Perceived versus actual attitude similarity as predictors of change in interpersonal attraction

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PERCEIVED VERSUS ACTUAL ATTITUDE
SIMILARITY AS PREDICTORS OF CHANGE
IN INTERPERSONAL ATTRACTION

BY

ANDREW ROBERT MCGARVA

BA, State University of New York at Plattsburgh, 1991;
MA, University of New Hampshire, 1993

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5/6/97
Date
This work is lovingly dedicated
to my mother, Mary,
as none of this would have been possible
had it not been for her dedication.

Thanks mom!
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ABSTRACT

PERCEIVED VERSUS ACTUAL ATTITUDE SIMILARITY AS PREDICTORS OF CHANGE IN INTERPERSONAL ATTRACTION

by

Andrew Robert McGarva
University of New Hampshire, May, 1997

The present investigation was intended to identify factors that affect the degree to which interpersonal attraction changes over the course of face-to-face interaction. Participants completed a modified version of Byrne’s (1971) attitude questionnaire, the Crowne-Marlowe Social Desirability Scale (1964), and Snyder’s Self-Monitoring Scale and were then paired into attitudinally similar, dissimilar, or neutral dyads. Both before and after interacting for 40-minutes, dyads were asked to rate their interpersonal attraction toward their partner. Attitude similarity better predicted post-conversation interpersonal attraction when controlling for pre-conversation attraction than when not controlling for pre-conversation attraction. Social desirability, self-monitoring, and the coordination of vocal activity rhythms were not related to interpersonal attraction.
INTRODUCTION

The development, growth, maintenance, and dissolution of relationships are in part determined by what occurs during the social interactions that define them (Hinde, 1981). In the words of Goldschmidt (1972), “Social interaction is the very stuff of human life. The individuals of all societies move through life in terms of a continuous series of social interactions” (p. 59). The importance of interaction in explaining and predicting behavior is without question. The present research will focus on the circumstances surrounding social behavior, from the conditions preceding to the evaluational consequences of face-to-face interaction.

People make choices about whom they interact with and exhibit preferences for some partners over others. There is a substantial amount of research that investigates what factors affect these preferences. I propose to examine factors that affect the interpersonal attraction experienced between conversants. A general model is offered in which the degree to which interacting people come to like one another is a function of the perceptions each has of the other, the personality characteristics each interactant brings with them to the interaction, as well as the coordination that occurs between the interactants during conversation. The factors to be included in this model are attitude similarity, the coordination of expressive behavior during social interaction, approval motivation, and self-monitoring. I will review each of these factors and then review past research that has focused on these variables in combination.
**Attitude Similarity and Interpersonal Attraction**

Social psychology has long strived to describe the factors that affect the degree to which people like each other. Physical attractiveness (Walster, Aronson, Abrams, & Rottman, 1966; Byrne, London, & Reeves, 1968; Berscheid, 1985; Cash & Kilcullen, 1985; Feingold, 1990), propinquity (Festinger, Schachter, & Back, 1950), self-disclosure (Sprecher, 1987; Archer, Berg, & Runge, 1980) have been shown to affect interpersonal attraction. However, the determinant of interpersonal attraction that has dominated the attraction literature is the degree of expressed or perceived similarity.

The connection between similarity and interpersonal attraction was noted as early as 1870 by Sir Francis Galton who observed that illustrious men married illustrious women. Pearson and Lee (1903) also reported the selection of like by like. Terman and Buttenweiser (1935) hypothesized that the greater the similarity between husband and wife, the more successful the marriage. They assessed opinions on various items and compared correlations of happy couples to unhappy and divorced couples and found that happy couples were consistently in higher agreement on the items.

The relation between attitude similarity and interpersonal attraction has been extensively investigated (Newcomb, 1961; Byrne, 1971; Duck, 1976; and Bochner, 1984). Through this body of research, the similarity/attraction relation has come to encompass a broad array of variables and has been studied extensively in many different contexts. Similarity in economic position, intelligence, behavior, and various
personality characteristics have been observed to affect the degree to which people are attracted to one another (Byrne, 1971). Deutsch, Sullivan, Sage, and Basile (1991) demonstrated that friends share more similarities in self-concept than do strangers.

Broad categories of similarity have been examined but generally the similarity/attraction relation concerns similarity in attitude. As Byrne put it, "We may speak of our attitude concerning communism, the Democratic party, the concept of God, birth control pills, Richard M. Nixon...nothing would seem to be gained by drawing distinctions among attitudes, preferences, values, opinions, tastes, and related evaluational constructs" (p. 24). Byrne has championed the idea that the degree of similarity between people has a major impact on the relations they share. It has been observed that while people are motivated to interact with others, they are not equally motivated to form social ties with all people. Preferences are often observed in the selection of people with whom relationships are formed. Newcomb (1956) suggested that the amount of mutual attraction in a relationship is a function of the rewards or reinforcements that are mutually provided. When two people are alike in their attitude toward a particular object they serve to reinforce each other's constructions of reality. According to Byrne-Clore (1966, 1970) a person can become a conditioned stimulus that becomes associated with "rewarding" or "punishing" stimuli. A person who expresses similar attitudes to another becomes associated with the reinforcing value of their attitudes and can thus be considered a secondary reinforcer and, as a consequence, is more attractive to the other. Conversely, when a relationship provides
The behavior of maintaining the relationship decreases, the result: dislike or repulsion.

**Bogus Stranger Technique.** Various paradigms have been employed in the study of the similarity/attraction relation. The “bogus stranger” technique was used by Byrne (1971) as a means to precisely control the degree of attitudinal similarity between a participant and an anticipated partner. Participants were given an attitude questionnaire presumably completed by a stranger. In actuality, the questionnaires were completed by the researcher who was able to manipulate the degree of attitudinal similarity between participant and phantom stranger. As a result, participants never actually met the similar or dissimilar stranger. After being presented with the attitude similarity manipulation, participants responded to Byrne’s (1961) Interpersonal Judgment Scale that included two critical questions, one asking how much they would like working with the stranger and one asking how much they thought that they would like the stranger. Interpersonal attraction was derived by summing responses on these two questions. Using this methodology, Byrne and others have reliably demonstrated a positive linear relation between attitude similarity and interpersonal attraction.

The relation between attitude similarity and interpersonal attraction has been quite reliable using this methodology, so reliable in fact that the relation has been advanced to paradigm status (Byrne, 1971). The validity of the bogus stranger methodology has been questioned however. Duck (1991) has criticized this methodology on the grounds that it is far removed from real life situations. In normal situations people do not normally receive information about others all at once and in
such a clear and unambiguous way. In face-to-face situations, people ordinarily gain information about each other gradually and as the result of deciphering clues.

However, while the unambiguous and thorough disclosure of attitude information used by Byrne is not readily generalizable to real life situations, interactions are often prefaced by general information presented all at once regarding expected compatibilities. In defense of the generalizability of Byrne’s paradigm, it is not uncommon that people receive a general overall idea of each other’s attitudes prior to their meeting. For instance, consider a situation in which you are to be introduced to another person by a mutual friend. Quite often you are informed by the mutual friend, prior to meeting, that you and this person are very much alike or are quite dissimilar.

The bogus stranger technique is further distanced from real life situations in that it has been employed to demonstrate the similarity/attraction relation in situations devoid of interaction. Participants are queried about their liking for a phantom stranger prior to actually meeting the stranger. Normally, when people meet, they have the opportunity to interact. Although a few early studies demonstrated that the similarity/attraction relation was maintained in situations where participants had the opportunity to discuss their similarities and differences (Brewer & Brewer, 1968; Byrne, Ervin, & Lamberth, 1970; and Byrne & Griffitt, 1966), the effect of the interaction on the similarity/attraction relation has received little attention until more recently.

Contrary Findings. Sunnafrank and Miller (1981) demonstrated that when participants were given the opportunity to interact, the effect of similarity on reported
attraction was no longer observed. This result was obtained when participants were not instructed on what to talk about as well as in later studies (Sunnafrank, 1983 & 1984) in which participants were explicitly told to discuss or not to discuss their attitudes in different conditions. In both conditions, a brief (5-minute) conversation wiped out the similarity/attraction relation. These findings were potentially devastating to the similarity/attraction hypothesis because they suggested that while similarity may lead to attraction, the effect is highly superficial. According to Sunnafrank and colleagues (1981, 1983, 1984), the relation between attitude similarity and interpersonal attraction holds only until people have the chance to interact. Once interaction takes place, attraction is no longer predicted by the degree of attitude similarity, but by an unrelated set of factors. Such a finding, if reliable, would have left attraction researchers scrambling to unearth a new grail.

Sunnafrank's conclusions regarding the weakness of the effect attitude similarity has on interpersonal attraction have been criticized by Cappella and Palmer (1992) on the grounds that their manipulation of attitude similarity was based only on two topics: nuclear power and preparedness for war. Cappella and Palmer (1990) questioned participants on a wide variety of attitudes and then paired them into either similar or dissimilar dyads. Each pair participated in 30-minute, face-to-face conversations without direction. After interacting, participants responded to eight, 7-point Likert-style questions regarding aspects of their partner and the conversation. Four of these questions asked about “involvement, comfort, satisfaction with the flow, and opportunity to say what was wanted before completing.” The remaining 4
questions were adapted from Byrne's Interpersonal Judgment Scale and asked about “liking, ‘working with’ the partner, intelligence, and adjustment” (p. 170). The interactions were also videotaped and coded for various vocal and kinesic behavior, including vocalization duration, posture, speech rate, gaze, and smiling.

Contrary to the findings of Sunnafrank and colleagues, Cappella and Palmer (1990) found attitude similarity to be an independent predictor of post-interaction interpersonal attraction and satisfaction. Participants who were similar in expressed attitude who then interacted expressed greater mutual liking for one another and were more likely to be satisfied with the interaction than participants who were attitudinally dissimilar. The difference in findings was explained by a more extensive assessment of participants' attitudes than that carried out by Sunnafrank and his colleagues. Interestingly, not only was attitude similarity found to be a significant predictor of reported attraction, attitude similarity was also found to predict similarities in several of the behavioral measures as well. Specifically, partners who were attitudinally similar spent less time leaning back and exhibiting “indirect shoulder orientation” than participants with dissimilar attitudes.

In addition to the strength of attitude similarity in predicting both interpersonal attraction and conversational behavior, Cappella and Palmer (1990) reported a significant relation between similarities in communicative behavior and attraction. Communicative behavior accounted for a significant amount of variance in attraction and satisfaction “over and above that attributable to initial attitude similarity” (p. 177). Furthermore, after adding behavioral components to the predictive model, a significant
amount of the variability in participants' attraction and satisfaction attributable to initial attitude similarity remained. It was therefore concluded that "there must exist a causal path from attitude similarity directly to attraction and satisfaction and a separate one from behavioral involvement to the outcome measures [of attraction and satisfaction]."

According to Cappella and Palmer (1992), the most important finding of their earlier (1990) research involved the strength of the behavioral similarities exhibited by the interacting dyads in predicting their reported attraction toward one another. When scores representing how similar interactants were with regard to pause and vocalization duration, eye gaze, gesture, smiles, laughter, posture, and orientation were entered into the model predicting interpersonal attraction, the predictive strength of attitude similarity was no longer significant. This result is suggestive of a causal model in which similarity of attitudes leads to a similarity of communicative behavior that, in turn, leads to interpersonal attraction. That is, in more naturalistic situations, where people have the opportunity to interact with one another, attitude similarity acts indirectly on attraction through similarities in expressive behavior.

The results of the Cappella and Palmer research (1990) reinforce the importance of the similarity/attraction relation by demonstrating that not only did attitude similarity lead to interpersonal attraction but that this relation held in situations involving interaction as well. Their results are interesting given the conditioned reinforcement explanation of the similarity/attraction relation. Where Byrne's bogus stranger procedure was intended to control for all but the secondary reinforcement
properties of a stranger’s attitude similarity, the similarity/attraction relation was
maintained in the presence of various other stimuli that present themselves in the
course of face-to-face interaction. It seems that the reinforcing value of attitude
similarity was large enough to outweigh or resist being washed out by the effects of
other stimuli.

Furthermore, given the findings of Cappella and Palmer’s study, it appears that
giving people information regarding how similar their attitudes are to one another
affects how they behave toward one another. The idea that the conversational behavior
of people in interactions is influenced by their perceived attitude similarity is not new.
Specifically, the effect of perceived similarity on induced changes in durations of
pauses, switching pauses, and vocalizations of interacting dyads was investigated by
Welkowitz and Feldstein (1969). Participants in their study were given a series of
personality questionnaires and were then randomly placed into two person groups.
Each dyad was told that they were similar to one another (N=15), dissimilar (N=15),
or randomly placed (N=10) with regard to their responses on the attitude
questionnaire. Pairs of participants were instructed that the purpose of the experiment
was to investigate “how people who are similar (dissimilar or randomly paired) get to
know each other” and then were placed alone in separate soundproof rooms where,
via an intercom system, they each participated in three, 60-minute conversations with
one another over the course of three weeks. The researchers observed both the degree
of convergence in expressive behavior in any one dialogue as well as the degree of
increasing convergence that occurred in dyad’s expressive behavior over the three dialogues.

