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## A Dyadic Perspective on Speech Accommodation and Social Connection: Both Partners' Rejection Sensitivity Matter

**Lauren Aguilar,**

Stanford University, Department of Psychology

**Geraldine Downey,**

Columbia University, Department of Psychology

**Robert Krauss,**

Columbia University, Department of Psychology

**Jennifer Pardo,**

Montclair State University, Department of Psychology

**Sean Lane,** and

New York University, Psychology

**Niall Bolger**

Columbia University, Department of Psychology

### Abstract

**Objective**—Findings from confederate paradigms predict that mimicry is an adaptive route to social connection for rejection sensitive individuals (Lakin et al., 2008). However, dyadic perspectives predict that whether mimicry leads to perceived connection depends on the rejection sensitivity (RS) of both partners in an interaction.

**Method**—We investigated these predictions in 50 college women who completed a dyadic cooperative task in which members were matched or mismatched in being dispositionally high or low in RS. We used a psycholinguistics paradigm to assess, through independent listeners' judgments ( $N = 162$ ), how much interacting individuals accommodate phonetic aspects of their speech toward each other.

**Results**—Results confirmed predictions from confederate paradigms in matched RS dyads. However, mismatched dyads showed an asymmetry in levels of accommodation and perceived connection: Those high in RS accommodated more than their low RS partner but emerged feeling less connected. Meditational analyses indicated that low RS individuals' nonaccommodation in mismatched dyads helped explain their high RS partners' relatively low perceived connection to them.

**Conclusions**—Establishing whether mimicry is an adaptive route to social connection requires analyzing mimicry as a dyadic process influenced by the needs of each dyad member.

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CORRESPONDING AUTHOR: Dr. Lauren Janine Aguilar, lauren.aguilar@stanford.edu.

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## Keywords

speech accommodation; mimicry; rejection sensitivity; relationships; communication

The sense of connection that is the foundation of personal relationships develops through social interaction. Spoken communication is one of the principal forms of social interaction (Krauss & Fussell, 1996). One way that spoken communication may promote a sense of social connection is through speakers' tendency to automatically accommodate their speech to that of conversation partners (Giles, Coupland, & Coupland, 1991). This thinking is based on evidence that people who resemble each other are more likely than those who differ to experience a connection, encompassing feelings of acceptance, trust, liking, affiliation, and attraction (Ireland, Slatcher, Eastwick, Scissors, Finkel, & Pennebaker, 2011; Newcomb, 1956). If speech accommodation<sup>1</sup> does in fact aid in forging social connections, is it a particularly adaptive route for individuals who have been sensitized to rejection to gain the connection they seek?

This possibility has been suggested in relation to subtle, non-conscious forms of mimicry on the basis of confederate studies (Lakin, Chartrand, & Arkin, 2008). In one set of studies, participants who had been situationally sensitized to rejection through a rejection experience nonconsciously mimicked the non-verbal behavior of a confederate (e.g., foot shaking; Lakin & Chartrand, 2003; Lakin, et al., 2008). In another study, participants showed more positivity to confederates who had mimicked them (Chartrand & Bargh, 1999). Although consistent with the idea that rejection sensitivity (RS) motivates mimicry and that increasing one's similarity to another person increases one's appeal to that person (Byrne, 1971), the confederate studies leave unresolved whether one-sided accommodation is sufficient to generate a sense of connection in both parties. If all that matters is increased similarity, regardless of how it comes about, then this should be the case. But, if feeling connected to a partner depends on the receipt of accommodation, both parties must accommodate for each to feel connected to the other. If instead one member of a dyad mimics the partner but the other does not, the interaction may leave the partner feeling connected but the mimicker feeling rejected.

This outcome would be particularly problematic for someone already high in RS. It would also suggest that whether speech accommodation is an adaptive way to have one's needs for connection met may depend on one's partner in the interaction. This possibility is implied by dyadic perspectives on human communication (Giles, et al., 1991) and relationships (Rusbult & Van Lange, 2003; Kelley & Thibaut, 1978). These perspectives emphasize that each individual's behavior during an interaction is *influenced by* and *responded to* by the partner. Thus, how much an individual accommodates may reflect the partner's RS as well as the individual's own RS. Establishing whether the interaction leads to feelings of connection requires assessing the responses of *both* partners to the accommodation.

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<sup>1</sup>The process of increasing speech similarity is known by various terms including *mimicry*, *accommodation*, *alignment*, *synchrony*, *imitation*. We use *speech accommodation* to refer to a particular form of the broader category of mimicry.

The present study tested whether mimicry is an adaptive route to social connection for individuals high in RS using a dyadic approach that assessed each individual's speech accommodation and feelings of connection towards the partner. We focused on accommodation at a level of speech production that is subtle, automatic, and typically nonconscious<sup>2</sup>—pronunciation of vowels and consonants (Pardo, 2006). Dyads consisted of individuals who were either matched or mismatched on dispositional RS, which involves a tendency to enter social situations seeking connection but fearing rejection (Downey & Feldman, 1996). To ensure that partners exert a strong situational effect on each other, we included only individuals who were either relatively high or low in the disposition (Thorne, 1987). Prior experimental and correlational studies have shown that individuals dispositionally high in RS are strongly motivated to be accommodating to gain acceptance and prevent rejection, but may do so in ways that compromise their relationships and well-being (Berenson et al., under review; Purdie & Downey, 2000; Romero-Canyas, Reddy, Rodriguez & Downey, 2013). The present study is the first to examine the RS–accommodation link from a dyadic perspective, with a focus on the potentially positive relational outcomes of accommodation.

## Dyadic Perspectives On Human Communication And Relationships

It is well established that talkers tend to align their speech production at all levels varying from the semantic to the phonological. It has been proposed that alignment aids communication by enabling construction of similar mental models, and that it serves social goals by increasing similarity (Giles et al., 1991; Krauss & Pardo, 2004; Pickering & Garrod, 2004). However, the extent of accommodation is not necessarily equal within dyads, and the same individual's accommodation may also vary across partners and contexts (Duncan & Fiske, 1977; Giles, 1973; Kuhlen & Brennan, 2012; Sancier & Fowler, 1997). Asymmetry may reflect the communication demands of the situation as when those tasked with giving information accommodate more than those tasked with receiving information (Pardo, 2006). It may also reflect differences between talkers' social motives.

Communication Accommodation Theory (CAT) was initially developed to explain how differences in social status may generate asymmetry in accommodation (Giles et al., 1991). Drawing on the similarity-liking link, CAT proposed that the greater need of people lower in status for the approval of a more prestigious partner motivates them to accommodate their speech toward the partner to generate similarity, whereas the non-accommodation of the partner signals their higher status (Byrne, 1971). Applied to RS, CAT predicts that dyad members mismatched in RS will deviate from the typical pattern where both partners engage in equally high levels of accommodation. Dyads matched on RS should follow this typical pattern.

