, within each speech rate condition, two of the responses displayed a latency that was on-time, one was 5 times longer, and one was 5 times shorter. All of the possible conditions of the experiment are illustrated in Figure 1.

The manipulations were randomly distributed across the 16 responses for a given speaker. Four different versions of the final recording were made. A randomization scheme was created such that each response was manipulated in a different way in each of the four versions (see Appendix B). For example, a response that was on-time/same in version 1 was early/fast in version 2, late/fast in version 3, and on-time/fast in version 4. This resulted in four different instances for each condition of the experiment.

**Apparatus**

The conversation was recorded directly onto a Dell Dimension 4500 computer using a Realistic 33-992C microphone. Response latencies and speech rates were manipulated using the program Audacity (Verilogix, Inc.). Manipulations did not significantly change the pitch, volume or sound quality (i.e. timbre) of the recorded voices. Participants were tested on Dell Dimension 4500 computers and listened to the recording through the Windows Media Player software program using Sony MDR CD-180 headphones.

**Procedure**

Participants were randomly assigned to one of the four versions of the recorded conversation and were tested in groups of 1 to 4. Participants were told the purpose of the study was to examine issues relating to person perception and deception. Upon arrival, participants were asked to fill out an informed consent form (see Appendix C) and a demographics form (see Appendix D). Participants were then given an instruction
sheet (see Appendix E) and rating packet (see Appendix F) and asked if they had any questions about the task. The instructions explained that the participants would be listening to a conversation between a couple named Jim and Claire and provided a short background paragraph about the characters. Participants were told that Jim and Claire had met at college, had been dating for 2 years, and just recently moved in together. Claire had just begun graduate school and Jim had just begun a job as a legal consultant. Participants were informed that the conversation began with Jim and Claire cleaning up from a lunch they had just hosted, at which they met each other’s parents for the first time.

Participants were instructed to listen carefully to the dialogue. After every response to a question was heard, a brief tone occurred followed by 15 seconds of silence. Responses were defined as the first sentence heard after the question was asked. During the 15 seconds of silence, the participants were asked to record their ratings. Participants were asked to provide three types of judgments: (1) Do you think the respondent was lying or telling the truth? (Truth Lie) (2) On a 7 point scale (where 1 = “not at all” and 7 = “very”), please indicate how confident you are of your judgment. (3) If you believe the respondent was lying, please indicate on a 7 point scale (where 1 = “not at all” and 7 = “very”) how serious you think this lie is. A serious lie was defined as one that, if discovered, would be particularly hurtful and would disrupt harmony in a relationship.

At the end of this task, participants were asked to answer three open-ended questions (see Appendix G). The first question asked what aspects of the conversation participants based their judgments on in order to see if participants were consciously
aware of the manipulations. The second question asked participants if they liked one speaker better than the other, and the third question asked if they thought one speaker was more honest than the other. These questions were asked to determine if one speaker was judged as more likable or honest a majority of the time, and whether or not participants’ sex affected their answers to these questions. The total duration of an experimental session was approximately 40 minutes.

**Results**

This study examined the impact of response latency and speech rate manipulations on perceptions of deception. Recall that participants were asked to make three types of judgments: (1) Whether the respondent was lying or telling the truth, (2) How confident they were in their answer, and (3) If they believed the respondent was lying, how serious the lie was. Each of these three dependent measures was assessed in turn. First, a set of Chi-Square analyses was conducted to determine if the number of truths and lies reported in each experimental condition varied significantly from the expected value. Second, an ANOVA was conducted on confidence ratings to determine if these varied significantly between male and female participants. Lastly, an ANOVA was conducted on seriousness ratings to determine if the lies in some experimental conditions were rated more serious than others.

**Chi-Square Analyses**

*Overall Analyses.* The primary question of interest in this study was whether the frequency of perceived truths versus lies varied 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 gender conditions of the experiment where in
each case, the expected value of a truth or lie was .50. Results are shown in Table 2, which depicts the proportion of perceived truths for all experimental conditions along with their respective Chi-Square values. Overall, a minimal value of .15 above or below .50 was required for significance at \( p < .05 \), meaning that proportions \( \geq .65 \) and \( \leq .35 \) indicate a significant frequency of perceived truths and lies, respectively. In addition to serving as the difference criterion from the expected proportion of .50, the .15 value was also used as the minimal difference required when conducting post-hoc comparisons between the different experimental conditions.