Analyses revealed that over the course of the three conversations, all dyads demonstrated an increasing similarity of switching pause and vocalization durations. There was no significant difference in convergence of any interaction parameter between the similar and dissimilar groups; however, the average differences in the three measured speech parameters for dyads in the random group were significantly larger than the differences observed in the similar and dissimilar groups. Convergence was measured by computing correlation coefficients that compared the parameter values of one participant with that recorded from the participant’s partner, for each group. The intraclass correlation coefficients (Haggard, 1958) for similar, different, and random groups (respectively) with regard to pause duration were: .58, .45, and .29; with regard to switching pause duration are: .53, .48, and .33; and with regard to vocalization duration are: .24, .22, and .25. The trends in the coefficients for pauses and switching pauses suggest that, overall, people tend to coordinate (with regard to pause durations and switching pause durations) with their interaction partners but more so when they believed they were similar to the person with whom they are interacting.

The same conversations that were used in the Welkowitz et al. (1969) study were later analyzed for convergence of speech intensity (Welkowitz, Finklestein, Feldstein, & Aylesworth, 1972). Only dyads believing to be paired on the basis of their similarity and dyads believing to be paired randomly were used in this study. Vocal
activity of each participant in conversations from the first and third sessions for both the similar and random groups was quantified in terms of loudness for each 10-second interval. First-session intraclass correlation coefficients between the members of the similar and random dyads, respectively, were .17 and -.28. Coefficients for similar and random dyads, respectively for the third session were .91 and .47. These results demonstrated that the degree to which people converge with regard to the intensity or loudness of their speech was a function of how similar they believed their attitudes to be.

Given much of the research on the similarity/attraction relation, and despite some objections, it seems that attitude similarity—whether it be actual or perceived—affects post-interaction interpersonal attraction. The effect, however, appears to be mediated by similarities in various forms of expressive behavior that occur during interaction. In the present research, I hope to provide evidence that supports the causative model in which attitude similarity leads to interpersonal attraction. The primary question being asked is what are the factors concerning what people do when interacting with one another that affect interpersonal attraction.

**Interaction Variables.** What happens during interaction that maintains or eliminates the similarity/attraction relation? Obviously, answering such a question requires a painfully thorough investigation into the many complexities of social interaction, for there seem to be countless channels of communication occurring when people interact with one another. For example, Altman and Taylor’s (1973) social penetration theory proposes a process by which relationships develop, are maintained,
and deteriorate. This process involves an intricate interrelation between multiple levels of behavior acting together as a unified system.

Given the research by Cappella and Palmer (1990, 1992) and Sunnafrank and colleagues (1981, 1983, 1984), it seems that to more accurately predict the attraction experienced between two interactants, given a knowledge of their attitude similarity, one must look more closely at what occurs during the conversation. Attraction may be more a function of how people deal with their differences in conversation than the actual degree to which they are different. People may use verbal strategies to avoid or minimize the importance of attitudinal differences during interaction. Research on equivocation (Balevas, Black, Chovil, & Mullett, 1990) has demonstrated that when people are in an avoidance-avoidance situation, they tend to generate equivocal messages to avoid disagreeing explicitly with their partners.

A great deal of research has focused on various aspects of social interaction as they relate to interpersonal attraction. This body of research, however, is by no means complete for it is not known to what degree people are sensitive to each other’s behavior. It is also not fully realized what behavior people are sensitive to. For instance, it took Condon (1982) a year and a half to fully appreciate the contingencies present between a speaker’s speech and subtle movements of both the speaker and a listener in a four and a half second segment of video tape. He wore out 130 copies of this tape before observing what he called interactional synchrony on the scale of milliseconds. “The listener’s body also frequency modulates, at least within 50 milliseconds, to the incoming sound structure of the speaker’s speech” (p.56). In the
following section, I will review the most relevant literature regarding the relation between expressive behavior and interpersonal attraction.

Interactive Responsiveness

Much of the research on social interaction has focused on the influence people have on one another's expressive behavior. Mutual influence, a basic element of Ashby's (1963) definition of communication, has been observed in a wide variety of verbal as well as nonverbal behavior, including speech rate (Street, 1984; Webb, 1972), accents (Giles & Powesland, 1975), pauses (Cappella & Palnap, 1981; Feldstein & Welkowitz, 1978), intensity (Natale, 1975a), response latency (Cappella & Palnap, 1981), fundamental vocal frequency (Buder, 1991), and turn duration (Matarazzo & Wiens, 1972), gaze (Klienke, Stanenski, & Berger, 1975; Noller, 1984), posture (LaFrance, 1982; Maurer & Tindall, 1983), head nods and facial expressions (Krause, Stemer, Sanger-Alt, & Wagner, 1989).

Cappella (1987) distinguished between mutual influence and mutual adaptation in communication. Cappella used the term "influence" to represent the "similarity (or reciprocity) and difference (or compensation) in aggregate behaviors exhibited by partners." Mutual influence was thus considered an overall adjustment that interactants made to one another when their interaction was considered as a whole. The term "mutual adaptation" addressed the dynamic effects one speaker may have on another within an interaction. For instance, the duration of person A's turns may change as a function of B's turns, which, in turn, vary according to then length A's turns. Rosenthal
(Tickle-Degnen & Rosenthal, 1987; Bernieri & Rosenthal, 1991) used the term "coordination" to refer, more generally, to the mutual sensitivity of interactants' behavior. Following Chappel, I have chosen to use the term "coordination" to refer to the overall effect people have one another during interaction, whether it be dynamic or static.

Interactional Synchrony. Coordination is a fundamental aspect of social interaction and has been observed in infants as young as 30-56 hours old (Berghout-Austin & Peery, 1983). At 3-4 months of age, children have demonstrated body movement adaptation to their mothers (Symons & Moran, 1987; Cohn & Tronick, 1987, 1988). Bernieri, Reznick, and Rosenthal (1988) observed what they termed interpersonal synchrony occurring between mothers and their children (aged 16-18 months). In their study, interactions between mothers and their actual children and between mothers and children that were not their own were videotaped and shown to participant judges who rated the degree of "simultaneous movement," "tempo similarity," and "coordination and smoothness" that occurred between the expressive behavior of the interacting dyads. Judges were also shown videotapes of pseudo-interactions where the mother and the child shown on the videotape were not interacting with each other but were spliced together from two separate interactions. Interactions between mothers and their own children were judged to exhibit the greatest degree of interactional synchrony. The findings were discussed in terms of synchrony as a product of motivation. In agreement with Rosenfeld (1981), Bernieri,
et al. (1988) suggested that “a state of high synchrony may indicate existing states of
or motivation for sociability among participants” (p.252).

Expressive Behavior. Not surprisingly, adults also exhibit the ability to
coordinate their expressive behavior with one another. An obvious example of
coordination is that which provides for efficient information exchange during
conversation. It is easier for one person to listen to and understand what another is
saying if the person remains silent while the other is talking and vice-versa. Thus,
during conversation, interactants typically take turns “holding the floor” (Duncan &
Fiske, 1977; Jaffe & Feldstein, 1970). When two people take turns speaking, when
they have coordinated their vocal activities in such a way that one person speaks while
the other remains silent, the potential for information exchange is maximized. Turn-
taking necessitates a behavioral sensitivity to the vocal activity of other people.
Duncan and Fiske have identified various verbal and nonverbal behaviors that signal
turn exchanges including hand gesticulations; paralinguistic drawls, involving
prolongations in the utterance of single syllables; and decreases in pitch or loudness.

Mutual responsiveness is evident in verbal as well as nonverbal aspects of
social interaction. Davis and Perkowitz (1979) defined “responsiveness” in terms of
contingencies that occur between the social behavior of interactants. Four functions of
interpersonal responsiveness were identified. First, responsiveness was explained to
serve the purpose of interaction maintenance. By behaving in a responsive way to one
another, people serve to maintain the interactions that they take part in and in so doing
increase the degree of mutual liking they experience. Second, responsiveness was
considered as a means toward the attainment of predictability in interaction which leads to feelings of control experienced by those involved in the interaction. These feelings of control act to reduce the stress that may occur in less predictable conversations. Responsiveness was also discussed as a means to facilitate the goals of the interaction. That is, although responsiveness will not necessarily lead to the fulfillment of an interactant's goal, unresponsiveness will surely prevent it. Last, the authors described responsiveness as a means to communicate interpersonal affect. They further reasoned that to the extent that responsiveness strengthens the social bond between people, it too is to be associated with interpersonal attraction.

To support this reasoning, Davis and Perkowitz (1979) performed an experiment in which participants answered questions for and listened to questions from whom they believed to be another participant. The other participant was, in fact, a series of tape recorded answers to a series of prearranged questions. Participants were told that their unseen partners had the opportunity to respond or not to respond to any of the questions from the list that participants were provided with. There were two conditions, one in which participants' questions were responded to 33% of the time (the unresponsive condition) and the other in which questions were responded to 66% of the time (responsive condition). Participants in the responsive condition reported significantly greater interpersonal attraction for their partners than participants in the unresponsive condition. Furthermore, participants interacting with a responsive partner believed that their partner liked them more than participants in the unresponsive condition. However, this latter effect was only marginally significant, p > .17.
A related finding was reported by Rosenfeld (1966) who instructed participants to either seek out or avoid approval from an unknowing partner. Participants who sought approval used more of what Rosenfeld called "recognitions" (e.g., such brief utterances as "Mmhmm," "Hmm," "Really," "Yep," etc.) than participants instructed to avoid approval. These more responsive, approval-seeking participants received more approval from their partners than the less responsive, approval avoiders.

In an experiment testing the effects of behavioral similarity on attraction, Dabbs (1969) manipulated the similarity of interactants' behavior during interaction by using a confederate. During one-on-one interactions, male participants interviewed a confederate who either mimicked or did not mimic their behavior. In the mimicked condition, confederates sat like the participants and imitated various gestures and mannerisms such as crossing arms or legs, fidgeting, and so on. Participants in both conditions did not differ in their ratings of how similar the confederate's posture, gestures, and mannerisms were to their own. However, mimicked participants did rate that confederates were more similar and thought more like they did. The confederate in the mimic condition was judged to be better informed, have sounder ideas, and present his ideas better than in the non-mimic condition. Although mimicry did not affect how much participants reported to like the confederate, there was an effect of mimicry on how much participants "identified" with the confederate. A second experiment using confederates who were not informed as to the purposes of the experiment confirmed these findings.
**Accommodation Theory.** Speech accommodation theory (SAT) was formulated to integrate a variety of findings related to the influence people have on one another's communicative behavior. The formulation of this theory began with Giles' (1973) demonstration of interpersonal accent convergence during a one-on-one interview situation. SAT encompasses two general categories for speech shifts—convergent and divergent. Convergent shifts are those in which speech behavior of social interactants change to be more similar to one another. Divergent shifts are those in which interactants' speech behavior changes in the opposite direction. These shifts can either be upward or downward in direction. An upward shift is one in which a speaker adjusts his speech behavior in a socially valued direction, whereas a downward shift describes an adjustment toward a less approved-of direction.

Platt and Weber (1984) observed both upward and downward convergence during interactions between native English speakers and immigrants from Singapore and Australia. Attempts toward downward convergence were made by native English speakers who adjusted their speech to what they believed the foreigners sounded like. Upward convergence occurred on the part of the foreigners when they adjusted their speech to sound like the native English speakers.

Giles, Taylor, and Bourhis (1973) observed speech convergence in the bilingual context of Montreal, Canada. It was found that the more a speaker converged to the language of the listener, the more highly regarded the speaker was by the listener and the more likely the listener would reciprocate the convergence. Since then, a wide variety of social behavior has been considered to fall within the scope of
SAT, including linguistic, prosodic, and nonverbal elements of communication. In 1987, Giles came to refer to SAT as communication accommodation theory (CAT) in order to encompass instances of convergence and divergence he observed in nonverbal behavior. As reviewed by Giles, Coupland, and Coupland (1991), the features observed to converge during social interaction include utterance length (Matarazzo, Weins, Matarazzo, & Saslow, 1968), speech rate (Street, 1983), information density (Aronson, Jonsson, & Linell, 1987), vocal intensity (Natale, 1975a), length and frequency of pauses (Jaffe & Feldstein, 1970), response latency (Cappella & Palnap, 1981), joking (Bales, 1950), gesture (Mauer & Tindall, 1983), head nods and facial affect (Hale & Burgoon, 1984), as well as posture (Condon & Ogston, 1967). Speech convergence is thus a change or shift in any of an increasingly large population of expressive behavior of one person toward the behavior of another.

Speech divergence is believed to be a way in which speakers accentuate differences between themselves and others. Such divergence was observed by Bourhis and Giles (1977) among Welsh participants who were learning the Welsh language. These people were interviewed by an English-sounding speaker who asked a question about their reasons for learning “a dying language with a dismal future.” This question was devised to threaten the participants' ethnic identity. It was observed that responses to this question were voiced with exaggerated Welsh accents, relative to responses to earlier, less threatening questions. Additionally, according to Giles, Mulac, Bradac, and Johnson (1987), divergence in communicative behavior can reflect a desire to “dissociate personally” from interaction partners.
Accommodation theory focuses on the cognitive processes underlying behavior during social interaction. Speech shifts during interaction reflect specific purposes of the speaker. That is, shifts are strategic in nature and are seen as the product of perceptions of the situation as well as perceptions of the consequences of the strategies taken. Convergent shifts in vocal behavior reflect a speaker's desire to increase social integration or identification with another, while divergent shifts have been explained as resulting from intentions to discontinue interaction. This perspective on the expressive behavior occurring during interaction fits in well with the causal model proposed in this paper. In fact, Giles, Coupland, and Coupland (1991) have acknowledged the reliance of accommodation theory on the similarity/attraction paradigm. In keeping with the notion that similarity leads to interpersonal attraction, people who desire increased connection with one another may adjust their vocal behavior in such a way as to minimize speech related differences.