Developed to account for interactional patterns and their relational consequences in close relationships, Interdependence Theory (IT; Rusbult & Van Lange, 2003; Kelley & Thibaut, 1978) is similar to CAT in explaining dyadic interaction patterns in terms of partners'

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<sup>2</sup>The precise level of awareness at which speech accommodation lies has not been empirically established. We refer to subtle, nonconscious accommodation as a behavior that cannot be detected or reported by participants engaged in the behavior.

dependency on each other for desired outcomes. IT predicts that the more dependent partner will engage in more of a behavior likely to garner the desired outcome than the less dependent partner. Applied to speech accommodation and RS, IT mirrors CAT in predicting that when partners are mismatched in RS, the partner higher in RS should accommodate more than the partner lower in RS. When RS levels match, then partners should enact equivalent levels of accommodation. If it can be presumed that the amount of each partner's accommodation reflects their respective levels of RS, then, according to IT and in contrast to CAT, a higher level of bidirectional accommodation should be found in dyads where both are high in RS than in dyads where both are low in RS. Thus, CAT and IT would appear to make similar predictions about accommodation in dyads matched and mismatched on high RS but different predictions about dyads matched on low RS.

### **Dyadic studies linking social motives and accommodation**

While several experimental studies show that participants lower in prestige accommodate toward confederates higher in prestige (e.g., Giles, 1973; Giles et al., 1991), we could identify only three relevant studies of naturalistic dyadic conversation. Two found evidence of this pattern in the same individuals conversing with different partners who varied in status. During interviews, the talk-show host, Larry King, accommodated acoustic attributes of his voice that signal deference when guests were higher in public status than him, whereas lower-status guests accommodated toward King's voice (Gregory & Webster, 1996). In phone conversations, people accommodated their pitch more when talking to lovers than to friends, presumably because of a greater need for their lovers' approval (Farley, Hughes, & LaFayette, 2013).

Finally, of most direct relevance to our research is Natale's (1975) laboratory study of naturalistic dyadic conversation between unacquainted peers. Each partner's need for approval, indexed by social desirability scores, was an independent predictor of dyadic convergence in vocal intensity over the conversation. Although there was also a significant interaction between participants' social desirability scores, its nature was not examined. Thus, it was not possible to assess whether the data supported CAT and IT predictions about how each individual might contribute to dyadic accommodation patterns.

### **Speech Accommodation and Perceived Connection**

Consistent with much of the work on the similarity-liking link, CAT appears to take for granted that each member of a dyad should feel connected to their partner to the extent that accommodation increases similarity, regardless of whether both members accommodate equally or one member does most of the accommodating. An alternative viewpoint can be derived from IT (Kelley & Thibaut, 1978). The theory views matches and mismatches in dyad members' post-interaction feelings as emanating from the pattern of their communication during the interaction, which, as we already noted, is assumed to be shaped by how dependent each member is on the other for valued outcomes. Thus, IT would predict that the connection that an individual feels toward a partner depends on the partner's accommodation to the individual, implying that, for each dyad member to feel a sense of connection to the other member, each must be the recipient of accommodation from the other member. If accommodation is asymmetrical, the more accommodating member should

elicit stronger feelings of connection in their less accommodating partner but should feel less connected to the partner.

### **Dyadic studies linking accommodation and perceived connection**

With the exception of two recent speed dating studies, the link between speech accommodation and perceived connection has not been investigated in naturalistic dyadic conversation. Ireland et al. (2011) found that subsequent mutual romantic interest was predicted by similarity between dyad members' use of function words during the conversation (e.g., articles, consonants, pronouns). However, because similarity was measured at the dyadic level, and did not assess each member's change in function word use from before to during the interaction, this study was not suited to addressing the question of whether mutual romantic interest required mutual accommodation or could be achieved through one-sided accommodation.

In the second study, which did have the potential to address this question, McFarland, Jurafsky and Rawlings (2013) examined the associations between each dyad member's perceived connection to their partner and mimicry of speech rate, function word use, and laughter. Mimicry was assessed as the frequency with which a dyad member mirrored the partner's behavior in the preceding speech turn. Enacting mimicry was not significantly associated with feeling connected to one's partner for any of the three measures of mimicry. This is consistent with the view that people's own mimicry does not prompt them to feel connected to their partner. However, the general absence of evidence that mimicry elicits feelings of connection in its target is a departure from prior experimental evidence and may reflect limitations with how the study assessed mimicry.

It remains to be resolved whether speech similarity leads to a both partners feeling a sense of connection or, instead, bidirectional accommodation is necessary. Moreover, prior research has not established that accommodation mediates the link between dyad members' pre-existing social motives and their post-conversation feelings of connection.

## **Hypotheses and Study**

### **RS pairings and accommodation patterns**

Both CAT and IT lead us to expect that: (a) in mismatched-RS dyads, accommodation should be asymmetrical with the high RS individual accommodating more than the low RS partner; (b) in matched-RS dyads, accommodation should be symmetrical. According to CAT, matched-RS dyads, regardless of level of RS, should show the normative relatively high levels of accommodation. According to IT and extrapolating Lakin and colleagues' (2008) confederate study findings, matched-high RS dyads should show higher levels accommodation than matched-low RS dyads because high RS motivates accommodation. We test these alternative possibilities.

### **Accommodation and perceived connection**

If the connection that an individual feels toward a partner depends only on *similarity*, then accommodation should lead the individual to perceive a stronger connection to the partner

irrespective of who does the accommodating. Alternatively, if perceptions of connection depend on *receiving accommodation*, then one's perception of connection should be influenced only by the accommodation enacted by one's partner. In either scenario, we expect mutual feelings of connection in matched-RS dyads because similarity is achieved through each partner's accommodative contribution. However, if perceived connection depends on receipt of accommodation, the low RS member in a mismatched-RS dyad should feel more connected to the high RS if, as hypothesized, the high RS member does most of the accommodation.

### Mediation

If speech similarity rather than receipt of accommodation matters for perceived connection, an individual's accommodation should mediate the link between the individual's RS and both their own perceived connection to their partner and their partner's perceived connection to them. If it is the receipt of accommodation that matters, then an individual's accommodation should mediate the link between an individual's RS and the partner's perceived connection to the individual, but not the individual's own perceived connection to the partner.

### Study

The hypotheses were tested in dyads comprised of unacquainted peers pre-selected to be either high or low in RS. Dyads engaged in an instrumental task that required coordination of attention and cooperation, which are thought to elicit accommodation and facilitate social connection (Anderson et al., 1991; Pardo, 2006). We operationalized speech accommodation as the extent to which subtle phonetic attributes of one dyad member's speech increased in resemblance to the speech of the other dyad member from before to during the conversation. By capturing change in the pronunciation of vowels and consonants in relation to a specific partner, the measure avoids possible confounds between accommodation to a partner and chance similarity in dyad members' speech style. While amenable to social influence, phonetic accommodation is more subtle and fine-grained than the more obvious coarse-grained speech attributes (e.g., vocal intensity, speaking rate, accentedness) investigated in most research on social influences on accommodation, increasing confidence that phonetic accommodation can operate outside of conscious awareness (Pardo, 2013).