Table 2

Proportion of perceived truths, \( \chi^2 \) values, and significance levels for all experimental conditions

<table>
<thead>
<tr>
<th></th>
<th>Claire</th>
<th>Jim</th>
<th>Other</th>
<th>Self</th>
<th>Other</th>
<th>Self</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAME RATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early</td>
<td>*.68</td>
<td>*.80</td>
<td>* .73</td>
<td>* .82</td>
<td>* .68</td>
<td></td>
</tr>
<tr>
<td>( \chi^2 = 5.82, p &lt; .02 )</td>
<td>( \chi^2 = 15.36, p &lt; .001 )</td>
<td>( \chi^2 = 9.09, p &lt; .01 )</td>
<td>( \chi^2 = 17.82, p &lt; .001 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-time</td>
<td>*.68</td>
<td>*.83</td>
<td>.64</td>
<td>.55</td>
<td>* .23</td>
<td>* .30</td>
</tr>
<tr>
<td>( \chi^2 = 5.82, p &lt; .02 )</td>
<td>( \chi^2 = 20.46, p &lt; .001 )</td>
<td>( \chi^2 = 3.27, NS )</td>
<td>( \chi^2 = .818, NS )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late</td>
<td>*.23</td>
<td>.48</td>
<td>* .20</td>
<td>* .30</td>
<td>*.16</td>
<td>* .32</td>
</tr>
<tr>
<td>( \chi^2 = 13.09, p &lt; .001 )</td>
<td>( \chi^2 = .091, NS )</td>
<td>( \chi^2 = 15.36, p &lt; .001 )</td>
<td>( \chi^2 = 7.36, p &lt; .01 )</td>
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<td></td>
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<tr>
<td>FAST RATE</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early</td>
<td>*.66</td>
<td>*.80</td>
<td>* .68</td>
<td></td>
<td>*.16</td>
<td>* .41</td>
</tr>
<tr>
<td>( \chi^2 = 4.45, p &lt; .04 )</td>
<td>( \chi^2 = 15.36, p &lt; .001 )</td>
<td>( \chi^2 = 5.82, p &lt; .02 )</td>
<td>( \chi^2 = 1.46, NS )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-time</td>
<td>*.81</td>
<td>*.76</td>
<td>.59</td>
<td>.56</td>
<td>*.16</td>
<td>* .14</td>
</tr>
<tr>
<td>( \chi^2 = 15.36, p &lt; .001 )</td>
<td>( \chi^2 = 13.09, p &lt; .001 )</td>
<td>( \chi^2 = 1.46, NS )</td>
<td>( \chi^2 = .818, NS )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late</td>
<td>*.41</td>
<td>* .32</td>
<td>*.14</td>
<td></td>
<td>*.41</td>
<td>* .32</td>
</tr>
<tr>
<td>( \chi^2 = 20.46, p &lt; .001 )</td>
<td>( \chi^2 = 1.46, NS )</td>
<td>( \chi^2 = 5.82, p &lt; .02 )</td>
<td>( \chi^2 = 23.27, p &lt; .001 )</td>
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</tr>
</tbody>
</table>

Note. In all cases \( n = 44 \) and \( df = 1 \). * = \( p < .05 \), NS = Not Significant, \( p > .05 \).

Given the complexity of this table and the fact that results vary with speaker gender (Claire or Jim), 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. This is shown in Table 3 where proportions have been collapsed over speaker.
Examining Table 3, the first thing to note is that the “late” latency condition yielded values significantly lower than those in the “early” and “on-time” conditions. In contrast to the “early” and “on-time” conditions, which were approximately equal in the proportion of perceived truths, significantly fewer truths were perceived in the “late” latency condition. This pattern generalizes across both speech rate and type of lie.