According to the similarity/attraction paradigm, people who are similar in attitude will likely be attracted to one another. According to accommodation theory, those who are attracted to one another will be inclined to form and maintain relations with one another. It is this inclination toward the formation and maintenance of interpersonal relations that is manifested in the coordination, or convergence of expressive behavior during interaction. In other words, the intentions of interactants toward one another is acted out when they converse, leading to increased liking or disliking. The interaction is the playing field on which the status of the relationship is determined. It is reasonable to presume that the attraction produced by attitude
similarity provides one of the underlying motivation for the convergent or divergent shifts in expressive behavior that occur during social interaction. Convergence and divergence should lead respectively to increased and decreased interpersonal attraction.

Social Coordination

The extent to which people are sensitive to each other's behavior during interaction is unknown. Past research has demonstrated that the way in which people behave toward one another during face-to-face conversation affects how that conversation is perceived by those involved. Communication accommodation theory suggests that people adjust their expressive behavior during interaction for the sake of expected consequences. Convergence is associated with situations in which interactants desire increased relations with one another or have a greater need to attain one another's approval. As reviewed, a good many verbal and nonverbal responses have been included in CAT. However, it is unlikely, given the intricacies of human interaction, that the total population of expressive behavior to which people are sensitive has been exhaustively researched. With the model I am proposing, I intend to include convergence of a category of behavior not yet examined under CAT's microscope, namely the rhythmic aspects of social behavior.

Iberall and McCulloch (1969) proposed that rhythm is a fundamental characteristic of living organisms. From this perspective, all organisms can be seen as a
collection of physiological oscillations, a set of endogenous rhythms that are in synchrony with one another. Wever (1982) described "a 'multi-oscillator system' consisting of several basic oscillators that control collectively all the different rhythms." The various physiological processes associated with life itself exhibit orderly fluctuations, from cellular metabolic rates to the time-based processes of life span development. A wide range of cyclic periodicities have been observed that range from fractions of a second to years.

Chappie (1970, 1982) characterized people as a "population of oscillators." According to Chappie's model, a person's social behavior is affected by a vast collection of internal biological oscillations (similar to the theory posed by Iberall and McCulloch, 1969) and that each person brings their endogenous rhythms with them to different social interactions. Among these physiologically-based time keepers are those that are responsible for moderating speech and language. He explained that communication rhythms begin at a very early age. Chappie suggested that these early interaction rhythms are the basis for the development of the child's personality. Later in life, these time-based personality characteristics play a major role in determining the complimentarity of one person to another. Complimentarity is discussed in terms of the ability of interactants to synchronize their "give-and-take" during conversation (1970, p.46).

In agreement with Chappie, McGrath and Kelly (1986) proposed a model of mutual social influence labeled the Social Entrainment Model, based on the assumption that there is a significant temporal component to human physiological, psychological,
and interpersonal behavior. According to this model, much of what falls into the
category of social behavior is presumed to be moderated by cyclic, or rhythmic
processes. When interacting with one another, people adjust their rhythms to one
another. That is, in social situations people become mutually entrained to the phase
and period (frequency) of each other's behavioral rhythms. People act as powerful
external pacer events (zeitgebers) and entraining cycles for one another.

Vocal activity rhythms. A prominent example of rhythm in people's social
behavior is the periodic fluctuation observed in on-off vocal activity during
conversation. These patterns involve periods of time during which a person is
generally less vocally active alternating with periods when that same person is
generally more active with respect to vocal activity in dyadic conversation (Warner,
1979). For instance, a 6-minute cycle would include roughly one 3-minute "on-phase"
and one 3-minute "off-phase." These on and off phases identify periods of relative
activity and inactivity, described by Dabbs (1983) as "megaturns". Chapple (1970)
suggested that these cycles in vocal activity are related to a set of underlying
physiological rhythms, in much the same way that wake/sleep cycles are linked to
endogenous time keepers.

When two people interact, as in verbal communication, coordination of both
behavioral and biological rhythms is required for the interaction to be a smooth one.
This coordination involves first, entrainment of one person's overt behavior to the
overt behavior of another person and second, the entrainment of each person's internal
rhythms to his own cyclic behavior. The result of this entrainment is a conversation in
which one person is experiencing an on-phase while the other is experiencing an off-phase. Optimally, interactants reach a point when their tendencies to be talkative alternate, resulting in fewer interruptions and silent pauses. Conversational precision is thus a function of the phase relation between the each speaker’s vocal activity rhythms.

Warner (1992) suggested that the ease with which speakers are able to coordinate their vocal activity rhythms depends on similarities between their baseline cycling rates. That is, each person has a preferred on-off vocal activity rhythm that is best suited for interactions with people who have compatible rhythms. Some dyads may thus have an easier time conversing than other dyads because of a similarity in preferred cycle rates. However, the degree to which interactants coordinated their non-content speech activity has been observed to vary as a function of an individual’s empathy, rapport, and social desirability (Matarazzo, Wiens, Matarazzo, & Saslow, 1968). Apparently there is more involved in the coordination of speech activity than the baseline cycling rates of the involved interactants. People bring both a collection of endogenous oscillators as well as a set of personality characteristics to an interaction. It is not yet clear how significant an impact personality variables have on the coordination of vocal activity rhythms.

Warner (1992) demonstrated that the cyclicity of vocal activity increases over the course of a face-to-face dyadic conversation. This finding suggests that as conversations progress, interactants find a rhythm that allows them to take turns talking while at the same time follow their own vocal cycles. The degree of
entrainment of vocal activity cycles with regard to both phase relation and frequency may depend on several factors. In other words, the degree to which conversation partners come to act as social zeitgebers on each others’ cyclic vocal activities may be determined by various factors. I expect to demonstrate that the greater the interpersonal attraction between people, the greater the effect each will have on the other’s interaction rhythms.

With the present research, I intend to extend accommodation theory to a convergence in vocal rhythms. The consequence of convergence in vocal intensity, speech rate, etc. is increased interpersonal attraction. Convergence in speech rhythms may have a similar effect. Rhythm convergence may occur in two ways. First is the question of the phase relationship between the rhythms of two speakers. Optimally, two people communicating verbally with one another would alternate their on-phases. While one person was experiencing a period of relative talkativeness, the other would best be experiencing a period of relative non-talkativeness. Such a phase relation would be described as being 180 degrees off-phase. However, it could be that when an interaction is initiated between two people each could be experiencing talkative or non-talkative phases concurrently. That is, the speakers could be perfectly in-phase. In all likelihood, the phase relation between the speech rhythms of two interactants at the onset of a conversation will fall somewhere between these two extremes (180 and 0 degrees off-phase). If the speakers are motivated to increase interpersonal relations between them their vocal rhythms may converge to a point where they are 180 degrees off-phase and thus report an increase in interpersonal attraction.
The second form of rhythm accommodation concerns the period length of each speaker's vocal activity rhythm. Warner, Kenny, and Stoto (1979) observed individual differences in the cyclic periodicities of people's speech rhythms. Warner and Mooney (1988), employing periodograms that were derived from Fourier analyses to represent cycles in on-off vocal activity, also observed significant individual differences in cycle rates. Specifically, Warner (1979) reported cycles in amount of talk ranging from 2-6 minutes in length. Chappie (1970) saw social rhythms such as those observed in vocal activity as a product of endogenous physiological oscillations. As there are individual differences in biological functions, so too are there individual differences in vocal activity rhythms. It is as though people have preferred rates of vocal activity cycling. Speech rhythm accommodation may occur in the degree to which people make adjustments in the frequency of their vocal activity cycles according to the cycle frequency exhibited in the vocal activity of others.

**Entrainment.** During vocal interaction, people seem to act as time keepers (zeitgebers) for each other's cycle rates. Entrainment occurs in conversations when one person adjusts his preferred rate of cycling to match the rate exhibited by the person with whom he is conversing. Mutual entrainment describes a situation where both interactants adjust their cycle rate toward that exhibited by the other, meeting at some cycle rate between the two preferred rates where the duration of time each spends being talkative compliments the duration of time that the other spends being non-talkative and vice-versa.
Entrainment of speech rhythms can be talked about in accommodation theory terms as adjustments made in communication behavior toward some end—in this case increased liking. Vocal rhythm entrainment may seem to strengthen the social bond between speakers. The factors that affect convergence in accent or speech convergence during social interaction may have a similar effect on convergent adjustments speakers make in their speech rhythms. With the research here proposed, I will look at the effect perceived attitude similarity has on speech rhythm entrainment and the consequent effect on reported interpersonal attraction. I expect that people who believe they are conversing with a partner who is attitudinally similar will be more likely to adjust the phase and frequency of their speech cycles to complement their partner than people who believe the partner is attitudinally dissimilar. Dyads exhibiting greater entrainment will, in turn, report greater liking for one another.

The relation between personality characteristics and convergence of paralinguistic speech behavior will also be extended by the present research to include speech rhythms. Specifically the correlation between a dyad’s need for social approval, as assessed by the sum of their scores on the Crowne-Marlowe Social Desirability Scale (Crowne & Marlowe, 1964), and the degree to which they coordinate their vocal activity rhythms will be investigated. It is expected that the mutual entrainment of speech rhythms will be greatest for those dyads that are highest in approval motivation.

Individual differences in how long it takes to go from periods of relative talkativeness to periods of non-talkativeness and back may play some part in what
determines how compatible two people are. It may be that the cycle length of a person's vocal activity is inflexible. That is, each person has a preferred rate of cycling and behaves at that fixed rate. It may also be that the length of a person's vocal activity cycle is flexible and can adapt to different cycle lengths of different partners. Furthermore, there may be individual differences with regard to how flexible a person's speech is. Some may tend to stick fairly close to some preferred rate, while others are able to cycle once every three minutes as easily as cycling once every five or six minutes. This issue of flexibility of vocal activity cycles remains to be seen, but is beyond the scope of the present experiments. For the purposes of the present research it is assumed that there are individual differences in cycle length and that there is some degree of flexibility in the length and phase of people's cycles. I expect that the degree to which a person exercises this flexibility and coordinates her vocal activity rhythms to those exhibited by a partner will be a function of need for approval and self-monitoring with the end result being interpersonal attraction.

**Judgment of Social Contingency**

Contingency judgment research addresses people's sensitivity to relations between events. There is a large body of past research that investigates the accuracy of people's contingency judgments when presented with a series of co-occurring events (see McGarva & Benassi, 1997 for review). In the majority of this past research, the events presented to participants were of a nonsocial nature. For instance, participants were asked to judge the relation between a series of button-press responses and the
occurrence of an outcome light (Jenkins & Ward, 1965). McGarva and Benassi (1997) extended this area of research to the judgment of contingencies between social events. In their experiment, participants listened to two-minute slices of a set of dyadic conversations and made judgments regarding the degree to which participants took turns speaking as well as judgments regarding the overall quality of the conversation. They observed that both judgments of turn-taking and conversation quality increased as a function of increasing precision in turn-taking, as indexed by computed phi coefficients. This finding was obtained both when participants knew prior to listening to the conversations that they would be asked to make such judgments, and when participants were unaware, prior to listening to the conversations that they were to be making such judgments.

The present experiment will replicate the condition of the experiment conducted by McGarva and Benassi in which participants were unaware of their impending contingency judgment— with several twists. First, those judging turn-taking precision will be interactants, rather than a 3rd party listening in. Second, whereas McGarva and Benassi presented judges with two-minute conversations segments, participants in the present experiment will judge turn-taking occurring during conversations lasting 40-minutes. Third, participants in the present experiment will have available to them a population of nonverbal behavior not presented by McGarva and Benassi to their participants. It is expected that judgments of turn-taking precision will vary as a function of objective contingency. It is also expected that judgments of
conversation quality will increase with increasing turn-taking precision, as represented by phi coefficient

Approval motivation

No investigation into the determinants of behavior is complete without questioning the degree to which the observed relations are affected by individual differences. When one presents different people with identical stimuli in identical conditions, one will observe a marked variability in responding. The causative model proposed herein is no exception. Individual differences are to be expected with regard to the influence interaction variables and attitude similarity have on interpersonal attraction. One personality characteristic that has been of a topic of interest in both the attraction paradigm and accommodation theory is a person's need for social approval.

Crowne and Marlowe (1964) described a series of studies on the behavioral correlates of what they termed the approval motive. Based on this research, they proposed that people with a high need for approval are more sensitive to the evaluations of others than people with a low need for approval. This was supported by Crowne and Strickland (1961) who compared the performance of participants who were high and low in approval motivation on a verbal conditioning task. In this experiment, plural nouns were reinforced by the experimenter saying "good." Participants with a high need for approval exhibited changes in the rate of their saying plural nouns while those with a low need for approval showed no change in response rate. In a similar study, Dixon (1970) reinforced participants for making statements of
self-reference. The responses of participants with a high need for approval exhibited a greater sensitivity to verbal reinforcement than those of participants scoring low in approval motivation. Similar conditioning effects have been observed in an interview setting (Marlowe, 1962) and in conditions that involved vicarious reinforcement (Marlowe, Beecher, Cook, & Doob, 1964).

Brannigan (1977) identified sensitivity as a major dimension of approval motivation. Given the heightened sensitivity to cues associated with social approval exhibited by those scoring high in need for approval, this personality variable offers itself as an interesting addition to the present research.