We draw on the Actor-Partner Interdependence Model (APIM; Kenny, Kashy, & Cook, 2006) to test our hypotheses because it provides an analytic framework that distinguishes for each member of the dyad the effect of being in the role of both an actor (e.g., a person high or low in RS) and a partner (e.g., the partner of someone high or low in RS) on accommodation and perceived connection.

### Method

The study had two phases: a conversational recording task and a perceptual assessment of conversational accommodation. In the *Recording Phase*, participants provided speech samples before and during an instrumental task. They provided assessments of their perceived connection to their partners following the interaction.

In the *Perceptual Judgment Phase*, accommodation assessments were made by a large set of independent participants who judged the phonetic similarity of the task speech samples (Goldinger, 1998; Pardo, 2006). This approach provides a global measure of speech accommodation that ordinary listeners can perceive during conversation.

### Recording Phase

**Participants**—The study was limited to women because of prior evidence linking RS with accommodation among females in dyadic encounters (Romero-Canyas et al., 2013) and because the conversational task was validated in women (Pardo, 2006). Participants, scheduled in dyads, were 68 female undergraduates preselected to be high or low in RS (i.e., in top or bottom third of the RS distribution) and without hearing or speech disorders. Of the 68 participants, 18 were excluded because one or both members of the dyad were not native American-English speakers, did not follow the task directions (resulting in an insufficient task duration and a dearth of viable speech samples), or shifted RS category from the pre-screen to post-task RS assessment. After exclusions, 50 participants (25 dyads) remained in the sample. Each participant got \$20 for completing the two-hour recording session.

**Conversation Task**—A modified version of the HCRC Map Task was used to evoke a conversation (Anderson et al., 1991; Pardo, 2006). Participants were randomly assigned to either the role of *giver* or *receiver* of information. Both giver and receiver were provided with six maps that included various landmarks. Givers' maps had paths that ran from a start point around a series of landmarks to a finish point. Receivers had corresponding maps without paths. The task was for the receivers to duplicate the givers' map routes on their maps. The giver instructed the receiver how to navigate around landmarks, and the receiver used the instructions to pencil the route on her map. During the task, each participant naturally repeats the landmark labels many times. To permit assessment of changes in the talkers' speech from before to during the task, samples of the landmark labels were also elicited independently from each participant before beginning the Map Task.

Because conveying information requires the giver to actively attune messages to fit the more limited knowledge set of the receiver, the giver was expected to accommodate more than the receiver, replicating past research (Pardo, 2006).<sup>3</sup> The effect of giver versus receiver communication role on accommodation was expected to be independent of the effects of RS.

**Procedure**—On arrival, participants were seated in separate rooms without seeing each other. They were told that they would be providing recorded speech samples before and during an interactive task. They were then fitted with AKG head-mounted microphones and all received the same printed sheets with the speech prompts. Prompts contained a numbered set of Map Task landmark labels to embedded in a phrase, e.g., "Number 1 is the lake", "Number 2 is the mountain." Participants were instructed to say the phrases in a normal speaking style.

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<sup>3</sup>For 7 dyads, role assignments were labeled leader and follower rather than giver and receiver, respectively. Label differences did not affect speech accommodation. Givers accommodated more, rather than less, than receivers arguing against the possibility that the role assignment activates perceived status differences, favoring givers, between dyad members.

After the Pre-task session, the receiver was brought into the giver's room and each were provided with written instructions and 6 printed map sheets. The pair was instructed to converse in order to accurately complete the task. Participants worked on the task while seated at desks separated by a divider preventing them from seeing each other. Conversations were digitally recorded onto separate synced audio channels to allow measurement of between-talker repetition latency (conversation durations: *Mdn* = 40 min, *Range* = 20–80 min). After finishing the Map Task, participants were separated to complete post-task measures of RS and perceived connection to the partner. Map path duplication accuracy was adequate ( $M > 75\%$ )<sup>4</sup> and unrelated to RS, speech accommodation, or perceived connection to the partner.

To probe for suspicion and awareness of accommodation, participants were asked what they thought the experiment was about, whether anything stood out to them, including their partner's behavior and whether they noticed any changes in their own or their partner's speech. None noticed accommodation in their own or their partner's speech, or had any awareness of a relationship between speech behaviors and either RS or feelings about the partner. Two participants reported thinking the study was about speech mimicry, but were retained because excluding them did not alter the results. Overall, phonetic accommodation appears to be largely nonconscious in the sample and all participants were unaware of the hypotheses.

### Questionnaire Measures

**Rejection sensitivity questionnaire (RSQ, Downey & Feldman, 1996; see Romero-Canyas et al., 2010, for review)**—The RSQ captures the threat experienced in situations in which individuals seek acceptance from valued others but doubt they will get it. Participants imagined 18 situations (e.g., “You ask your friend to do you a big favor”) and indicated the anxiety they would experience (1=‘very unconcerned’, 6=‘very concerned’) and the likelihood they would be accepted (1=‘very unlikely’, 6=‘very likely’). Anxious expectations of rejection are captured by weighting rejection expectation (reverse of acceptance) by rejection anxiety and computing a cross-situational average score (RS range = 1 [low] - 36 [high]). Most RS scores fall within 1–20 in non-clinical samples, with 95% scoring between 3.7 and 15.6 (Ayduk, Downey & Kim, 2001; Downey & Feldman, 1996). The study included participants categorized based on a pre-screening survey as in the top (> 9.83; high in RS) or bottom (< 7.78; low in RS) third of the RS distribution. The analyses are based on this categorical definition of RS.

Participants were scheduled in dyads that were either matched or mismatched in high vs. low RS. Four types of dyads were defined by fully crossing the dyad members' RS category and role, resulting in 25 dyads: *high RS giver/high RS receiver* = 6, *low RS giver/low RS receiver* = 5, *high RS giver/low RS receiver* = 8, *low RS giver/high RS receiver* = 6.

**Perceived connection to partner**—This composite was the average of participants' responses to 5 items assessing their attitudes toward their partner (How accepted by your

<sup>4</sup>We placed a transparency of each giver's maps with a 1×1-cm grid superimposed over each receiver's map. Accuracy was the proportion of the cells that a receiver's path duplicated a giver's path to the total number of cells on a giver's path (Pardo, 2006).



partner do you feel? How likeable is your partner? How friendly is your partner? How trustful is your partner? How much would you like to spend more time with your partner?;  $I = \text{not at all}$ ,  $6 = \text{completely/extremely}$ ;  $M = 4.3$ ;  $SD = .85$ ;  $\alpha = 0.83$ ; all items loaded on a single factor).