Secondly, Table 3 illustrates that proportion values did not differ significantly in the “same” versus “fast rate” conditions. In contrast to predictions, an increase in speech rate did not influence the proportion of lies perceived. There is, however, one notable exception to this statement. For “self” lies spoken at an “early” latency, significantly more truths were perceived in the “same rate” condition (.81) than in the “fast rate” condition (.61). Generally, however, there was no main effect of speech rate. Lastly, Table 3 shows that in the “same rate, late” condition, “other” responses (.22) were significantly more likely to be perceived as lies than were “self” responses (.39).

This overall pattern of results, however, depends on speaker gender as shown in Table 2. First consider Claire. For latency, the same general pattern emerges in which
the “early” and “on-time” conditions are approximately equal while the “late” condition yields significantly fewer truths. The only exception is the difference between the “early” (.66) and “on-time” (.81) values in the “other, fast rate” condition. This difference of .15 is only marginally significant. For Claire, speech rate did not have a significant effect on perceived truths versus lies.

For type of lie, Claire is perceived to commit significantly more “other” than “self” lies. This effect generalizes to all latencies and both rate conditions. There are, however, two exceptions to this statement. The first is in the “early, same rate” condition, which is in the specified direction, but is only marginally significant with a difference of .12 between the “other” (.68) and “self” (.80) responses. The second is in the “on-time, fast rate” condition where the difference between “other” (.81) and “self” (.76) responses was not significant.

Next consider Jim. The same latency pattern found previously emerged in that “late” latencies always resulted in significantly more perceived lies. Unlike Claire, speech rate did seem to have an effect on the proportion of lies perceived for Jim, but only in the “self” condition. For Jim, “self, early” responses spoken at a “fast rate” (.41) were significantly less likely to be perceived as truths than “self, early” responses spoken at the “same rate” (.82). “Self, late” responses spoken at a “fast rate” (.14) were significantly more likely to be perceived as lies than “self, late” responses spoken at the “same rate” (.30).

The difference between “self” and “other” lies for Jim was not as large as for Claire. For Jim, a significant difference between the two lie types emerged in only two out of the six conditions. Additionally, Jim was found to have fewer responses that
differed significantly from a proportion of .50. Overall, participants were more likely to perceive “self” responses as lies for Jim versus Claire. In fact, participants exhibited a truth bias for Claire whereby none of Claire’s “self” responses were perceived significantly as lies. This truth bias did not exist for Jim with significant proportions of “self” lies found in the “same rate, late” (.30) and “fast rate, late” (.14) conditions. In contrast, Claire was perceived to commit more “other” lies than Jim.

*Male and Female Participants.* Lastly, independent Chi-Square analyses examining proportions of perceived truths were conducted on male versus female participants. These results are presented in Tables 4 and 5.

Table 4

*Proportion of perceived truths for male participants (n = 19)*

<table>
<thead>
<tr>
<th></th>
<th>Claire</th>
<th></th>
<th></th>
<th>Jim</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Other</td>
<td>Self</td>
<td>Other</td>
<td>Self</td>
<td></td>
<td></td>
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<tr>
<td><strong>SAME RATE</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early</td>
<td>.58</td>
<td>*.79</td>
<td>.58</td>
<td>.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-time</td>
<td>.61</td>
<td>*.85</td>
<td>.69</td>
<td>.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late</td>
<td>.32</td>
<td>.42</td>
<td>*.26</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FAST RATE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early</td>
<td>.63</td>
<td>*.74</td>
<td>*.79</td>
<td>.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-time</td>
<td>*.74</td>
<td>*.82</td>
<td>.58</td>
<td>.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late</td>
<td>*.16</td>
<td>.37</td>
<td>*.26</td>
<td>*.11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Minimal difference = .24. Significant values are denoted with an asterix.
Table 5

*Proportion of perceived truths for female participants (n = 25)*

<table>
<thead>
<tr>
<th></th>
<th>Claire</th>
<th>Jim</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Other</td>
<td>Self</td>
</tr>
<tr>
<td><strong>SAME RATE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early</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><strong>FAST RATE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early</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>

*Note.* Minimal difference = .22. Significant values are marked with an asterix.