Approval motivation and similarity/attraction. Both Nelson (1966) and Aronsen and Worchel (1966) proposed that when a stranger expresses attitudes that are similar to those held by a person, that person is led to believe that the stranger is more likely to like him. Conversely, people assume that an attitudinally dissimilar stranger would be less likely to like them. According to these researchers, it is this assumed response on the part of the stranger that is responsible for the similarity/attraction relation. Nelson proposed that an individual “may have learned to expect that he is more likely to be approved of by someone with attitudes similar to his own than by someone with contradictory attitudes, and that his preference for being with others with attitudes similar to his own may be mediated by expectancies that these others will ‘approve’ of him.” This theory has been termed the “approval-cue” hypothesis.
Demonstrating the approval-cue hypothesis, Bloom (1968) segregated participants into those scoring high and those scoring low on the Marlowe-Crowne Social Desirability Scale. All participants were provided with attitude information regarding a stranger. Participants in a condition in which a later interaction was expected and those in a condition in which a later interaction was not expected all received a .88 similar stranger. Participants in the no-meet condition who expressed a low need for approval reported significantly lower attraction toward the stranger than participants in the other conditions. It was suggested that people high in approval motivation may inhibit negative attraction responses. From this finding it is not known whether need for approval as assessed by the Marlowe-Crowne Scale merely represents a response bias or a more pervasive characteristic of social behavior. That is, were Bloom’s participants who were high in need-for-approval merely inhibiting negative responses or were they more sensitive to attitude similarity?

Approval motivation and expressive behavior. A relation between approval motivation and accommodation of non-content speech behavior has been documented. The greater a person's need for approval, the more likely that person is to converge toward others during social interaction. Natale (1975a) observed that people scoring higher in social approval were more likely to converge to the vocal intensity of another speaker. Unacquainted participants were administered the Crowne-Marlowe Social Desirability Scale and placed in a soundproof room on opposing sides of a curtain to eliminate nonverbal communication. Participants high in need-for-approval were much more likely to match their partner’s speech intensity.
In a similar study, Natale (1975b) observed a relation between social desirability and the convergence of temporal speech patterns. As in the previously reviewed study, participants who were either high or low in approval motivation were paired and instructed to converse freely. However, unlike the other experiment, participants were not separated by a curtain; speakers had access to each other's nonverbal cues. Those high in need-for-approval were more likely to converge. Natale reasoned that these results emphasize the importance of individual personality characteristics in the prediction of speech convergence.

The effect of need for approval on the similarity/attraction relation as well as on the behavioral aspects of face-to-face interaction makes this personality variable a prime candidate for inclusion into the causal model explored in the present research. It was expected that those high in need-for-approval would be more sensitive to attitude similarity and more likely to display convergence of expressive behavior during interaction than those low in need-for-approval. Specifically, I expected that dyads reporting a greater combined need for approval would exhibit greater convergence and express greater liking for one another than dyads reporting lower combined need-for-approval.

**Self-monitoring and expressive behavior**

The construct of self-monitoring has been useful in predicting the behavior of people in social situations. In general, high self-monitors are more likely to adapt their social behavior to fit the situation they are in and act according to external cues while
low self-monitors are more likely to maintain a consistent way of behaving, independent of the demands imposed by the situation, and act in social situations according to internal cues. Snyder (1974, 1987) has discussed differences in self-monitoring in terms of a variability in the degree to which people are responsive to both social and interpersonal cues indicating what behavior is appropriate.

I expected that high self-monitors would be more likely to adjust their behavior to the behavior exhibited by their partner. Dyads scoring high on Snyder’s Self-Monitoring Scale were expected to display a greater convergence toward one another than dyads who scored lower on the Self-Monitoring Scale. As a result of this increase in convergence it was expected that high self-monitors would report greater liking for their partners than low self-monitors.

**Expected Findings**

It was expected that those who were similar in attitude would report greater attraction for one another. It was also expected that attraction would be dependent upon the coordinatedness of the interaction—specifically, as coordination in the form of entrained vocal activity rhythms increases, reported interpersonal attraction would increase as well. Attraction was also expected to vary as a function of the need-for-approval of interactants. Those high in need-for-approval were expected to report greater attraction for one another than those low in need-for-approval.

It was thought that the entrainment of vocal activity rhythms might have been related to actual or purported attitude similarity, that those who were actually similar
in attitude or those who were told they were similar in attitude would be more likely to 
experience coordination than those who were actually or purportedly dissimilar in 
attitude. It was also expected that those high in self-monitoring would be more likely 
to exhibit coordinated vocal activity rhythms than those low in self-monitoring.
METHOD

Participants

On hundred and seventy-four female introductory psychology students at the University of New Hampshire participated as part of a course requirement. All were told, prior to participation, that their attendance was required at two sessions. Participants were freshman and sophomores, typically between the ages of 18-25 and all spoke English as a first language.

Procedure

Data for this experiment were collected over two sessions. During the first session, groups of participants were given a battery of questionnaires including the Crowne-Marlowe Social Desirability Scale, Snyder’s Self-Monitoring Scale and an attitude questionnaire derived from that used by Byrne1 (1971) (Appendix A).

It was explained that participants would later be paired based on their responses to the attitude questionnaire. Participants were also asked to provide some information about when they would be available to participate in the second session.

Each participant’s responses to the attitude questionnaire were compared to the responses made by other participants. Attitude similarity scores were calculated for
each pair of participants by comparing their responses on each attitude item. Each attitude item could be responded to in one of six ways. For instance, participant could respond to the item regarding birth control by circling one of six answers ranging from “I am very much in favor of most birth control techniques.” to “I am very much opposed to most birth control techniques.” with no middle point. In-between answers ranged from moderately in favor, slightly in favor, slightly against, and moderately against. If two participants responded at opposite end points on an item they received a score of five for that item. If one participant responded “very much in favor” and the other responded “moderately in favor” the pair received a score of one for that item. If responses were the same for an item, the pair received a score of zero for that item. The scores for each of the 29 items were summed to form an overall attitude similarity score. The lower the score, the more similarly a pair of participants responded to the attitude items.

Table 1
Experimental conditions

<table>
<thead>
<tr>
<th>Actual Attitude Similarity</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
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<tbody>
<tr>
<td>Told they were similar</td>
<td>Pseudo-Similar (n=17)</td>
<td>Actually Similar (n=27)</td>
<td></td>
</tr>
<tr>
<td>Told they were dissimilar</td>
<td>Actually Dissimilar (n=21)</td>
<td>Pseudo-Dissimilar (n=20)</td>
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</table>
Participants were scheduled for the second session in pairs. Dyads fell into one of four groups: actually similar, pseudo-similar, pseudo-dissimilar, and actually dissimilar (Table 1). The actually similar group (n=27) ranged in attitude similarity from 16 to 29. The actually dissimilar group (n=21) ranged in attitude similarity from 42 to 60. The pseudo similar and pseudo dissimilar groups range in attitude similarity from 27 to 40.

Pairs of participants were scheduled for the second session and arrived at separate entrances. They were greeted by the experimenter who explained the basis of their pairings. Those in the actually similar and pseudo-similar groups were told that, based on their responses to the attitude questionnaire from the first session, they were paired with a person they were similar in attitude to. Those in the actually dissimilar and the pseudo-dissimilar groups were told that they were paired with another participant whose responses on the attitude questionnaire were much different than their own. As only unacquainted dyads were used in this study, participants were asked at this time if they knew one another. If participants had been previously acquainted they were rescheduled with new partners.

Prior to meeting, participants were then asked to complete Byrne’s six-item (1971) Interpersonal Judgment Scale (Appendix B). Amongst the questions on this scale were two critical inquiries regarding how much they believed that they would like their partner and how much they would enjoy working with their partner. Judgments were made on 7-point scales.
Upon the completion of the Interpersonal Judgment Scale, participants were brought into a 12' x 12' room and told to make themselves comfortable in each of two wing-back chairs. The chairs were about 24” apart and angled toward one another. Dyads were told that for the next 40 minutes they were to carry on a conversation in which they “get to know each other.” The experimenter then left the room and closed the door.

Participants’ on-off vocal activity was recorded using a system similar to the Automatic Vocal Transaction Analyzer (AVTA) developed by Jaffe and Feldstein (1970). Conversants each wore a Shure SM-10 noise-canceling microphone positioned about one inch in front of their mouths. Input from each speaker was fed into a separate channel of a stereo tape recorder. During playback, input from each channel was first run through a low-pass filter that removed all high frequency components of the signal which was then passed through a threshold detecting circuit (see Jaffe and Feldstein, 1970, p. 164 for a more detailed description). Thresholds for each channel could be individually adjusted using a potentiometer, allowing a human listener to adjust the input so that output corresponded with the actual vocal activity and not with any background noise such as heavy breathing or voice bleed-over (a situation where one person’s voice can be heard on the other person’s channel). If voice amplitudes exceeded the set threshold, the circuit output one voltage and if amplitudes did not exceed the threshold, the circuit output a second voltage. These binary voltage signals were fed into an analogue-to-digital converter board (Metrabyte DAS-16). A computer program then sampled the signal from each channel 400 times per second.
and represented dyadic vocal activity as two series of 1’s and 0’s. If for each 1/4 second (100 samples) 51% of the voltage samples were above the set threshold then vocal activity was coded as present (“1”). If the majority of the voltage samples were below the set threshold vocal activity was coded as absent (“0”) for that 1/4 second.

After the conversation, participants were brought into separate rooms and asked to complete a second copy of Byrne’s Interpersonal Judgment Scale. In addition to this scale, participants were asked to make various judgments regarding the overall quality of their conversation on 7-point scales. Participants were also asked to rate the degree of turn-taking precision on a scale ranging from -100 to +100. These questions are provided in Appendix C. Following the completion of these items, participants were debriefed, thanked for their participation, and dismissed.
RESULTS AND DISCUSSION

Attitude Similarity/Pre-Conversation Attraction

To test the effect of whether participants who were told they were similar to one another reported liking their unseen partners more than participants told that they were dissimilar to their partners, each dyad's responses to the critical questions of Byrne's Interpersonal Judgment Scale were summed producing an overall pre-interaction liking score ranging from 0-28, with 0 indicating extreme disliking. Pre-conversation liking scores for all participants ranged from 14 to 27, with a standard deviation of 3.06. A one-way analysis of variance (ANOVA) was performed to test the effect of what participants were told regarding their attitude similarity (similar/dissimilar) on pre-interaction attraction. The results indicated a significant relation, $F(1,84) = 70.62, p < .05$. Participants who were told they were to be meeting a partner who had responded similarly on an attitude questionnaire, reported greater attraction toward their unknown and unseen partner than participants who were rating an unknown and unseen partner described as attitudinally dissimilar to themselves (Table 2).

Byrne's (1971) attitude similarity/attraction paradigm predicted that people believing to be similar in attitude would report greater attraction toward one another than people believing to be dissimilar in attitude. This effect has been observed to hold.
in situations in which people have no more information about one another than attitude similarity/dissimilarity—Byrne's bogus stranger paradigm.

Table 2

Pre- and Post-Conversation Interpersonal Attraction (with Standard Deviations) for Dyads told they were Similar or Dissimilar

<table>
<thead>
<tr>
<th></th>
<th>Pre-conversation</th>
<th>Post-conversation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Told similar</td>
<td>22.78 (2.00)</td>
<td>25.20 (1.93)</td>
</tr>
<tr>
<td>Told dissimilar</td>
<td>18.66 (2.54)</td>
<td>23.29 (3.67)</td>
</tr>
</tbody>
</table>

Observing here that whether participants were characterized as attitudinally similar or dissimilar to one another affects interpersonal attraction supports the attitude similarity/interpersonal attraction paradigm championed by Newcomb (1961), Byrne (1971), Duck (1976), Bochner (1984). The present experiment replicated Byrne's "bogus stranger" technique with some adaptations. Byrne's technique required participants to complete attitude questionnaires similar to those used in the present study. He then presented them with a second questionnaire that was completed by a purported stranger. These bogus questionnaires were in fact completed by an experimenter to control the exact degree of similarity between a participant's attitudes and those of the stranger. Participants had the opportunity to see which issues they
and the stranger differed on. In the present study, participants completed an attitude questionnaire and were then told of a stranger that was either generally similar or generally dissimilar from themselves. Participants in the present experiment did not actually see the responses of a stranger, but were merely told of some overall similarity/dissimilarity.

The bogus stranger technique was criticized on the grounds that it bore little similarity to what occurs in everyday situations (Duck, 1991). People are rarely given information regarding the attitudes held by a person they are to meet as explicitly as it is given using the bogus stranger technique. In the present experiment, participants were given a brief portrayal of another in a way resembling how it often occurs outside of the laboratory. “Amy, I should introduce you to my friend, Megan. I believe you and she are very much alike.” Observing the similarity/attraction relation in the present experiment suggests a degree of generalizability from the similarity/attraction relation as it was observed in previous research to a situation that more closely approximates those occurring in “real life”.

Post-Conversation Attraction

Alleged Similarity. In assessing the relation between similarity and post-conversation attraction, it is important to discriminate between the influence of what participants were told and the influence of actual similarity/dissimilarity on attraction. A one-way ANOVA was computed to test the difference in pre-conversation attraction between those participants in the pseudo-similar condition (those moderate
in attitude similarity who were told they were similar, n = 18) and those in the pseudo-dissimilar condition (those moderate in attitude similarity who were told they were dissimilar, n = 20) yielded significant results, F(1,36) = 69.14, p < .001. The same procedure performed on pseudo-similar and pseudo-dissimilar dyads' post-conversation attraction ratings was not significant, F(1,36) = 1.09, p > .05. These means are presented in Table 3.