### Extraction of Speech Samples

To assess phonetic accommodation, dyad members' verbatim repetitions of landmark labels from the Map Task were selected for use in listener similarity judgments (Pardo, 2006). To minimize effects of repetition latency in the conversation, only landmark repetitions uttered within a 1-minute interval were included (over 80% were within 10 sec.), and repetitions were selected equally from the first and second half of the conversation. To minimize first mention effects, the first utterance of a landmark label on the *givers'* and the *receivers'* maps were excluded (Bard, et al., 2000; Fowler & Housum, 1987). To permit an assessment of direction of accommodation, six landmark-label repetitions were randomly selected in each dyad such that in three landmarks one of the talkers was repeating a prior utterance by the partner (e.g., partner says "mountain"; talker repeats "mountain"), and the roles were reversed for the remaining three landmarks. In each case the talker's corresponding Pre-Task recordings of the landmark labels were also extracted for use in the judgment task (e.g., talker's Pre-Task recording of "mountain").

### Perceptual Judgment Phase

A separate set of 162 college students (91 female; 5 were excluded because of technical problems or being a non-native American-English speaker) received course credit or \$10 to judge the phonetic similarity of the landmark repetition speech samples from the Map Task in an AXB test (Goldinger, 1998). The test establishes how much each talker's speech changed during the task in response to the speech of the partner.

The approach is reliably sensitive to phonetic variation (e.g., Goldinger, 1998; Namy, Nygaard, & Sauerteig, 2002; Pardo, 2006). Whereas acoustic measures of speech accommodation can capture specific attributes of the speech signal, measurement of one feature alone cannot adequately capture phonetic accommodation because it is comprised of a complex array of changes across multiple acoustic-phonetic features of speech, across words and across talkers (Pardo, 2013; Pardo, et al., 2013). Phonetic accommodation and listeners' judgments of similarity are holistic and do not rest on single features of the acoustic signal (Babel & Bulatov, 2012; Pardo, 2013). Therefore, reliable evidence of perceived global phonetic accommodation can be found despite inconsistency in patterns of accommodation in specific acoustic-phonetic attributes (e.g., pitch, vowel spectra; Pardo, 2013).

A trial in the AXB test involved two utterances of the same landmark label by the talker (talker utterances—A/B) that flanked an utterance of the same landmark by the partner (focal utterance—X). The focal utterance was presented 200ms after the first talker utterance and 200ms before the second utterance. The flanking utterances produced by the talker were the Map Task repetition (A - utterance repeated by the talker after the partner's focal utterance) and the Pre-Task (B - baseline) version of the landmark label. The trial was

created for each of the six landmark repetitions selected for a dyad. As noted above, three of six landmarks were selected to assess the direction of speech accommodation of each dyad member. Judges received six repetitions for each trial: In three the presentation order was AXB and in three BXA.

The judges were instructed to listen to speech samples presented over Sennheiser HD280 headphones connected to Macintosh G3 computers running PsyScope (Cohen, MacWhinney, Flatt, & Provost, 1993). They were asked to compare talkers' pronunciation of consonants and vowels, and to disregard other differences such as pitch or speech rate. The judge then indicated on a computer keyboard which of the utterances by the talker was more similar to the focal middle utterance made by the partner (X in AXB): The talker's Map Task repetition (A in AXB; scored 100%) or the talker's Pre-Task utterance (B in AXB; scored 0%). To avoid overtaxing the judges, each judge made similarity ratings on no more than 4 of the 25 dyads. Each talker in each dyad was judged by approximately 15 judges, yielding approximately 270 judgments per talker (3 landmarks per talker X 6 trials per landmark X 15 judges). Prior to data analysis, the scores on the six trials per landmark were averaged, yielding an accommodation score that varied between 0 and 100 percent. The interrater reliability for judges' ratings of a given talker was 0.98 (Shrout & Lane, 2012).

When further averaged over the three landmarks and the approximately 15 judges, the overall accommodation score for each talker in a dyad is estimated as the percent of judgments on which a talker's Map Task Repetition (A in AXB trial) was judged as more similar than the talker's Pre-Task utterance (B in AXB trial) to a partner's focal Map Task utterance (X in AXB trial). The use of a 2-alternative forced-choice task means that values reliably greater than 50% indicate detection of phonetic accommodation (talker's speech during the task sounds more like their partner's task speech than the talker's own pre-interaction speech) whereas scores not significantly above 50% indicate non-accommodation (talker's speech during the task sounds *does not* sound more like their partner's task speech than the talker's own pre-interaction speech). Research suggests that listeners appear to have a tolerance for a certain amount of speech accommodation beyond which the conversation may be disrupted (Giles et al., 1991). Complete accommodation is neither expected nor desirable.

## Results

### Phonetic Accommodation

By design, the RS levels of each dyad member are crossed such that all possible combinations are examined (high RS person with a high RS partner; low RS person with a low RS partner; high RS person with a low RS partner; and low RS person with a high RS partner). For each type, the AXB test gives separate estimates of accommodation for each dyad member. With this design, a person's effect as an actor can be disentangled from the person's effect as a partner (Kenny, Kashy & Bolger, 1998; Kenny, et al., 2006). An actor RS effect is how much being high versus low in RS affects one's accommodation to one's partner. A partner RS effect is how much interacting with a partner who is high versus low in RS affects one's own accommodation. To calculate actor and partner effects, the accommodation scores of each dyad member were used twice, once for her own

accommodation as an actor and once for her accommodation as the other member's partner. Actor and partner effects and giver and receiver effects were crossed in the design, which is a 2 (actor RS: low, high)  $\times$  2 (partner RS: low, high)  $\times$  2 (role: giver, receiver) factorial design, with random effects for dyad and judge.

Data were analyzed using a multilevel regression model, implemented in PROC MIXED, a component of SAS STAT 9.3 software (SAS Institute, 2013). To account for likely non-independence of the data due to: (a) pairing of participants in dyads; (b) repeated judgments of accommodation for each dyad member; (c) repeated judgments by each judge, both dyad and judge were treated as factors with random effects. All other independent variables were treated as categorical fixed effects (actor RS, partner RS, role). We opted for the most conservative approach to statistical testing by basing them on the number of dyads ( $N = 25$ ; Littell, Milliken, Stroup, Wolfinger & Schabenberger, 2006). We report least squares means.