In general, male and female participants tended to agree in their perceptions of Claire. As was found for the overall sample, “late” latencies were more likely to be perceived as lies. The “other, same rate” condition presented the only instances where males and females differed in their ratings of Claire. Males’ ratings of Claire did not differ significantly from .50 in any of the “other, same rate” instances. For females, Claire was rated as significantly more truthful during the “on-time” (.74) and “early” (.76) latencies for “other” lies and significantly less truthful during the “late” (.16) latencies.

Results for Jim indicate less agreement between male and female participants. For “other” responses spoken by Jim at a “fast rate”, female participants did not differ significantly from .50 in their ratings at all three latencies. Male participants, on the other hand, perceived Jim as telling significantly less “other” lies at “early” latencies (.79) and significantly more “other” lies at “late” latencies (.26). Male and female participants exhibited a similar general pattern to one another for “other” responses spoken by Jim at
the “same rate”, with greater proportions of lies found in the “late” latency condition for both groups. “Self” responses spoken by Jim at the “same rate” were non-significant at all latencies for male participants. Female participants, on the other hand, found “early” latencies (.92) significantly more truthful and “late” latencies (.20) significantly less truthful. Both males and females found “self” responses spoken by Jim at a “fast rate” to be nonsignificant except during “late” latencies in which a greater proportion of lies were identified.

**Confidence Ratings**

An overall ANOVA revealed two significant effects of confidence. First, a speaker x latency interaction \((F(3,105) = 3.89, p < .05)\) was identified and is shown in Table 6 whereby participants were found to be more confident in Claire’s responses at all latencies except “late”. Second, a lie type x latency x participant gender effect was found \((F(3,105) = 3.45, p < .05)\) and is shown in Table 7. This interaction showed that males tended to be more confident overall, especially at “early” latencies. Females, on the other hand, tended to be less confident overall, especially at “late” latencies. Although it was initially predicted that females would be more confident when rating other-oriented responses and males would be more confident when rating self-oriented responses, no evidence for an interaction between participant gender and type of lie was found.

Table 6

**Speaker x Latency Interaction**

<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

*Type x Latency x Gender Interaction*

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

**Seriousness**

Recall that participants were asked to indicate the seriousness of a response (where 7 = very serious) only when they believed the response was a lie. An overall ANOVA of seriousness ratings revealed no significant effects. As can be seen in Table 8, the mean values for seriousness were less than 4 in every experimental condition, indicating none of the lies were perceived as particularly serious.

Table 8

*Mean seriousness ratings (7 = very serious) for all experimental conditions (n = 44)*

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

*Note.* Standard deviations are shown in parentheses.
**Open-ended Questions**

In their open-ended responses, participants indicated liking Claire better than Jim, and believed that Claire was more honest than Jim. These results, however, did not differ significantly between genders. When asked what cues they used to determine truthfulness or deceit, participants reported using both verbal and nonverbal cues. Many participants reported using latency as a deception cue while very few reported using speech rate.

**Discussion**

The present research directly compared the two nonverbal cues of response latency and speech rate to determine the impact of each on deception perception. Results converged with past research by Baskett and Freedle (1972) and Boltz (2003), who both demonstrated the effect of latency as a deception cue. Both found that responses made either too quickly or too slowly after a question was posed were perceived as lies.

The present study, however, found only “late” latency conditions to be associated with perceptions of lying. While “late” latencies were always more likely to be perceived as lies than truths, the proportion of lies perceived in the “early” latency conditions did not differ significantly from .50. In accordance with Burgoon’s (1993) theory, it appears as though the “late” latency conditions aroused participants’ attention and caused them to evaluate the speaker as lying.