Table 3

<table>
<thead>
<tr>
<th>Condition</th>
<th>Pre-conversation</th>
<th>Post-conversation</th>
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</thead>
<tbody>
<tr>
<td>actually similar</td>
<td>22.41 (1.95)</td>
<td>25.15 (1.96)</td>
</tr>
<tr>
<td>pseudo-similar</td>
<td>23.33 (2.00)</td>
<td>25.28 (1.93)</td>
</tr>
<tr>
<td>pseudo-dissimilar</td>
<td>17.95 (1.99)</td>
<td>24.35 (3.28)</td>
</tr>
<tr>
<td>actually dissimilar</td>
<td>19.64 (3.13)</td>
<td>22.55 (3.91)</td>
</tr>
</tbody>
</table>

The preceding analyses examined the relation between what participants were told regarding the degree to which their attitudes were similar and reported interpersonal attraction toward one another. Prior to meeting their partner, participants' attraction judgments were markedly affected by what participants were told. Those who were told they were similar to their unacquainted partner reported liking one another more than those who were told they were dissimilar. This finding lends little needed support to the findings of Byrne using his bogus stranger technique.
Post-interaction attraction was not affected by what participants in the pseudo conditions were told regarding the degree to which their attitudes were similar to those of their partner. Participation in a 40-minute interaction moderated the effect of purported attitude similarity on participants' responses on Byrne's Interpersonal Judgment Scale (IJS). Prediction of post-conversation interpersonal attraction must therefore be based upon variables present during the course of interaction.

**Actual Similarity.** Of concern in the present investigation into the similarity/attraction relation was the effect that actual similarities and dissimilarities between participants' attitudes had on their attraction toward one another. Cappella and Palmer (1990) observed that interactants who were similar in attitude reported greater interpersonal attraction toward one another than participants who were dissimilar in attitude. They treated attitude similarity as a categorical variable; dyads were either similar or not similar. Their findings regarding the effect of actual attitude similarity (high, low) on post-interaction attraction were significant, $F(1,76) = 14.24$, $p < .001$.

Treating attitude similarity in the present experiment as a categorical variable, similar and dissimilar dyads' pre- and post-conversation liking scores were compared using a one-way analysis of variance (ANOVA). As was expected, there was a significant difference in pre-conversation attraction between dyads who were similar and dyads who were dissimilar, $F(1,47) = 14.41$, $p < .01$. A significant relation remained between attitude similarity and interpersonal attraction when assessed after the interaction, $F(1,47) = 9.17$, $p < .01$. Dyads who were actually similar reported
greater post-conversation attraction toward one another than dyads who were attitudinally dissimilar. The means and standard deviations are presented in Table 3.

Sunnafrank (1983, 1984; and Miller, 1981) observed that for similar and dissimilar dyads who were asked to interact for only 5 minutes, the similarity/attraction relation was negated. However, their assessment of participants' attitudes was weak. Their assessment of attitude similarity was based only on two topics: nuclear power and preparedness for war. Cappella and Palmer (1990) placed participants into either attitudinally similar or dissimilar pairings based on their responses to a derivation of Byrne's Interpersonal Judgment Scale. Pairs were asked to interact for 30-minutes before their interpersonal attraction toward one another was assessed. In contrast to Sunnafrank's findings, Cappella and Palmer observed that participants who were similar in expressed attitude reported greater interpersonal attraction toward one another than participants who were dissimilar in attitude. The present experiment replicated the findings of Cappella and Palmer using a similar attitude questionnaire but requiring participants to interact for a longer duration (40 minutes).

**Change in Attraction.** Participants were told that they would be meeting another person and that this person was either similar or dissimilar to themselves. They then were asked to rate their "personal feelings" and "desire to work with" toward this stranger. At this point, participants, appearing confused, often commented on their inability to make such assessments given such limited information. The pat response to any concerns or questions raised at this time was, "Give it your best guess, given that you know that you and she are similar/dissimilar in attitude."
Pre-conversation attraction was affected by the general attitude information provided by the experimenter. But, given the ambiguity of the experimental situation, the meaningfulness of the effect of this independent variable relative to the collective influence of the myriad extraneous variables is questionable. Variance in responding to Byrne’s (1961) Interpersonal Judgment Scale (IJS) is associated with a population of antecedent conditions. What participants were told regarding their attitude similarity to their expected partner was one factor among many in this population, albeit of slight influence ($\eta^2 = .03$). Other factors affecting attraction toward a stranger included participants’ personality characteristics, their mood, time of day, the weather, season, etc. Individual beliefs and/or recent interpersonal experiences relating to similarity and attraction—either that “opposites attract” or “birds of a feather flock together” were surely influential as well.

Rosenbaum (1986) demonstrated that the attitude similarity/attraction relation in the bogus-stranger paradigm results not from an attraction to similarity but from a repulsion from dissimilarity. His experiment employed three conditions: participants were told of a similar stranger, a dissimilar stranger, or a stranger about whom no information was given. Participants were more attracted to the similar stranger than to the dissimilar stranger, but regarded the similar stranger and the neutral stranger equally. This evidence for the “repulsion hypothesis” makes the rating of strangers an even more dubious affair.

Pre-conversation judgments of interpersonal attraction are surely sensitive to demand characteristics. Byrne (1971) defended against this criticism by noting that the
similarity-attraction relation was originally observed in real-life situations.

"Presumably, the various friendships and marriages between attitudinally similar individuals did not develop in order to satisfy the demands of researchers who might happen along" (p. 61). It is important to note, however, that these real-world relationships are based on more information than that provided to participants in the present experiment.

As these stranger judgments were based on so little information, little meaning may be placed on participants' "feelings toward" and "desire to work with" unknown others. They may, however be useful as a baseline measure of responding on Byrne's IJS from which to adjust ratings of post-conversation attraction. In the present experiment, participants' pre- and post-conversation liking scores were moderately correlated with one another, \( r = .50, p < .001 \). It is the 75% of the variance in post-conversation attraction that was not associated with pre-conversation attraction that is of primary interest. What it is that leads a participant to change her attraction judgment over the course of meeting and interacting with her partner should be the specific focus of research involving interpersonal attraction as a dependent variable. Using the amount of change in reports of liking from pre- to post-conversation may serve as a means to control for some unexplained variability in pre-conversation assessments of interpersonal attraction.

In the present experiment, each dyad received an attitude similarity score and was placed into one of four conditions based on this score (see Table 1). The most similar dyads were told they were similar and the most dissimilar were told they were
dissimilar. Of those dyads intermediate with regard to attitude similarity, roughly half were told they were similar and half were told they were dissimilar. The experiment can be treated as a 2 x 2 design—dyads were told either correctly or incorrectly that they were similar or dissimilar in attitude. Therefore, in assessing the amount of variability in post-conversation attraction accounted for by attitude similarity alone, the variance accounted for by what participants were told and whether this information was valid or invalid must first be removed.

A hierarchical regression analysis was performed to determine if attitude similarity (ATTSIM) predicted post-conversation attraction (POSTLQC) after partialing out variability accounted for by what participants were told (TOLDSIM) and whether this information was valid or invalid (VALID). After step 1, with variance in post-conversation liking accounted for by whether participants were told they were similar or dissimilar to their partners removed, attitude similarity was not a significant predictor of post-conversation attraction, \( R^2 = .12, t_{\text{inc}} (81) = -1.22, p > .05 \). Treated as a continuous variable, actual attitude similarity did not significantly predict post-conversation interpersonal attraction.

A second hierarchical regression analysis was performed entering not only TOLDSIM and VALID but participants’ pre-conversation judgments of interpersonal attraction (PRELIKE) into the model. After removing the variance in POSTLQC explained by PRELIKE, TOLDSIM, and VALID, attitude similarity became a significant predictor of post-conversation attraction, \( R^2 = .33, t_{\text{inc}} (80) = -2.50, p < .05 \). Table 4 presents the correlations among the variables, the unstandardized
regression coefficients ($B$) and intercept, the standardized regression coefficients ($B$),
the semipartial correlations ($sr^2$) and $R$, $R^2$ and adjusted $R^2$ after entry of all three
independent variables. After step 3, with all independent variables in the equation, $R = .58$, $F(4,80) = 10.03$, $p < .001$.

Table 4

Hierarchical Regression of Actual Attitude Similarity Scores on Post-Conversation Attraction

<table>
<thead>
<tr>
<th>Variables</th>
<th>POSTLIK (DV)</th>
<th>PRELIKE</th>
<th>TOLSIM</th>
<th>VALID</th>
<th>ATTSIM</th>
<th>$B$</th>
<th>$B$ (incremental)</th>
<th>$sr^2$</th>
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<tbody>
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<td></td>
<td></td>
<td>.606</td>
<td>.614</td>
<td>.19*</td>
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<td></td>
<td></td>
<td>1.896</td>
<td>.314</td>
<td>.03</td>
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<tr>
<td>VALID</td>
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<td>-.10</td>
<td>.10</td>
<td></td>
<td></td>
<td>1.009</td>
<td>.166</td>
<td>.03</td>
</tr>
<tr>
<td>ATTSIM</td>
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<td>-.01</td>
<td></td>
<td>-.092</td>
<td>-.328</td>
<td>.05*</td>
</tr>
</tbody>
</table>

intercept = 10.488

Means 24.26 20.79 1.48 1.44 33.72
SD 3.03 3.07 .50 .50 10.88

$R^2 = .33$
Adjusted $R^2 = .30$
$R = .58$

* $p < .05$

In the present experiment, interpersonal attraction was more strongly related to actual attitude similarity when attraction was represented by the amount of change in reported liking from pre- to post- conversation assessments than when it was
represented by post-conversation judgments alone. Removing the variance in post-conversation attraction ratings that was associated with pre-conversation attraction served to remove unexplained variance in post-conversation attraction ratings. The degree of liking indicated by participants prior to meeting and interacting with a stranger may serve as an effective baseline measure of interpersonal attraction assessed after interaction. Future research should benefit from a less noisy measure of post-conversation interpersonal attraction.

In experiments such as those conducted by Sunnafrank (1983, 1984), Sunnafrank and Miller (1981), and Cappella and Palmer (1990), participants entered into the interaction with varying degrees of expectation regarding how much they believed they would like their partner. Over the course of the interaction, participants’ expectations were either confirmed or disconfirmed. By representing interpersonal attraction as the amount of change (see Cohen & Cohen, 1983) occurring over the course of an interaction instead of using post-interaction reports alone, the prediction of interpersonal attraction may be enhanced.

An analysis of covariance (ANCOVA) was performed to test the significance of the interaction between what participants were told (similar/dissimilar) and whether this information was valid or invalid on the dependent variable, post-conversation attraction. Pre-conversation attraction was entered as the covariate. This interaction was significant, F(1,80) = 9.55, p < .01. Table 5 shows the adjusted mean post-conversation attraction ratings for each condition.
Dyads in each condition reported greater attraction for their partner after interacting than before. This positive effect of participation in a 40-minute conversation on interpersonal attraction was reflected in the positive change scores shown in Table 6. The average change score for those who were actually similar and were told they were similar was roughly the same as the average change reported by those who were actually dissimilar and were told they were dissimilar. Those who were neither similar nor dissimilar to one another, but were told they were dissimilar (pseudo-dissimilar), reported the greatest positive change in attraction. Those in the pseudo-similar condition exhibited the least change in attraction over the course of the 40-minute conversation.

On average, for all dyads, interpersonal attraction increased from pre- to post-conversation reports. The greatest increase was observed for those in the pseudo-similar group, those who believed they would be conversing with a dissimilar other but
actually conversed with someone of intermediate similarity. Over the course of the conversation, invalid information regarding attitude similarity was disconfirmed.

Table 6
Mean Change in Attraction from Pre-to Post-conversation

<table>
<thead>
<tr>
<th></th>
<th>Valid</th>
<th>Invalid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Told Similar</td>
<td>2.41</td>
<td>1.82</td>
</tr>
<tr>
<td>Told Dissimilar</td>
<td>2.95</td>
<td>6.40</td>
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</tbody>
</table>

In none of the past research focusing specifically on the effect of interaction on the attitude similarity/interpersonal attraction relation has there been a comparison between reports of liking made prior to and following an interaction. Using pre-conversation attraction to control for unexplained variability in post-conversation attraction, a larger proportion of variance in post-conversation attraction may be accounted for by attitude similarity. It may be that the relation between a dyad’s actual attitude similarity and interpersonal attraction is stronger than previously thought.

Coordination of Vocal Activity

Time series data from the coded vocal activity of each interactant were analyzed using a spectral analysis—a modified Fourier analysis. Fourier analysis represents the cyclic periodicities in a time series as a sum of sine and cosine waves.
The difference between Fourier and spectral analyses is that the former assumes a deterministic process in which future events can be precisely predicted given knowledge of past events. The latter assumes a stochastic process in which future events are only partially predicted by past events. Spectral analyses were conducted to identify cycles in each participant's vocal activity. Specifically, a periodogram analysis partitioned the variance in the amount of vocal activity over time into that amount accounted for by various cycle lengths. The process operates much like a best-fitting regression line but with a line that is sinusoidal.

Using the same techniques as Warner (1992), vocal activity for each speaker was aggregated into 10-second time intervals. The 40-minute conversations were, as a result, broken down into 240 observations for each participant. The cycle lengths of the sinusoidal regression lines used to fit the data was a function of the number of observations. The N/2 or 120 periodic components included in the periodogram (Box & Jenkins, 1970) ranged in length as determined by 10(240/i) where i = 1,2,3,4,...,120. That is, the variance in each speaker's vocal activity over the course of the 40-minute conversation was fitted to a series of sinusoidal regression lines with cycle lengths (in seconds) of 1200, 800, 600...20. If vocal activity were randomly distributed across the 40 minute time series—if there was no cyclic variation in amount of talk, each periodic component would account for .83% (1/120) of the overall variance. However, if a person's vocal activity exhibited cyclic periodicities, then a greater degree of variance was accounted for by one or more of the periodic components.
There are often two or three significant periodic components to a person’s vocal activity (Warner, 1992). In the present experiment, significance levels were determined according to a set of significance tables prepared by Russell (1985). The primary periodic component in an interactant’s on-off vocal activity was considered significant at the .05 level if it accounted for more than 7% of the variance in on-off vocal activity. A secondary component was considered significant if it accounted for 5% of the variance in vocal activity. And a tertiary component was significant if it was associated with 3% of the variance.