**Power analysis**—In determining the sample size we were guided by the fact that prior research on speech accommodation using the present paradigm found reliable effects with a small number of dyads, reflecting, in part, the high reliability of the judgments of accommodation (e.g., Pardo, 2006). Because the paradigm is labor intensive and time consuming, we sought to maximize having the power to test predictions about RS in a relatively small sample of dyads by limiting participants to those high or low in RS. We drew on the prior literature on RS and phonetic speech accommodation to conduct a power analysis simulation to ascertain if 25 dyads would be sufficient to find a significant effect of dyad RS composition on speech accommodation. We randomly selected 6 of each type of RS dyad, in which members scored in the top or bottom of the distribution (using RS  $SD=3.5$ ; Downey & Feldman, 1996). We then generated 1000 samples of multilevel data based on the parameters from the current study. The power analysis indicated a 100% chance (rounded to the nearest percent) of observing a small effect of one's partner's RS on one's own accommodation. The power of detecting the Actor RS  $\times$  Partner RS interaction effect was also 100%, as was the power of the contrast of interest between low RS persons with high RS partners and the other 3 pairings.

### Accommodation During the Task

**Replicating giver versus receiver effect**—Replicating Pardo (2006), givers accommodated their speech more to receivers than vice versa: givers  $M = 56.9$ , receivers  $M = 51.0$ ,  $t(21) = 5.08$ ,  $p < .0001$ . As expected, none of the two- and three-way interactions of role and actor RS and partner RS were significant ( $t$ 's  $< .69$ ;  $p$ 's  $> .50$ ). The greater accommodation of givers relative to receivers occurs irrespective of RS and of the RS combinations in the dyads. This replication indicates that the paradigm is operating as intended—as a setting where expected communication-role influences can be detected in speech production.

**RS and accommodation**—There was no significant main effect of actor RS (actor: high RS  $M = 55.1$ , low RS  $M = 52.9$ ,  $t(21) = 1.16$ ,  $p = .26$ ). However, there was a significant main effect of partner RS, with partners of those high in RS accommodating less than partners of those low in RS (partner: high RS  $M = 51.9$ , low RS  $M = 56.1$ ,  $t(21) = 2.24$ ,  $p = .$

04). As shown in Figure 1A, there was a significant interaction between actor RS  $\times$  partner RS,  $t(21) = 2.48, p = .02$ , supporting the prediction that each individual's accommodation depends on the RS of both members of the dyad. Means and CIs for each dyad type were as follows: *low RS person with high RS partner*:  $M = 47.9, CI = [44.4, 51.5]$ ; *high RS person with low RS partner*:  $M = 54.3, CI = [50.8, 57.9]$ ; *low RS person with low RS partner*:  $M = 57.9, CI = [52.6, 63.2]$ ; *high RS person with high RS partner*:  $M = 55.9, CI = [51.0, 60.7]$ . Planned contrasts confirmed that low RS people accommodated significantly less to high RS partners than people accommodated to their partners in any other dyad types,  $M_{diff} = -7.7, CI = [-11.6, -3.9], t(21) = 4.39, p = .0003$ . As the CIs show, accommodation was significantly above 50% chance level in the dyads comprised of high RS people with low RS partners, high RS people with high RS partner, and low RS people with low RS partner. The accommodation of individuals in matched-RS dyads did not significantly differ from each other,  $t(21) = .59, p = .56$ , or from that of high RS people paired with low RS partners,  $t(21) = 1.03, p = .32$ . In dyads mismatched in RS, those low in RS accommodated significantly less than those high in RS,  $t(21) = 4.19, p = .0004$ .

### Accommodation and Perceived Connection

Does a person's accommodation to the partner predict the partner's post-task perceived connection to the person? For this analysis, we aggregated the accommodation scores across trials and judges to generate a summary score for each dyad member. In this way, the predictor and outcome were at corresponding levels of analysis. Also, to make regression coefficients easier to interpret, we rescaled accommodation from a percentage (1/100) unit to a per tenth (1/10) unit, i.e., one unit was 10 percentage points rather than one percent (rescaling does not affect statistical significance).

To establish whether accommodation predicted a person's perceived connection to a partner regardless of who accommodated, we ran a multilevel model with both actor and partner accommodation as fixed effects and dyad as a random effect. The effect of a person's accommodation on the partner's perceived connection to them was significant when adjusting for partner accommodation ( $b = .28, t(24) = 2.48, p = .02$ ). However, a person's accommodation did not predict her perceived connection to her partner adjusting for partner's accommodation ( $b = .02, t(24) = .15, p = .88$ ). A person's perceived connection to the partner depends on how much the partner accommodates to the person but not on the person's own level of accommodation. Partner accommodation was dropped from subsequent analyses. We next established that the effect of a person's accommodation on the partner's perceived connection remained significant adjusting for role, actor RS, partner RS and the actor RS  $\times$  partner RS interaction ( $b = .24, CI = [.01, .47], t(21) = 2.13, p = .044$ ). Two persons who differ in accommodation by ten percentage points had partners who differed in perceived connection to them by one quarter of a unit (on a 1 – 6 scale), corresponding to a Cohen's  $d$  effect size of  $.24/.85 = .28$  SD units.<sup>5</sup>

In the three RS pairings in which people showed equivalently high accommodation, their partners perceived similarly high levels of connection (*low RS person with low RS partner*:

<sup>5</sup>Role did not predict a partner's perceived connection to the actor ( $b = .12, t(21) = .51, p = .62$ ).

$M = 4.4$ , high RS person with high RS partner:  $M = 4.6$ , high RS person with low RS partner:  $M = 4.5$ ; Figure 1B). However, when a low RS person had a high RS partner, the high RS partner felt less connected to the low RS person than did partners in the other dyads (low RS actor with high RS partner:  $M = 3.9$ ,  $M_{diff} = .59$ ,  $t(21) = 2.20$ ,  $p = .04$ ). Thus, in mismatched RS dyads where the low RS person did not accommodate but the high RS partner did accommodate, the high RS partner felt a lower sense of connection relative to the partners in any of the other dyads.

**Does accommodation explain the association of RS-Dyadic Composition with Perceived Connection?**—We have already seen that the RS composition of a dyad predicts the degree of accommodation of dyad members and the degree to which their interaction led them to feel a connection to one another. We have also seen that, independent of dyad composition, a person's accommodation predicts their partner's perceived connection. A final analysis examined the extent to which a person's accommodation accounted for the association between the RS composition of the dyad and the partner's perceived connection to the person (Figures 1A & 1B). As before, the contrast of most interest is between a low RS person with high RS partner and the other three RS pairings.

To test this mediation hypothesis we changed our analytic strategy from multilevel modeling to structural equation modeling, a particular strength of which is testing mediation. Although structural equation models were developed independently, they are now understood to be closely related such that certain multilevel models have SEM equivalents (for examples see Bolger & Shrout, 2007, Bolger & Laurenceau, 2013). We restructured the dataset above such that the accommodation and perceived connection for each dyad member were included on the same data lines. Recall that the multilevel modeling results just discussed were based on each dyad member having her own data line. The SEM equivalent to this analysis is to require the dataset to have one observation per dyad, where the measures for each dyad member are represented as different variables rather than different observations (Bolger & Shrout, 2007, provide an example of these contrasting approaches). A well-known example of the multiple-variables form is the standard APIM for dyads (Kenny et al., 2006). Our mediation analysis can be viewed as a version of this model (see also Ledermann, Macho & Kenny, 2011).