Although it is not certain why no effect for “early” latencies was found, there are two possible explanations. First, is the fact that responses made in the stimulus conversation were probably perceived by participants as spontaneous rather than planned. Findings from Greene et al. (1985) revealed that “late” latencies are usually associated
with spontaneous lies while “early” latencies are usually associated with planned lies. Walczyk et al.’s (2003) cognitive model explains why “late” latencies are often perceived as lies. This model illustrates that the act of constructing a lie takes greater cognitive effort, and thus more time, than responding truthfully. Responding too quickly to a question has been associated with overcompensating for one’s dishonesty in the form of “attempted control” (Greene et al., 1985). The respondent does not want to appear as though he or she is thinking too much about his or her answer, which leads to responding too quickly.

The stimulus recording in the present experiment was intended to reflect an everyday conversation between Jim and Claire. The possibility of Jim or Claire having a lie planned out may have been perceived as highly unlikely by participants. Even in the pretest, participants were less likely to identify the “early” latencies as lies.

There is, however, evidence showing that instead of being perceived as lies, experiment participants perceived “early” latencies as relatively more sincere. This leads to the second explanation for why “early” latencies had no effect. Participants’ open-ended responses revealed that “early” latencies were often interpreted as the speaker responding enthusiastically. This finding converges with Boltz (2003) who showed that “early” latencies for the dimensions of confidence, compliance, and certainty were perceived to be the most positive. Similarly, Kraut (1978) found shorter hesitations before an answer to be perceived as more sincere. This may be especially true in a close relationship where greater latitude (i.e. the benefit of the doubt) is given to one’s partner. As McCornack and Levine (1990) found, the truth bias increases the closer partners become. The close relationship status of Jim and Claire may have caused participants to
assume that “early” latencies meant enthusiasm as opposed to deceit. A different pattern of results may have occurred if Jim and Claire were strangers or new acquaintances. In these cases, “early” latencies may have been perceived as lies.

In contrast to response latency, there was little evidence indicating that speech rate accommodation was used as a cue to deception. In almost all cases, the proportion of lies identified did not differ significantly between the two rate conditions. The speeding up of speech rate was not interpreted by participants as deceptive. This was evinced in the open-ended responses where hardly any participants indicated using speech rate to identify lies.

Perhaps fast speech rate was perceived similarly to early latencies. Participants may have viewed cues related to thinking quickly (fast speech and early latencies) as enthusiastic. Fast speech is often perceived as more fluent, which may have led to more positive evaluations by participants (Siegman, 1987). Additionally, the fact that the stimulus conversation did not include high anxiety-arousing questions may have contributed to the lack of effect for speech rate. Siegman (1987) found that moderate anxiety increases speech rate. If participants did not believe the speakers were anxious, they may not have attended as closely to their speech rate and thus may have been less likely to use fast speech as a deception cue. In conclusion, the present study found that response latency was weighed more heavily than speech rate when making decisions about a speaker’s truthfulness.

Beyond 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 versus other lies in an empirical setting. To date, comparisons between different types of
lies have only been made in the context of diary studies (DePaulo et al., 1996; Kashy & DePaulo, 1996; DePaulo & Kashy, 1998). No empirical research has been done to examine the influence of lie type on the detection of deception. In the present study, there were two main issues of interest.

First, it was predicted that a more restricted acceptance range would be found for self-oriented versus other-oriented lies. Self-oriented lies are viewed as more serious therefore people should be more strict in their judgments of these types of lies. On the other hand, lying for another person can often be viewed positively; therefore more leniency should be given during the telling of an other-oriented lie. Results from the present study, however, did not support this prediction. In most instances, either more other-oriented lies were identified or there was no significant difference between the two lie types. Additionally, seriousness ratings did not differ significantly between self and other-oriented lies. All lies were viewed as relatively unserious. Perhaps if Jim and Claire had told more serious lies, there would have been more differentiation between proportions of lies perceived in the “self” versus “other” conditions.