Mutual entrainment of vocal activity required that a large proportion of the variability in the vocal activity of two interactants was explained by the same periodic components. That is, cycles in each interactant’s vocalization behavior must have shared the same period. However, evidence of shared cycles alone is not a sufficient indicator of entrainment. The periodogram analysis gives no information about the phase relation of participants’ vocal activity rhythms. For instance, it may be two people whose vocal activity can both be represented by a sinusoidal wave form with a three-minute length are cycling 180 degrees off-phase from each other or it could be that they are cycling perfectly in phase. In order to make any conclusions regarding the entrainment of rhythms it must not only be known that two cycles are of the same length but that they are related in phase as well. As previously discussed, in the case of vocal activity, entrainment requires two rhythms that are 180 degrees off-phase—one person’s talkative phase coinciding with another’s non-talkative phase. This determination cannot be made from the periodogram analysis alone.
In order to address the entrainment of vocal activity rhythms, it must be shown not only that participants were cycling at the same rate but also that their talkative phases were alternating. A conversation in which people's talkative phases were occurring coincidentally would be fraught with a large proportion of simultaneous speech. The same conversation would also exhibit periods of frequent silences while both interactants concurrently experienced their non-talkative phases. The contingency between the vocal activity of two interactants was expressed as a correlation coefficient. By observing the presence or absence of talk for two speakers during a given interval of time (in this case every 1/4 second), four different event states occurred. Either both were talking, both were silent, one was talking while the other was silent or vice-versa. By recording the frequencies for each of these event states in a 2 x 2 matrix, a phi coefficient was calculated. With cell a representing the frequency of simultaneous speech; b, the frequency of mutual silence; c, the frequency of one person talking while the other is silent; and d, the frequency of the other talking while the first is silent then:

\[
\phi = \frac{bc - ad}{\sqrt{(a+c)(b+d)(a+b)(c+d)}}
\]

Possible phi coefficients range from -1.0 to +1.0. A conversation receiving a score of -1.0 indicated a situation where every time one person was speaking, the other was silent, and vice-versa. There could be no time when both were speaking and no time when both were silent—a highly improbable outcome. The degree to which two people's vocal
activity rhythms were out of phase with one another was represented by the phi coefficient computed for their conversation. It was reasoned that a conversation in which both speakers were experiencing their talkative phases at the same time would be less precise (involving a greater proportion of simultaneous speech and mutual silence, thus receiving a less negative phi) than a conversation in which the phase of speakers' rhythms had mutually entrained (receiving a more negative phi). The phi coefficient is sensitive to turn-taking precision and was thus employed as a measure of the phase relation between speaker's vocal activity rhythms. Vocal activity cycles were considered off-phase (participants' bouts of relative talkativeness were alternating with one another) if conversations received a phi more negative than the overall mean value (-37.67).

On-off vocal activity entrainment was defined as a situation in which interactants exhibited cycles of similar length and in which these cycles were off-phase with one another. Conversations fell into one of three categories: significantly coordinated (n = 24), in which the primary (Table 7a) or secondary (Table 7c) cyclic components in participants' vocal activities were the same or within one in the series of computed lengths (Table 7b) and the computed phi of their combined vocal activity was more negative than the overall mean phi of -37.67; slightly coordinated (n = 37), in which interactants shared near significant periodic components (Table 8a) or shared significant cyclic components but had phi coefficients less negative than the mean; and uncoordinated (n = 26), in which neither significant or near significant periodic components in participants' vocal activities shared the same or similar frequency (Table 8b).
Table 7

Proportion of Variability in Vocal Activity for Interacting Speakers Accounted for by Sinusoidal Curves of Different Period Lengths (DYADS 30, 66, and 52)

<table>
<thead>
<tr>
<th>Period Length</th>
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<th>Person B</th>
<th>Person A</th>
<th>Person B</th>
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</table>

*** indicates significance of major component at alpha = .05
** significant as a secondary component (alpha = .05)
* significant as a tertiary component (alpha = .05)
Table 8

Proportion of Variability in Vocal Activity for Interacting Speakers
Accounted for by Sinusoidal Curves of Different Period Lengths
(DYADS 41 and 10)

<table>
<thead>
<tr>
<th>Period Length</th>
<th>Person A</th>
<th>Person B</th>
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<td>.00</td>
<td>.01</td>
<td>.00</td>
<td>.01</td>
</tr>
<tr>
<td>240.0</td>
<td>.00</td>
<td>.01</td>
<td>.06**</td>
<td>.00</td>
</tr>
<tr>
<td>218.2</td>
<td>.06*</td>
<td>.06</td>
<td>.00</td>
<td>.01</td>
</tr>
<tr>
<td>200.0</td>
<td>.02</td>
<td>.02</td>
<td>.00</td>
<td>.01</td>
</tr>
<tr>
<td>184.6</td>
<td>.08**</td>
<td>.05</td>
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<td>.01</td>
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<td>171.4</td>
<td>.00</td>
<td>.00</td>
<td>.03</td>
<td>.02</td>
</tr>
<tr>
<td>160.0</td>
<td>.00</td>
<td>.00</td>
<td>.07***</td>
<td>.01</td>
</tr>
<tr>
<td>150.0</td>
<td>.02</td>
<td>.00</td>
<td>.04</td>
<td>.01</td>
</tr>
<tr>
<td>141.2</td>
<td>.04</td>
<td>.02</td>
<td>.02</td>
<td>.01</td>
</tr>
<tr>
<td>133.3</td>
<td>.09***</td>
<td>.06</td>
<td>.04</td>
<td>.02</td>
</tr>
<tr>
<td>126.3</td>
<td>.01</td>
<td>.00</td>
<td>.02</td>
<td>.00</td>
</tr>
<tr>
<td>120.0</td>
<td>.01</td>
<td>.00</td>
<td>.02</td>
<td>.00</td>
</tr>
<tr>
<td>114.3</td>
<td>.03</td>
<td>.05</td>
<td>.04</td>
<td>.02</td>
</tr>
</tbody>
</table>

*** indicates significance of major component at alpha = .05
**  significant as a secondary component (alpha = .05)
*  significant as a tertiary component (alpha = .05)

Coordination/Post-conversation Attraction. A one-way analysis of variance (ANOVA) was conducted to test the hypothesis that the coordination of on-off vocal activity rhythms (high, moderate, none) affects interpersonal attraction (post-
conversation liking). The results were not significant, $F(2, 83) = .68$, $p > .05$. Dyads who entrained to one another’s on-off vocal activity rhythms reported no greater attraction toward one another than dyads who failed to entrain to one another’s vocal activity rhythms. An analysis of covariance (ANCOVA) was computed between the coordination of vocal activity and change in attraction, with pre-conversation attraction entered as the covariate. Controlling for pre-conversation attraction, the effect of coordination on post-conversation attraction was non-significant, $F(2, 85) = 1.48$, $p > .05$. It appears that interpersonal attraction, represented either as the change in liking as post-conversation liking or alone from pre- to post-conversation was not affected by the degree to which rhythms in interactants’ vocal activities mutually entrain to one another.

A one-way analysis of variance (ANOVA) was performed to determine if a relation existed between the coordination of vocal activity rhythms and dyads’ combined judgments of the quality of the interaction. The results were not significant, $F(2, 83) = .17$, $p > .05$. Vocal activity entrainment does not appear to be linearly related to judgments of attraction or quality.

It has been discussed in past research (Gottman, 1979; Warner, 1992) that for some types of dyads, a high degree of coordination or predictability may be associated with negative affect. It may then be that dyads who exhibited a high degree of coordination rated the conversation as being lower in quality than those who exhibited lesser degrees of coordination. The quadratic trend in quality ratings across levels of coordination (none, slight, significant) was not significant, $F(1, 83) = .001$, $p > .05$. 

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Whether or not participants’ adjusted to cycles in one another’s vocal activity did not appear to influence their judgments of conversation quality.

**Purported Similarity/Coordination.** It was expected that interactants who believed they were conversing with a partner who was attitudinally similar would be more likely to adjust the phase and frequency of their speech cycles to complement their partner than interactants who believed their partner was attitudinally dissimilar. Specifically, it was expected that dyads who were told they were similar would be more likely to exhibit entrainment of on-off vocal activity rhythms than those told they were dissimilar. A two-way chi-square was used to test the relation between coordination (high, moderate, none) and purported attitude similarity (told similar/told dissimilar). The relation was not significant, \( \chi^2 (2) = 1.09, p > .05 \). Again, roughly half of the dyads in the similar condition were actually similar in attitude and roughly half of the dyads who in the dissimilar condition were actually dissimilar. To better test the relation between purported attitude similarity and coordination, a second chi-square was performed involving only those in the pseudo-similar condition (those moderate in attitude similarity who were told they were similar) and those in the pseudo-dissimilar condition (those moderate in attitude similarity who were told they were dissimilar). This relation was also nonsignificant, \( \chi^2 (2) = 2.38, p > .05 \).

It was previously suggested that the entrainment of speech rhythms could be examined in accommodation theory terms as adjustments made in communicative behavior toward some end—in this case increased liking. Giles et al. (1991) has
acknowledged the reliance of accommodation theory on the similarity/attraction paradigm. While the similarity/attraction paradigm insists that people who are similar in attitude will attract one another, accommodation theory asserts that those attracted to one another will act to maintain their relation. That is, inclinations to increase and decrease social integration or identification with another should result in convergent and divergent shifts in behavior, respectively. Given this, the entrainment of vocal activity rhythms was expected to strengthen the social bond between speakers, to increase interpersonal attraction and overall perceptions of conversation quality. It had no such effect. Attitude similarity (either purported or actual) did not lead to the entrainment of participants’ vocal activity rhythms.

Had it been observed that similar dyads displayed greater coordination of speech rhythm than dissimilar dyads, two explanations were plausible: 1) that people who believed to be similar to one another were more likely to converge to one another with regard to their vocal activity rhythms or 2) that people who were actually similar to one another in attitude shared other similarities as well, including a similarity in the rate of their vocal activity cycles. As coordination was predicted by neither actual nor purported attitude similarity, both hypotheses are moot given the present findings.

Our biology represents a population of oscillators (Chapple, 1970). Cyclic periodicities have been observed in behavior ranging from biochemical processes (cellular respiration, neurotransmission) to overt activity (hibernation). Often these oscillations are influenced by exogenous time cues. Through the process of entrainment, the phase and/or frequency of an oscillation can be affected by the
occurrence of environmental events. Of interest to the present investigator are the cyclic components of social behavior and the entrainment of social rhythms to external time cues that are social in nature.

While people have been observed to act as external time cues for one another's cyclic behavior, instances are sparse. An example of this the entrainment of our wake/sleep cycles to social activity. In the same manner that rhythms in wake/sleep activity entrain to social cues, rhythms in people's social behavior should demonstrate a sensitivity to external time cues that are social in nature.

The present research was intended not only to extend the population of observed instances of behavioral entrainment to social time cues but to begin to map out the determinants of this entrainment as well. Vocal activity rhythms were expected to synchronize to the on-off vocal activity of a conversation partner. Marginal to significant entrainment was, in fact, observed in over a third of the recorded conversations. This observation was not novel, however. The entrainment of vocal activity rhythms has been observed by others (Warner, 1979, 1992; Warner, Waggener, & Kronauer, 1983). The present experiment set out to identify factors that predict the entrainment of vocal activity rhythms. None of the variables assessed in the present experiment were associated with the coordination of vocal activity rhythms.

Judgment of Social Contingency

In the present experiment, the coordination of social interaction was defined as the mutual entrainment of speakers' vocal activity rhythms. As is obvious by this point,
objective determinations regarding conversation coordination involved an extended series of calculations. There is a body of research that focuses on the sensitivity of people's judgments of coordination to actual coordination. Cappella (1997) observed a relation between judged coordination and actual coordination in video-taped, one-minute interactions. His participants watched videotaped interactions and agreed or disagreed to such statements as "the partners had similar tempos of activity." Their judgments were sensitive to "synchrony" in smiling and "complimentary patterns" of nonverbal behavior associated with expressiveness (gazing and gesturing). McGarva and Benassi (1997) showed that judgments of turn-taking precision increased as a function of the actual contingency between speakers' vocalizations. They also observed judgments of conversation quality to increase with objective contingency.

To assess the sensitivity of participants' judgments of turn-taking precision to the objective contingencies between their on-off vocal activity, a Pearson correlation coefficient was computed between objective contingency (represented by phi coefficient) and dyads' combined contingency judgments. The relation was not significant, $r = .05, p > .05$. A second Pearson correlation coefficient was computed between phi coefficient and participants' combined judgments of conversation quality. This relation was also not significant, $r = .03, p > .05$. Judgments of turn-taking precision and conversation quality were not sensitive to the objective relation between participants' on-off vocal activity.

These findings are inconsistent with those of McGarva and Benassi (1997) who showed that both judgments of turn-taking and conversation quality increased as a
function of increasing precision in turn-taking. In their experiment, participants were instructed to listen to two minute slices of a conversation and make judgments regarding the degree to which interactants took turns speaking as well as the overall conversation quality. There are several possible explanations for this inconsistency. Participants in the present experiment made judgments regarding their own interaction, rather than as a 3rd party listening in. It is possible that judges, as interactants, were unable to attend to the contingency between their vocal alternations.