As Figure 2 illustrates, there are two parallel mediation pathways, one for each dyad member, and the key coefficients of these are constrained to be identical. The upper mediation pathway goes from a dummy variable for a low RS person with a high RS partner (versus the other three RS combinations) to the person's accommodation to the partner, and from there to the partner's perceived connection to the person. The lower mediation pathway goes from a dummy for a low RS partner with a high RS person to the partner's accommodation to the person, and from there to the person's perceived connection to the partner. Constraining the equivalent coefficients of these mediation pathways to be identical produces a single mediation model that applies equally to each dyad member. It also provides the closest correspondence between the multilevel modeling approach just discussed and the equivalent SEM approach.

We followed the analysis approach of Shrout and Bolger (2002) and obtained bootstrapped confidence bounds for coefficients and indirect effects. We fit the model using Mplus (version 7.11; Muthén & Muthén, 1998–2013) and used 10,000 bootstrap samples to estimate bias-corrected confidence bounds. The model shown in Figure 2 fit the data well ( $\chi^2(13) = 14.37, p = .35, RMSEA = .06, CFI = .90$ ).<sup>6</sup>

Low RS people engaged in less accommodation when paired with high RS partners relative to people in the three other combinations ( $b = -.77, CI = [-1.54, -.08]$ ) and their high RS partners reported less connection ( $b = .23, CI = [.01, .50]$ ). The direct effect of the dummy variable for RS dyadic composition (i.e. low RS person with a high RS partner versus all other dyads) on partner's perceived connection was ( $b = -.41, CI = [-1.03, .15]$ ) (equivalent coefficients found in a multilevel analysis of the same dataset were  $-.79, .24,$  and  $-.40$ ). The product of the path from the dummy for RS dyadic composition to the mediator times the path from the mediator to the outcome is the indirect effect that assesses the extent to which a person's accommodation mediates the link between RS dyadic composition and a partner's perceived connection to the person. The coefficient was  $b_{Indirect} = -.180, CI = [-.669, -.001]$ , corresponding to a Cohen's  $d$  of .21 SD units ( $-.18/.85$ ) and represents 31% of the total effect of dyad composition on perceived connection (total effect =  $-.41 + -.77 \times .23 = -.59$ ; percent mediated =  $(-.77 \times .23)/-.59 = .31$ ).<sup>7</sup>

## Discussion

Using a dyadic framework, we tested the proposal by Lakin et al. (2008), based on confederate studies, that subtle, automatic behavioral mimicry may be an adaptive route to social connection for individuals high in RS. We confirmed the proposal for dyads with members matched in RS. However, in dyads with members mismatched in RS, there was a striking asymmetry in speech accommodation and perceptions of connection: Those high in RS, i.e., those with the most need for acceptance and fear of rejection, accommodated more than their low RS partners but emerged with the least feelings of connection to their partners. Meditational analyses showed that non-accommodation by low RS individuals in mismatched dyads helped explain the relatively low feelings of connection in their high RS partners.

That a person's own accommodation toward a partner increases dyadic similarity but does not affect the person's own perceived connection to the partner is inconsistent with prior thinking. A frequent assumption in the literature on the similarity–liking link, including in CAT, is that when similarity increases so will each partner's perceptions of connection to

<sup>6</sup>The model treats dyad members as indistinguishable in terms of the associations between RS, accommodation, and perceived connection. It does not directly account for role's potential impact on accommodation or perceived connection. However, it does so indirectly by allowing the means to differ between partners, given the observed difference in accommodation between givers and receivers in the first analysis. This simplification had little impact on the estimated mediated path.

<sup>7</sup>To test whether role (giver vs. receiver) was an additional antecedent to perceived connection, we tested the alternative mediation model in which role predicted one's own speech accommodation, which then predicted partner's perceived connection. A model with role replacing RS was fit to the data and bootstrapped CIs were calculated. Because using average accommodation scores reduced power, the effect of role on accommodation, while comparable to the estimate from the multilevel model, was not significant ( $B = 5.64; 95\% CI = [-2.05, 14.21]$ ). Consistent with the RS mediation analysis, givers' accommodation predicted receivers' perceived connection to giver ( $B = .27; 95\% CI = [.001, .063]$ ). The resulting indirect effect, however, was not significant ( $B = .153; 95\% CI = [-.017, .702]$ ). The results for role are very similar and non-significant when adjusting for both partners' RS in the model. The significant mediation for RS remains when controlling for role.

the other. Rather, we found that, consistent with IT, the receipt of mimicry is what matters for perceiving a connection. For an individual's partner to feel connected, the individual must *mimic* their partner's behavior. To feel connected to the partner, the individual must *be mimicked* by their partner. So, when accommodation is asymmetrical, the more accommodating member will leave feeling less connected than the less accommodating member.

Despite the fact that social connections develop through dyadic communication, this study is one of few to examine communication processes that influence dyadic similarity at a dyadic level. What is most distinctive about this study, however, is that our psycholinguistics paradigm established how much each individual actor accommodated toward the partner rather than generating a summary dyadic measure of similarity on some aspect of speech (e.g., Natale, 1975, Ireland et al., 2011). Thus, it was possible to assess the influence of the RS of both members of a dyad on how much each accommodated toward their partner. We could also distinguish the effects of each dyad member's mimicry on their perceived connection toward their partner and that of their partner toward them. Whereas prior research has usually examined either influences on mimicry *or* how similarity influences perceived connection, we considered both links simultaneously to show that dyadic patterns of mimicry mediated the link between individual differences in people's pre-existing RS and their feelings of connection toward each other after the interaction.