Second, we predicted that there would be a gender x lie type interaction for confidence ratings. It was predicted that males would be more confident when judging self-oriented lies and females would be more confident when judging other-oriented lies. This was predicted based on DePaulo et al.’s (1996) findings that men tell, and are told, more self-oriented lies while women tell, and are told, more other-oriented lies. Although no evidence of this interaction was found for confidence ratings, frequency data did show that Claire was perceived as telling more other-oriented, and Jim more self-oriented, lies. This pattern was found to be especially true at “late” latencies.
This effect, however, was differentially perceived by male and female participants. Females were more likely to perceive Claire as telling other-oriented lies, and Jim as telling self-oriented lies, in the “same rate, late” condition. Results for female participants more closely resembled those that would be predicted based on DePaulo et al.’s (1996) findings about the types of lies told by each gender. It is as if females were more attuned to the response latency cue when Claire told an other-oriented lie and Jim a self-oriented lie.

To aid them in deciding when a speaker was lying, it appears as though female participants relied on social expectations about the types of lies males and females tell. Male participants exhibited this pattern as well, although not as strongly. Across the sample as a whole, Jim was perceived as telling more self-oriented lies and Claire was perceived as telling more other-oriented lies.

Maltz and Borker (1982) explain how this difference in lie-telling may stem from differences in socialization between males and females. Boys are encouraged to boast about their strengths and assert themselves over other boys, while girls are taught the importance of intimacy and developing connections with others (Maltz & Borker, 1982). Tannen (1990) explains how these roles continue to play out in adult conversation:

Men are more often inclined to focus on the jockeying for status in a conversation: Is the other person trying to be one-up or put me down? Is he trying to establish a dominant position by getting me to do his bidding? Women are more often attuned to the negotiation of connections: Is the other person trying to get closer or pull away? Since both elements are always present, it is easy for women and men to focus on different elements in the same conversation. (p. 38)
The present study illustrates how knowledge of these different elements can influence one’s perceptions of deception. Claire was perceived as telling more other-oriented lies than Jim. On the other hand, Claire was never significantly perceived as telling a self-lie while Jim was only once significantly perceived as telling the truth about himself.

Findings from the present study revealed that the temporal cues of response latency (and sometimes speech rate) were relied upon to make decisions about a speaker’s truthfulness. These temporal cues, however, were more or less important depending on the speaker’s gender and type of lie spoken. Generally, when gender expectations were confirmed (Claire told an other-oriented lie or Jim a self-oriented lie) the temporal cues were strongly relied upon. For example, the only instance where speech rate appeared to have an effect was for “self” responses spoken by Jim. These responses were perceived as lies in the “same rate, late” condition, but were even more likely to be perceived as lies in the “fast rate, late” condition. It was as though speech rate only made a difference when a lie was already expected. On the other hand, when gender expectations were violated (Claire told a self-oriented lie or Jim an other-oriented lie), the temporal cues were relied upon less. Despite the fact that an equal number of temporal cues occurred in each experimental condition, participants were more likely to find lies where they expected them.

This finding was also supported by many of the open-ended responses in which participants indicated relying on gender stereotypes to make their decisions. Past research has found greater activation of stereotypes when participants are under time pressure (Gilbert & Hixon, 1991; Kunda, Davies, Adams, & Spencer, 2002). It is
possible that the 15 seconds participants were given to record their ratings may have caused them to feel time pressure and thus rely more on gender stereotypes.

These findings provide insight into the complexity of communication interactions between males and females. Tannen (1990) comments on the different aspects of conversations that men and women attend to. Whereas men tend to be more concerned with building themselves up, women tend to be more concerned with the feelings of other people. Males are expected to talk about themselves while females are expected to be humble and modest in their accomplishments (Tannen, 1990).

DePaulo and Kashy (1998) found that other-oriented lies increase relationship harmony. Why then, do men not tell more other-oriented lies? Is it because men do not care about other peoples' feelings or is it because they are not aware of other peoples’ feelings? Take this example of Tannen’s (1990) analysis of a couple driving in their car:

The woman had asked, “Would you like to stop for a drink?” Her husband had answered, truthfully, “No,” and they hadn’t stopped. He was later frustrated to learn that his wife was annoyed because she had wanted to stop for a drink. He wondered, “Why didn’t she just say what she wanted? Why did she play games with me?” The wife, I explained, was annoyed not because she had not gotten her way, but because her preference had not been considered. From her point of view, she had shown concern for her husband’s wishes, but he had shown no concern for hers. (p. 15)

Based on this example, it appears as though males are less likely to realize the appropriate time to make an other-oriented lie. Since women tend to be more attuned to and concerned with the feelings of others, they are more likely to realize when an other-oriented lie might be needed. This fits well with our results broken down by participants’
gender. In the “same rate, late” condition, females were much more likely to perceive Claire as telling an other-oriented lie than were males. It is as if female participants’ knowledge of when “other” lies should be told aided them in recognizing these types of lies in other females. Male participants, on the other hand, may have lacked this knowledge and were therefore less likely to recognize other-oriented lies.