A second explanation is that conversations to be judged in the present experiment were 40-minutes long, considerably longer than the two-minute slices presented to judges in the experiment conducted by McGarva and Benassi (1997). It may be that participants were unable to process such a long series of alternating vocalizations. Future research could be directed at determining which of these factors is responsible for the insensitivity of judgments to contingencies between social events as they are presented in the present investigation.

**Approval motivation**

**Similarity/Attraction.** The approval-cue hypothesis was demonstrated by Bloom (1968) who provided participants scoring high or low on the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1964) with attitude information regarding a stranger. Bloom assigned participants were assigned to one of two conditions: one in which a later interaction was expected and a second in which a later interaction was not expected. All were told of a stranger who was similar in attitude
to themselves. Participants in the no-meet condition who expressed a low need-for-
approval reported significantly lower attraction toward the stranger than participants
in the other conditions. No such effect was observed for those who expected to meet
the similar stranger. It was suggested that people high in approval motivation may
have been inhibiting negative attraction responses.

From this finding it is not known whether need for approval as assessed by the
Marlowe-Crowne Scale merely represents a response bias or a more pervasive
characteristic of social behavior. Were participants who were high in need for approval
merely inhibiting negative responses or were they more sensitive to the attitude
information?

Participants in the present experiment completed the Marlowe-Crowne Social
Desirability Scale (MCSD). A social desirability score was computed for each dyad by
summing each participant’s score. The larger the score, the higher the level of
approval motivation. As was done in previous research on approval motivation
(Bloom, 1968; Brannigan, Schaller, & McGarva, 1993) only high (32 and above) and
low (26 and below) scores were used. For the present analyses those dyads receiving
intermediate scores on the social desirability scale were not used.

In the present experiment, all participants expected to meet and interact with a
similar or dissimilar stranger. In order to test the possibility that social desirability
represents a response bias, dyads high in need for approval and those low in need for
approval were compared with regard to their pre-conversation ratings of attraction.
An analysis of covariance (ANCOVA) was computed between the approval
motivation (low, high) and pre-conversation attraction, with what participants were told (similar/dissimilar) entered as the covariate. Controlling for what participants are told, the effect of approval motivation on pre-conversation attraction approached significance, $F(1,54) = 3.14, p > .08$. Those high in need of approval did not report liking their unseen partner significantly more than those low in approval motivation but the effect was in the expected direction. The means and standard deviations are provided in Table 9. It appears that approval motivation may introduce a slight bias in participants' responses to the questions assessing interpersonal attraction prior to meeting their partner.

Table 9

Obtained and Adjusted Mean Pre-conversation Interpersonal Attraction Ratings for Dyads High and Low in Need for Approval (With Standard Deviations)

<table>
<thead>
<tr>
<th>Pre-conversation Interpersonal Attraction</th>
<th>Obtained</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low in Need For Approval</td>
<td>20.48 (3.32)</td>
<td>20.42</td>
</tr>
<tr>
<td>High in Need For Approval</td>
<td>21.38 (2.72)</td>
<td>21.44</td>
</tr>
</tbody>
</table>
Interpersonal attraction. A 2 x 2 ANOVA was used to test the effect of a dyads' combined score on the MCSD (low, high) and purported similarity (similar or dissimilar) on the change in their ratings of interpersonal attraction from pre- to post-conversation. Reported change in attraction did not vary as a function of dyads' need for approval, $F(1,56) = 1.52, p > .05$. The means are presented in Table 10. Based on these findings, the need for approval of interacting dyads did not appear to be associated with their post-conversation judgments of attraction toward one another.

Table 10
Mean Change in Interpersonal Attraction Ratings (from Pre- to Post-conversation) for Dyads High and Low in Need for Approval Told they were Similar or Dissimilar in Attitude

<table>
<thead>
<tr>
<th>Dyad Type</th>
<th>Told Similar</th>
<th>Told Dissimilar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low in Need for Approval</td>
<td>1.93 (n=14)</td>
<td>6.09 (n=11)</td>
</tr>
<tr>
<td>High in Need for Approval</td>
<td>2.18 (n=17)</td>
<td>4.00 (n=15)</td>
</tr>
</tbody>
</table>

A possible interpretation of the approval-cue hypothesis is that people who are high in need-for-approval may be more sensitive to the actual degree of attitude similarity between themselves and others than those who are low in need-for-approval. To test the hypothesis that dyads high in need-for-approval are more sensitive to
attitude similarity, four Pearson r correlation coefficients were computed between attitude similarity scores and change in interpersonal attraction from pre- to post-conversation. For dyads low in need-for-approval who were told they were similar to one another (n = 14), r = -.34, p > .05. For dyads low in need-for-approval who were told they were dissimilar (n = 11), r = -.69, p < .05. For dyads high in need-for-approval who were told they were similar (n = 17), r = -.65, p < .05. For dyads high in need-for-approval who were told they were dissimilar (n = 15), -.29, p > .05.

Based on these correlations, it does not appear that need-for-approval increased the sensitivity of interpersonal attraction to attitude similarity. The findings of the present experiment failed to support the approval-cue hypothesis. Overall, approval motivation seemed to have no effect on interpersonal attraction either as a response bias in participants' reports or as an increased sensitivity to attitude similarity.

Self-Monitoring

The psychological construct of self-monitoring has been discussed in terms of a means for explaining variability in the degree to which people are responsive to both social and interpersonal cues indicating what behavior is appropriate (Snyder, 1987). High self-monitors are more likely to adapt their social behavior to fit the situation they are in and act according to external cues while low self-monitors are more likely to maintain a consistent way of behaving, independent of the demands imposed by the situation, and act in social situations according to internal cues.
In the present experiment, high self-monitors were expected to be more likely to adjust their behavior to the behavior exhibited by their partner. In effect, dyads scoring high on Snyder's Self-Monitoring Scale (SMS) were expected to display a greater convergence toward one another than dyads who scored lower on the SMS. As a result of increased convergence it was expected that high self-monitors would report greater liking for their partners than low self-monitors.

To test the convergence hypothesis a discriminant function analysis was performed using participants' combined SMS score to predict coordination categorization (none, slight, significant). SMS scores did not significantly predict coordination, $F(2,66) = 1.03, p > .05$. The means are presented in Table 11. High self-monitors were no more likely to coordinate to one another's vocal activity rhythms than low self-monitors.

### Table 11

**Mean Self-Monitoring Score (With Standard Deviations) for Coordinated and Uncoordinated Dyads**

<table>
<thead>
<tr>
<th>Coordination</th>
<th>None</th>
<th>Slight</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Combined Score on Self-Monitoring Scale</td>
<td>12.82 (2.55)</td>
<td>12.02 (3.14)</td>
<td>11.50 (2.44)</td>
</tr>
</tbody>
</table>

Despite expectations, self-monitoring was unrelated to the tendency of interacting dyads to coordinate their vocal activity rhythms. It may be that the process
of entrainment of vocal activity cycles is too subtle for the more "active" process of self-monitoring. People do not seem aware of their vocal activity rhythms; therefore, those attempting to adapt their outward appearance to fit a given situation should not be able to adjust their rhythms on command.
Conclusions, Implications, and Future Directions

Attraction Ratings. Those who were similar in attitude reported greater attraction toward one another than those who were dissimilar. However, there is much variability in post-conversation attraction that has not been accounted for in the present experiment by attitude similarity, purported similarity, coordination, and approval motivation. Much of what affected attraction occurred during interaction. The present research focused on various non-content aspects of the recorded conversations (turn-taking, entrainment of vocal activity rhythms). Interpersonal attraction must surely be influenced by what has been said while conversing.

A content analysis might show a relation between change in attraction and the way in which attitudinal differences were addressed. When differences arose were they downplayed or was common ground sought? It may be that attraction ratings differed between participants who avoided discussion of attitudes and those who discussed attitudes freely. There may be much below the surface of general attitude similarity occurring during the dynamics of verbal communication that influences interpersonal attraction.

Coordination. Individual differences in how long it takes to go from periods of relative talkativeness to periods of non-talkativeness and back may play some part in what determines how compatible two people are. It may be that the cycle length of a person’s vocal activity is inflexible. That is, each person has a preferred rate of cycling...
and behaves at that fixed rate. It may also be that the length of a person's vocal activity cycle is flexible and can adapt to different cycle lengths of different partners. Furthermore, there may be individual differences with regard to how flexible a person's speech is. Some may tend to stick fairly close to some preferred rate while others are able to cycle once every three minutes as easily as cycling once every five or six minutes. This issue of flexibility of vocal activity cycles remains to be seen...but is beyond the scope of the present experiment. For the purposes of the present research it was assumed that there are individual difference in cycle length and that there is some degree of flexibility in the length and phase of people's cycles. It may be that the degree to which a person exercises this flexibility and coordinates her vocal activity rhythms to those exhibited by a partner is a function of need for approval and self-monitoring with the end result being interpersonal attraction.

Judgment of Social Contingency. Future research will focus on the insensitivity of participants' judgments of turn-taking to the actual degree of contingency occurring during 40-minute conversations. Judgments have been shown to be sensitive to such social contingencies as turn-taking during dyadic interaction under different conditions (McGarva & Benassi, 1997).

The cause for this difference in findings cannot be determined from the research on the judgment of social contingency to date. Future participants must be asked to judge social contingencies (turn-taking) as participants of shorter conversations (2-minute slices). Others must be asked, as a third party, to judge the turn-taking precision occurring in the 40-minute conversations recorded for this project.
**Self-Monitoring.** The present research failed to extend the relation between personality characteristics and convergence of paralinguistic speech behavior to include speech rhythms. There was no attempt to pair participants based on either their need for approval or score on the self-monitoring scale. It may be that a relation between coordination and personality would have been observed if those very high or very low in either characteristic were paired together. Future research may follow this direction.

**Major Contributions.** The present research demonstrated that interpersonal attraction was more precisely predicted by actual attitude similarity when attraction was measured by the amount of change in attraction occurring over the course of face-to-face interactions than when attraction was measured by attraction ratings made following interactions. Apparently, participants bring to the experimental situation certain expectancies regarding their attraction toward unknown others. Such individual differences in interpersonal attraction, as they are affected by factors unrelated to experimental variables, act to cloud the relation between interpersonal attraction and the independent variables in question. Using pre-conversation attraction to control for unexplained variability in post-conversation attraction, a larger proportion of variance in post-conversation attraction may be accounted for by experimental variables.

In none of the past research addressing the relation between interaction variables and interpersonal attraction has there been a comparison between pre- and
post-conversation attraction. For instance, in research performed by Sunnafrank (1983, 1984), Sunnafrank and Miller (1981), and Cappella and Palmer (1990), participants reported attraction only after interacting with one another.

The degree of liking indicated by participants prior to meeting and interacting with a stranger serves as an effective baseline measure of interpersonal attraction assessed after interaction. Controlling for what participants were told prior to interacting regarding their attitude similarity, the prediction of interpersonal attraction was enhanced in the present investigation. Partitioning variance out of post-conversation attraction ratings by using baseline ratings should serve future research as a useful methodological tool. In the present research, baseline attraction ratings were based only on what participants were told regarding an unseen and unknown person. Baseline ratings can be used to statistically control for potential extraneous variables, such as interactants’ physical appearance, manner of dress, and so forth.

Dyads in each condition increased their reported liking for their partners over the course of interacting. The greatest increase was exhibited for those who were incorrectly told, prior to interacting, that they were dissimilar in attitude. Those falsely believing to be dissimilar were able to disconfirm this expectation during the course of their conversation. It appears that during introductory conversations, participants were sensitive to the degree to which their attitudes resembled those held by their previously unknown partner.

The present findings lend support to the growing body of evidence suggesting a positive relation between attitude similarity and interpersonal attraction. It was
demonstrated that people who were similar to a conversation partner in attitude were more likely to be attracted to one another than those who were dissimilar in attitude. This research adds to past investigations into the similarity/attraction relation in that the relation was maintained after 40-minute, undirected, introductory conversations. Past research demonstrated the similarity/attraction relation using shorter interactions (Cappella & Palmer, 1990).
FOOTNOTES

1 Byrne’s (1971) 57-item attitude scale includes items relating to community bomb shelters, Red China and the U.N., dating in high school, and racial integration. For the present experiment, a pilot study was conducted in which freshman and sophomores were asked to indicate the importance of more up-to-date items, including attitudes toward the legalization of marijuana. Those items rated as most important were used to replace some of Byrne’s items, including attitudes toward legalized abortion, recreational drug use, and inter-racial relationships. The scale used in this experiment consists of 28 items.

2 Participants’ ratings of post-conversation liking are better predicted by their pre-conversation ratings than by attitude similarity. (See Table 4).

3 Bloom (1968) dichotomized participants into those scoring high and those scoring low on the Marlowe-Crowne Social Desirability Scale (1964). Those scoring in the middle in social desirability were discarded. This strategy of excluding intermediate scorers was also employed by Brannigan, Schaller, and McGarva (1993).
REFERENCES


Byrne, D., London, O. & Reeves, K. (1968). The effects of physical attractiveness, sex and attitude similarity on interpersonal attraction. Journal of Personality, 36, 259-271.


APPENDIX
Appendix A

Survey of Attitudes  (Labeled “O” if an original item on Byrne’s scale, “R” if revised)

(O) 1. Optimism (choose one)
   a. In general, I have a very optimistic outlook on life.
   b. In general, I have an optimistic outlook on life.
   c. In general, I have a mildly optimistic outlook on life.
   d. In general, I have a mildly pessimistic optimistic outlook on life.
   e. In general, I have a pessimistic optimistic outlook on life.
   f. In general, I have a very pessimistic optimistic outlook on life.