### Emergence of dyadic speech accommodation patterns

Previously unacquainted peers were randomly assigned to interact, were blind to their partner's RS, and the phonetic accommodation operated nonconsciously. Thus the accommodative patterns examined were an emergent property of the interaction that could not be attributed to obvious preexisting differences in social dependency, as when dyad members differ in public status (e.g., Larry King interviewing guests of differing public prestige). High RS individuals accommodated to an equally high extent regardless of their partner's level of RS but those low in RS accommodated to a similarly high level toward low RS partners but not toward high RS partners. The finding that partners in matched-low RS dyads accommodate as much as partners in matched-high RS dyads is not consistent with predictions from IT that each person's accommodation should reflect their level of dependency on the partner. Instead, it supports the CAT view that, all other things being equal, people will contribute equally to attain the level of dyadic alignment needed to facilitate the information exchange required for task completion, but that differences in social motives (e.g., RS) may disrupt the normative tendency for dyads members to contribute equally. [0] For the matched dyads, preexisting similarity in levels of RS might have facilitated accommodation and also activated a sense of connection in each member (Byrne, 1971). Although this possibility warrants investigation, it cannot explain the greater accommodation of the high RS partner in the mixed RS dyads. Perhaps the heightened motivation to gain acceptance and avoid rejection accelerated the time course of accommodation in those high in RS relative to the typical tendency of speech alignment to begin slowly and increase over time, which should characterize those low in RS (Natale, 1975; Pardo, 2006). An asymmetry in rates of accommodation in the opening stages of the interaction may trigger processes leading to the overall asymmetry in accommodation seen

in RS-mismatched dyads. The present design does not allow for a direct test of these possibilities because the landmark label repetitions evaluated for accommodation were not selected with precision in timing. They were simply selected from either first or second half of interactions that varied considerably in duration. To understand how patterns of accommodation emerge temporally, future research designs should permit a fine-grained sampling of accommodation occurring over the course of the interaction with a particular focus on the very early phase.

**Implications for RS Model**—This study is the first to investigate the impact of RS on dyadic communication during a cooperative task, potentially shedding light on how RS affects relationship formation. Finding that people high in RS accommodated subtle, nonconscious aspects of their speech in a way that had the potential to foster a social bond extends prior work linking RS with a willingness to accommodate in potentially harmful ways (Berenson et al., under review; Purdie & Downey, 2000; Romero-Canyas et al., 2010; Romero-Canyas et al., 2013;). However, this study also demonstrates that whether accommodation may foster social bonds for a high RS person depends on the RS level of their partner.

The findings have implications for understanding how self-fulfilling prophecies affect people high in RS. In Downey, Freitas, Michaelis and Khouri (1998), anxious expectations of rejection led women to be hostile during conflict with their romantic partners, which, in turn, elicited forms of partner rejection that predicted breakup. The current results suggest a different and particularly pernicious self-fulfilling prophecy that operates in dyads mismatched on RS in which those high in RS accommodated in a way that actually had the potential to foster social bonds. Because low RS partners did not accommodate in these mismatched dyads, high RS people had no basis for feeling the sense of connection that mimicry elicits. Instead, they left the interaction feeling relatively less connected than their low RS partner, despite the fact that their accommodation made their low RS partners feel connected to them. This dynamic implies that people high in RS may not fare well with partners low in RS, who take acceptance for granted and are generally socially successful (Romero-Canyas et al., 2010). But, it could be that they benefit from partners high in perspective taking, a skill that is associated with mimicry (Chartrand & Bargh, 1999) but unrelated to RS (Romero-Canyas & Downey, 2013).

### **Caveats and Future Directions**

Whereas the results support our hypotheses, several caveats need to be considered. First, the phonetic accommodative processes that we argue are nonconscious might correlate with other more obvious and consciously regulated aspects of speech that revealed the level of RS of one partner (or other relevant characteristics) to the other. We tested this possibility by having two independent observers listen to 5-minute speech samples selected from the first- and second-half of the interaction from all 50 participants. For both speech samples observer ratings of relevant variables such as participants' RS, need for acceptance, and likeability were unrelated to RS self-report scores, RS dyadic pairings, accommodation or perceived connection to the partner. Phonetic accommodation in this study appears to be independent of other aspects of conversational behavior readily evident to observers.



Second, the replicability of the results needs to be established, especially given the small sample. While a power analysis provided support for the study's ability to adequately test key hypotheses, a larger sample would have been desirable. Third, the generalizability of the results beyond this specific task needs to be established. Research underway shows that phonetic accommodation can be reliably measured in female and mixed-sex dyads and in a negotiation task, which evokes competition rather than cooperation (Aguilar, 2011). Importantly, this negotiation research shows that experimentally manipulated social-identity threat and social-identity-based RS reduces people's accommodation to their partner and their partner's feelings of connection to them. The relatively high accommodation found in high RS women in mismatched-RS dyads in the cooperative task was reversed in the negotiation task. This supports predictions from the RS model that those high in RS will accommodate in situations where they view acceptance as possible but not when they view rejection as highly likely (Downey et al., 1998). The negotiation results validate that patterns of speech accommodation can be altered in predictable ways that reflect situational and dispositional influences beyond those assessed here.

Fourth, future research should examine the precise motives generated when high and low RS people enter social interactions like the one we investigated. We do not know for sure whether need for acceptance, fear of rejection or both, as we suspect, are activated in high RS individuals but not in low RS individuals.

There are yet other questions that need to be addressed in the future: Does speech accommodation induce feelings of connection because it generates feelings of fit and engagement (Higgins, 2006), heightens perceived familiarity and closeness (Byrne, 1971; Shepard, Giles, & Le Poire, 2001), interdependent self-construals (Ashton-James, van Baaren, Chartrand, & Decety, 2007) and increases prosociality (Stel, van Baaren, Vonk, 2007), acts as an invisible support in accomplishing the task in hand (Bolger & Amarel, 2007), or activates a physiological sense of social connection (Bartz, Zaki, Bolger, & Ochsner, 2011)?

## Conclusion

This research shows the value of studying mimicry from a dyadic perspective in naturalistic conversation (Krauss & Fussell, 1996). The approach revealed that, whereas those who are sensitive to rejection engage in more of the behaviors that help forge a sense of connection, doing so appears to diminish the accommodative efforts of partners who take acceptance for granted and may ultimately confirm fears of rejection for those most sensitized to it. In future work, it will be important to identify how to interrupt this pernicious process.