The lower number of self-oriented lies told by women, however, might be explained in a different way. Women seem to be aware of moments when they could tell a self-oriented lie (or a self-oriented truth), but consciously choose not to. There is a pressure on women not to boast, or appear better than others (Tannen, 1990). Social expectations impair women’s abilities to talk about themselves positively. The following is another example from Tannen (1990) which illustrates this point:

Margaret and Charles are both successful lawyers….Margaret feels that Charles boasts: He lets it be known how important he is by mentioning recognition he has received, cases he has won, and important people he knows….In his eagerness to impress, he sometimes embellishes what he has done and implies that he knows people he has actually met only once or twice. For her part, Margaret tries to hide her success. She deliberately avoids letting on if she knows important people whose names arise in conversation, and she never alludes to her many accomplishments.

As can be seen from this example, women tend to avoid “showing-off” while men tend to embrace it. Although the above examples only represent the experiences of two couples, they appear to be representative of society as a whole. There are gender stereotypes relating to the way men and women act in conversation, and these stereotypes
are often upheld. They both determine how we, ourselves, act in communication, and bias how we expect other people to act. Although there is no saying whether one gender’s way of communicating is any better or worse than that of the other, it is important to recognize the existence of these differences and the possible barriers they create in cross-gender conversation.

Gender expectations played a role in the present study in part because of its context: an everyday conversation between a dating couple. Lying, however, occurs in all types of interactions. How might the results of the present study been different had the context been different? What if the speakers were of the same gender? Friends instead of romantic partners? Of different ages? Future studies should examine the use of temporal cues to deception in other contexts to see if the present findings can be extended to other situations or if they are situation-specific. Gender, status, anxiety-level, and countless other factors have an impact on the way people speak and communicate with each other. Manipulating these types of variables might change the way in which deception is understood and identified.

Another direction for future research would be to examine the developmental aspects of lying behavior. How do children learn how to tell lies and identify when other people are lying? At what age do children learn to attend to nonverbal cues in order to detect deceit? Future studies could also examine how the gender expectations about lying develop. Are they socially formed, as Maltz and Borker (1982) would predict, or is there a biological basis to these differences? Do gender stereotypes about lying result from the different roles males and females are associated with in society? Males are typically thought of as the breadwinners who must navigate a competitive work
environment in order to succeed. Females, on the other hand, are typically viewed as homemakers whose success is measured by how well they care for others. Gender stereotypes may result when people rationalize why the different genders take on these different roles (Hoffman & Hurst, 1990).

The development of gender differences in lying may also be examined through evolutionary theory. Is it evolutionarily advantageous for males to lie about themselves and for females to lie for the benefit of others? Evolutionary theory has been used to explain differences in lie detection between males and females (Johnson et al., 2004). A female must be good at detecting deceit in potential mates in order to ensure that she will receive support for herself and her offspring. A study by Johnson et al. (2004) compared lie detection abilities in single women versus women in a relationship. Findings revealed that single women were better at detecting lies than were women in relationships. More reproductive consequences exist for single women if they are unable to detect deceit in potential partners, thus it is important for them to possess this skill (Johnson et al., 2004).

Based on these findings, it would have been of interest in the present experiment to examine whether participants’ relationship status affected their performance. Future studies should examine whether the advantage single women hold in detecting deception can be extended to situations in which the women are outside observers rather than directly involved in the conversation. Additionally, could relationship experience have affected our results? Would people with more experience in intimate relationships be better or worse at detecting deception?