1a. How important is agreement on this issue for liking in relationships?
   a. I feel that agreement on this issue is very important for liking in relationships.
   b. I feel that agreement on this issue is important for liking in relationships.
   c. I feel that agreement on this issue is somewhat important for liking in relationships.
   d. I feel that agreement on this issue is somewhat unimportant for liking in relationships.
   e. I feel that agreement on this issue is unimportant for liking in relationships.
   f. I feel that agreement on this issue is very unimportant for liking in relationships.

(O) 2. Careers for Women with Children (choose one)
   a. I am very much opposed to women with children pursuing careers.
   b. I am opposed to women with children pursuing careers.
   c. I am mildly opposed to women with children pursuing careers.
   d. I am mildly in favor of women with children pursuing careers.
   e. I am in favor of women with children pursuing careers.
   f. I am very much in favor of women with children pursuing careers.

(O) 3. Patriotism (choose one)
   a. I am very patriotic.
   b. I am patriotic.
   c. I am mildly patriotic.
   d. I am mildly un-patriotic.
   e. I am un-patriotic.
   f. I am very un-patriotic.

(R)4. Ban on Cigarette Smoking (choose one)
   a. I am very much in favor of allowing smoking in public places.
   b. I am in favor of allowing smoking in public places.
   c. I am mildly in favor of allowing smoking in public places.
   d. I am mildly in favor of banning smoking in public places.
   e. I am in favor of banning smoking in public places.
   f. I am very much in favor of banning smoking in public places.
(O) 5. Women in Today’s Society (choose one)
   a. I strongly believe that women are not taking too aggressive a role in society today.
   b. I believe that women are not taking too aggressive a role in society today.
   c. I mildly believe that women are not taking too aggressive a role in society today.
   d. I mildly believe that women are taking too aggressive a role in society today.
   e. I believe that women are taking too aggressive a role in society today.
   f. I strongly believe that women are taking too aggressive a role in society today.

(O) 6. Dating (choose one)
   a. I strongly believe that girls should be allowed to date before they are in high school.
   b. I believe that girls should be allowed to date before they are in high school.
   c. I mildly believe that girls should be allowed to date before they are in high school.
   d. I mildly believe that girls should not be allowed to date before they are in high school.
   e. I believe that girls should not be allowed to date before they are in high school.
   f. I strongly believe that girls should not be allowed to date before they are in high school.

(O) 7. War (choose one)
   a. I strongly feel that war is necessary to solve world problems.
   b. I feel that war is necessary to solve world problems.
   c. I mildly feel that war is necessary to solve world problems.
   d. I mildly feel that war is not necessary to solve world problems.
   e. I feel that war is not necessary to solve world problems.
   f. I strongly feel that war is not necessary to solve world problems.

(O) 8. Strict discipline (choose one)
   a. I am very much against strictly disciplining children.
   b. I am against strictly disciplining children.
   c. I am mildly against strictly disciplining children.
   d. I am mildly in favor of strictly disciplining children.
   e. I am in favor of strictly disciplining children.
   f. I am very much in favor of strictly disciplining children.

(O) 9. Financial help from parent (choose one)
   a. I strongly believe that parents should provide financial help to young married couples.
   b. I believe that parents should provide financial help to young married couples.
   c. I mildly believe that parents should provide financial help to young married couples.
   d. I mildly believe that parents should not provide financial help to young married couples.
   e. I believe that parents should not provide financial help to young married couples.
   f. I strongly believe that parents should not provide financial help to young married couples.

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(O) 10. One true religion (choose one)
   a. I strongly believe that my church represents the one true religion.
   b. I believe that my church represents the one true religion.
   c. I mildly believe that my church represents the one true religion.
   d. I mildly believe that no church represents the one true religion.
   e. I believe that no church represents the one true religion.
   f. I strongly believe that no church represents the one true religion.

(O) 11. Attending the Theater (choose one)
   a. I dislike attending the theater very much.
   b. I dislike attending the theater.
   c. I mildly dislike attending the theater.
   d. I mildly enjoy attending the theater.
   e. I enjoy attending the theater.
   f. I enjoy attending the theater very much.

(R) 12. Legalization of Marijuana (choose one)
   a. I strongly believe that the possession and cultivation of marijuana should be legalized.
   b. I believe that the possession and cultivation of marijuana should be legalized.
   c. I mildly believe that the possession and cultivation of marijuana should be legalized.
   d. I mildly believe that the possession and cultivation of marijuana should remain illegal.
   e. I believe that the possession and cultivation of marijuana should remain illegal.
   f. I strongly believe that the possession and cultivation of marijuana should remain illegal.

(O) 13. Day Care (choose one)
   a. I strongly believe the federal government should provide free day care for all families.
   b. I believe the federal government should provide free day care for all families.
   c. I mildly believe the federal government should provide free day care for all families.
   d. I mildly believe the federal government should not provide free day care for all families.
   e. I believe the federal government should not provide free day care for all families.
   f. I strongly believe the federal government should not provide free day care for all families.

(R) 14. Legal Abortion (choose one)
   a. I am very much against the legal practice of abortion.
   b. I am against the legal practice of abortion.
   c. To a slight degree, I am against the legal practice of abortion.
   d. To a slight degree, I am in favor of the legal practice of abortion.
   e. I am in favor of the legal practice of abortion.
   f. I am very much in favor of the legal practice of abortion.

(O) 15. Premarital Sex Relations (choose one)
   a. In general, I am very much opposed to premarital sex relations.
   b. In general, I am opposed to premarital sex relations.
   c. In general, I am mildly opposed to premarital sex relations.
   d. In general, I am mildly in favor of premarital sex relations.
   e. In general, I am in favor of premarital sex relations.
   f. In general, I am very much in favor of premarital sex relations.
16. Recreational Drug Use (choose one)
a. In general, I am very much in favor of college students using recreational drugs.
b. In general, I am in favor of college students using recreational drugs.
c. In general, I am mildly in favor of college students using recreational drugs.
d. In general, I am mildly opposed to college students using recreational drugs.
e. In general, I am opposed to college students using recreational drugs.
f. In general, I am very much opposed to college students using recreational drugs.

17. Belief in God (choose one)
a. I strongly believe that there is a God.
b. I believe that there is a God.
c. I feel that perhaps there is a God.
d. I feel that perhaps there is no God.
e. I believe that there is no God.
f. I strongly believe that there is no God.

18. Homosexuality (choose one)
a. I am strongly opposed to homosexual behavior.
b. I am opposed to homosexual behavior.
c. I am slightly opposed to homosexual behavior.
d. I am slightly in favor of homosexual behavior.
e. I am in favor of homosexual behavior.
f. I am strongly in favor of homosexual behavior.

19. Inter-racial Relationships (choose one)
a. I am strongly in favor of inter-racial relationships.
b. I am in favor of inter-racial relationships.
c. I am mildly in favor of inter-racial relationships.
d. I am mildly opposed to inter-racial relationships.
e. I am opposed to inter-racial relationships.
f. I am strongly opposed to inter-racial relationships.

20. Minorities (choose one)
a. In general, I very much like minority members.
b. In general, I like minority members.
c. In general, I mildly like minority members.
d. In general, I mildly dislike minority members.
e. In general, I dislike minority members.
f. In general, I very much dislike minority members.

21. Children (choose one)
a. In general, I very much like children.
b. In general, I like children.
c. In general, I somewhat like children.
d. In general, I somewhat dislike children.
e. In general, I dislike children.
f. In general, I very much dislike children.
(R)22. Birth Control (choose one)
   a. I am very much in favor of most birth control techniques.
   b. I am in favor of most birth control techniques.
   c. I am mildly in favor of most birth control techniques.
   d. I am mildly opposed to most birth control techniques.
   e. I am opposed to most birth control techniques.
   f. I am very much opposed to most birth control techniques.

(R)23. Breaking the Law (choose one)
   a. In general, I am very much against breaking the law.
   b. In general, I am against breaking the law.
   c. In general, I mildly against breaking the law.
   d. In general, I mildly in favor breaking the law.
   e. In general, I am in favor of breaking the law.
   f. In general, I very much in favor of breaking the law.

(R)24. Death Penalty (choose one)
   a. I am very much in favor of the death penalty.
   b. I am in favor of the death penalty.
   c. I am mildly in favor of the death penalty.
   d. I am mildly opposed to the death penalty.
   e. I am opposed to the death penalty.
   f. I am very much opposed to the death penalty.

(O) 25. College Education (choose one)
   a. I strongly believe that it is not very important for a person to have a college education in order to be successful.
   b. I believe that it is not very important for a person to have a college education in order to be successful.
   c. I believe that perhaps it is not very important for a person to have a college education in order to be successful.
   d. I believe that perhaps it is very important for a person to have a college education in order to be successful.
   e. I believe that it is very important for a person to have a college education in order to be successful.
   f. I strongly believe that it is very important for a person to have a college education in order to be successful.

(R)26. Homeless People (choose one)
   a. I strongly believe that it is a good idea to give money to the homeless.
   b. I believe that it is a good idea to give money to the homeless.
   c. I believe that perhaps it is a good idea to give money to the homeless.
   d. I believe that perhaps it is a bad idea to give money to the homeless.
   e. I believe that it is a bad idea to give money to the homeless.
   f. I strongly believe that it is a bad idea to give money to the homeless.
(R) 27. The Environment (choose one)
   a. I strongly believe that taking care of the environment is very important.
   b. I believe that taking care of the environment is very important.
   c. I mildly believe that taking care of the environment is very important.
   d. I mildly believe that taking care of the environment is not very important.
   e. I believe that taking care of the environment is not very important.
   f. I strongly believe that taking care of the environment is not very important.

(O) 28. Animals (choose one)
   a. In general, I very much like animals.
   b. In general, I like animals.
   c. In general, I somewhat like animals.
   d. In general, I somewhat dislike animals.
   e. In general, I dislike animals.
   f. In general, I very much dislike animals.
Appendix B

1. Intelligence (check one)
   ___ I believe my partner to be very much above average in intelligence.
   ___ I believe my partner to be above average in intelligence.
   ___ I believe my partner to be slightly above average in intelligence.
   ___ I believe my partner to be average in intelligence.
   ___ I believe my partner to be slightly below average in intelligence.
   ___ I believe my partner to be below average in intelligence.
   ___ I believe my partner to be very much below average in intelligence.

2. Knowledge of current events (check one)
   ___ I believe that my partner is very much below average in her knowledge of current events.
   ___ I believe that my partner is below average in her knowledge of current events.
   ___ I believe that my partner is slightly below average in her knowledge of current events.
   ___ I believe that my partner is average in her knowledge of current events.
   ___ I believe that my partner is slightly above average in her knowledge of current events.
   ___ I believe that my partner is above average in her knowledge of current events.
   ___ I believe that my partner is very much above average in her knowledge of current events.

3. Morality (check one)
   ___ My partner impresses me as being extremely moral.
   ___ My partner impresses me as being moral.
   ___ My partner impresses me as being moral to a slight degree.
   ___ My partner impresses me as being neither particularly moral nor particularly immoral.
   ___ My partner impresses me as being immoral to a slight degree.
   ___ My partner impresses me as being immoral.
   ___ My partner impresses me as being extremely immoral.

4. Adjustment (check one)
   ___ I believe that this person is extremely maladjusted.
   ___ I believe that this person is maladjusted.
   ___ I believe that this person is maladjusted to a slight degree.
   ___ I believe that this person is neither particularly maladjusted nor particularly well adjusted.
   ___ I believe that this person is well adjusted to a slight degree.
   ___ I believe that this person is well adjusted.
   ___ I believe that this person is extremely well adjusted.

5. Personal feelings (check one)
   ___ I feel that I would probably like this person very much.
   ___ I feel that I would probably like this person.
   ___ I feel that I would probably like this person to a slight degree.
   ___ I feel that I would probably neither particularly like this person nor particularly dislike this person.
   ___ I feel that I would probably dislike this person to a slight degree.
   ___ I feel that I would probably dislike this person.
   ___ I feel that I would probably dislike this person very much.

6. Working together (check one)
   ___ I believe that I would very much dislike working with this person in the future.
   ___ I believe that I would dislike working with this person in the future.
   ___ I believe that I would dislike working with this person in the future to a slight degree.
   ___ I believe that I would neither particularly like nor dislike working with this person in the future.
   ___ I believe that I would like working with this person in the future to a slight degree.
   ___ I believe that I would like working with this person in the future.
   ___ I believe that I would very much like working with this person in the future.
Appendix C

If you have questions regarding any of the following items please ask the experimenter for clarification.

1. How well do you feel you and your partner got along? (circle one)

   1  2  3  4  5  6  7
   (very poorly)   (very well)

2. Please rate the overall quality of the interaction you just participated in. (circle one)

   1  2  3  4  5  6  7
   (very low quality) (very high quality)

3. How enjoyable was the conversation? (circle one)

   1  2  3  4  5  6  7
   (very unenjoyable) (very enjoyable)

4. How likely do you think it is that you and your partner will seek out further interaction with one another? (circle one)

   1  2  3  4  5  6  7
   (very unlikely) (very likely)

5. How similar do you feel you and your partner are with regard to your attitudes? (circle one)

   1  2  3  4  5  6  7
   (very dissimilar) (very similar)

6. How precise do you believe the turn-taking was in your conversation? That is, how well did you and your partner alternate vocalizations? (circle one number)

   -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100
   (my partner spoke every time I was speaking and was silent every time I was silent)
   (when my partner and I were speaking seemed unrelated)
   (every time I was speaking my partner was silent and every time I was silent, she was speaking)