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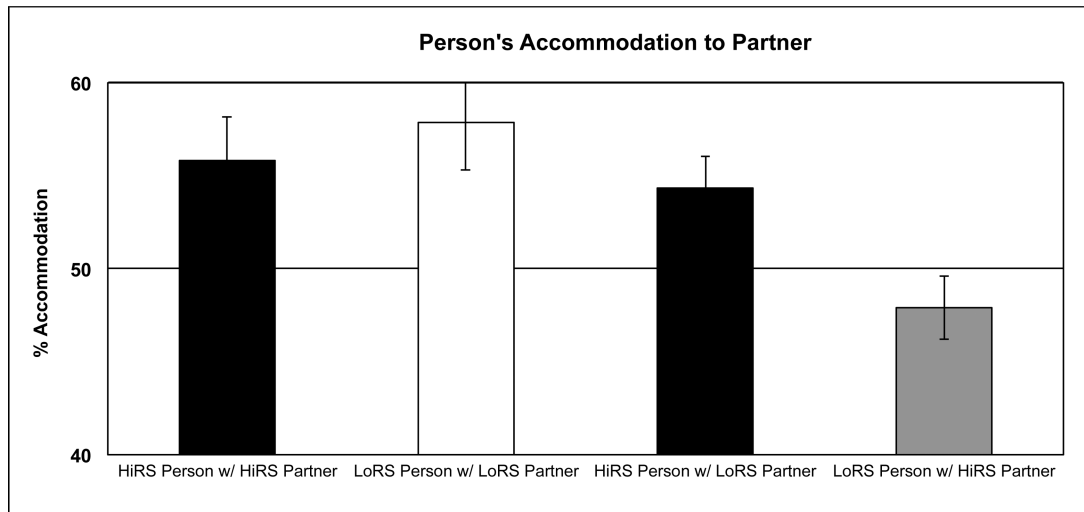
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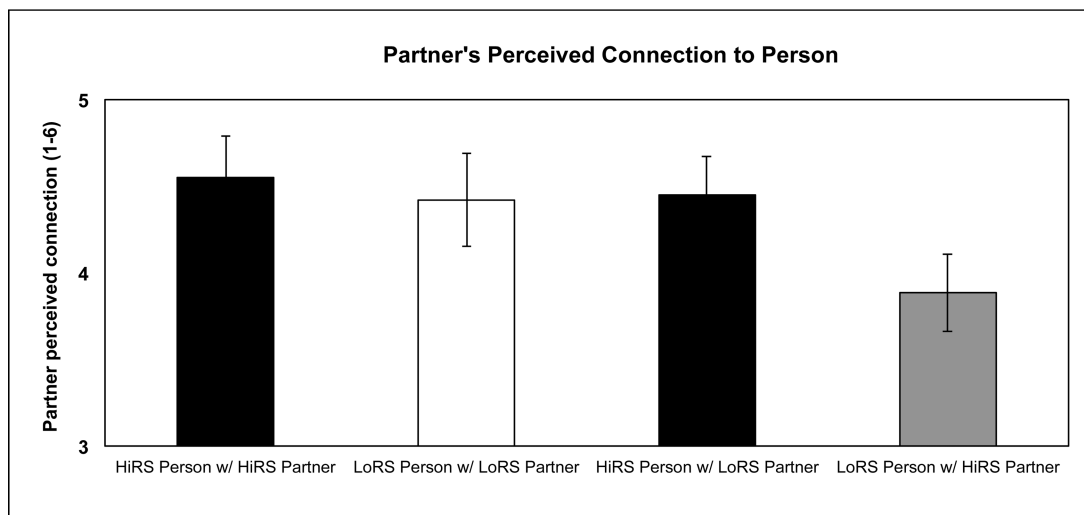
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A:

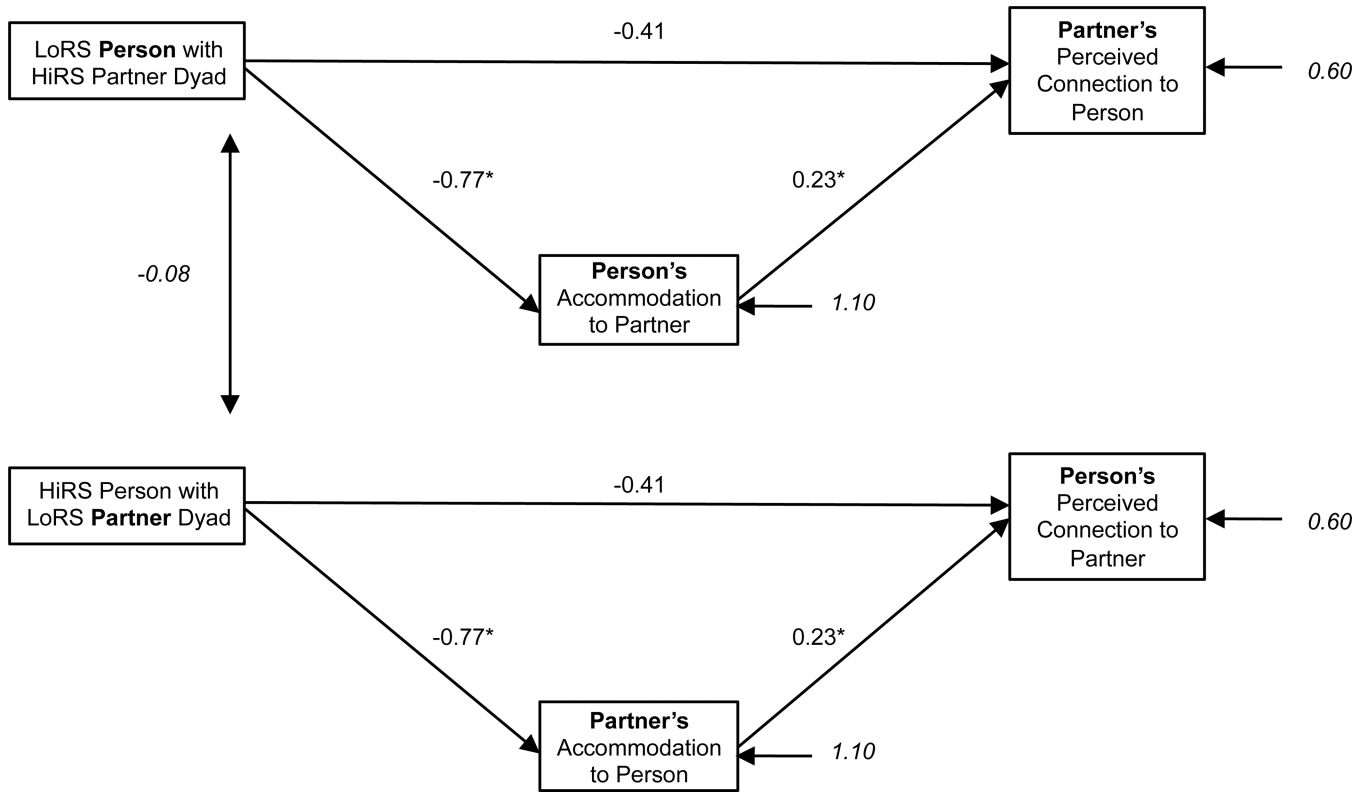


B:

**Figure 1.**

A: Speech accommodation of person to their partner in matched and mismatched RS dyads. Grey bar indicates relatively lower speech accommodation of low RS people toward their high RS partners. Error bars show standard errors of means.

B: Partner's perceived connection to the person (who accommodated or did not accommodate to them in Figure 1A) in matched and mismatched RS dyads. Grey bar indicates HiRS partners' relatively low perceived connection to LoRS people.



**Figure 2.** Mediation path model. The person RS contrast (upper path) was a dummy indicator of whether the person was a member of a dyad in which a LoRS person had a HiRS partner (=1) or not (=0). Similarly the partner RS contrast (lower path) was a dummy indicator of whether the partner was a member of a dyad in which a HiRS person had a low RS partner (=1) or not (=0). Equivalent paths were constrained to be equal. Equivalent residual variances were constrained to be equal. Path coefficients with an asterisk had confidence intervals that did not include 0.