Lastly, the present study focused only on three temporal vocal cues: early latency, late latency, and fast speech rate. Future studies should examine whether or not other
vocal cues influence perceptions of deception. For example, one main limitation of the present study was the lack of a “slow rate” condition. Although increases in speech rate did not appear to affect lie perception, it would have been useful to look at decreases in rate as well. Siegman’s (1987) inverted U hypothesis predicts a slowing of speech rate at very high levels of anxiety. Although high levels of anxiety were unlikely to occur in the present scenario, examining more anxiety-arousing scenarios might result in the use of slow speech rate as a deception cue. Possible scenarios could include a woman accusing her husband of cheating, or a defendant being interrogated by a lawyer during a trial.

The present study illustrates the importance of temporal vocal cues in determining the truthfulness of a speaker. Late latencies were found to lead to perceptions of deception while early latencies and fast speech rate were found to have little impact. Past research was extended by examining how gender and lie type interacted with lie identification. Females were perceived as lying more for others while males were perceived as lying more for themselves. This study revealed that attending to the vocal cues in conversation between relationship partners can aid in the detection of lies. Therefore, the next time you overhear a member of a couple respond to his or her partner ask yourself this: “Was that the truth?”
References


Figure 1

The design of the experiment illustrating the manipulations of type of lie, response latency, speech rate, and sex of the speaker.

<table>
<thead>
<tr>
<th></th>
<th>Early</th>
<th>On-Time</th>
<th>Late</th>
<th>On-Time</th>
<th>Early</th>
<th>On-Time</th>
<th>Late</th>
<th>On-Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech Rate Accommodation</td>
<td>Same</td>
<td></td>
<td></td>
<td>Same</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fast</td>
<td></td>
<td></td>
<td>Fast</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type Of Lie</td>
<td>Self</td>
<td></td>
<td></td>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex of Speaker</td>
<td>Male- Jim</td>
<td>Female- Claire</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Each of the 32 cells above represents a different condition for each of the responses included in the conversation. For example, the cell in the top left corner illustrates a condition in which Jim makes a self-oriented response, speech rate is the same, and response latency is early.
Appendix A

Conversational Script

[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. 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 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 really 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.

Jim: Well, don’t worry, you still have plenty of time before you graduate.

Claire: I know. I’ve been looking for internships, though, and I’m kind of worried about having enough time for everything.

Jim: Well, I’m sure you can handle it, 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. You do make enough to support both of us. By the way, are you still up for that promotion?

Jim: Yeah, I am. I should know in the next few weeks.

Claire: Great.

[Pause – participants just hear them doing the dishes]

Claire: This drain still seems clogged. Do you think you can fix it?
Jim: Sure, no problem. 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. 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.

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.

Claire: That’s fine, no problem.

Jim: 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.
Claire: Oh, and we should invite the new neighbors to come along. 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 you lost last week’s game they seemed pretty pissed. Not a fun crowd to be around.

Jim: Don’t worry; I didn’t invite them back this week. 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, not at all. 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.

Jim: Are you still glad that you bought the gym membership for yourself?

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: Ok…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.

Claire: Great.

[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’d study with her for our next exam, so you’ll have to be alone with Maura for a couple hours before I get home. Sometimes she can be a bit wild, though.

Jim: Oh, 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, they seem to. I don’t know why, really, but I certainly don’t mind.

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 it 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 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

*The 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</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
- **V1** = early, same
- **V2** = on-time, same
- **V3** = late, same
- **V4** = on-time, fast
- **V1** = early, fast
- **V2** = on-time, fast
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

*Instructions sheet*

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

First Page of the rating sheet

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:**

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?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Acknowledgements

Thanks to my advisor, Marilyn Boltz, for her constant support and guidance, and to Jennifer Pals for her thoughtful feedback and encouragement. Thanks to Becca Dyer for being the best thesis partner ever and for always remaining calm when I was not. Thank you to my family for always believing in me. Lastly, to Isha; Sarah; Margot; Nina; Sharon; and Sarah F. thanks for the wonderful friendships and for allowing me to drag you into participating in all of my psych experiments.