COMMUNICATION FAILURE AND PLAN ADAPTATION: IF AT FIRST YOU DON'T SUCCEED, SAY IT LOUDER AND SLOWER

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The hierarchy hypothesis asserts that when persons initially fail to reach social goals but they continue to try to attain them, they will first alter such lower level elements of message plans as speech rate and vocal intensity rather than more abstract plan elements having to do with the organization and structure of message content. Support for this hypothesis was found in a study in which persons were thwarted in their attempts to provide geographic directions to others. Both the locus of communication failure (language-based versus direction-based) and the race of the persons receiving the directions were varied (Asian versus Caucasian). Directions given after being thwarted showed little evidence of changes in structure; although post-thwarting directions manifested significantly less detail. By contrast, after being thwarted participants demonstrated significant increases in vocal intensity and decreases in speech rate (although, significant higher order interactions were observed for speech rate). These findings were discussed in terms of the hierarchy hypothesis.

In even the most mundane social interactions there is some likelihood that the intentions of interactants will be miscommunicated and, as a result, produce misunderstandings. A glance, a routine greeting delivered in a particular tone of voice, or a question worded in a certain way might lead observers of these acts to draw inferences about the social actor's intentions that are at variance with the intentions of the social actor. As the complexity of the communication situation increases and as the affect levels of interlocutors increase, the probability of these misunderstandings also increases. In the extreme, the level of communication fidelity may be so low or participants' inferences about each other's intentions so divergent that those involved in conversations may not be able to understand each other at all. Such extreme levels of misunderstanding may arise when people who are not familiar with each others' languages attempt to interact with each other.

Such terms as miscommunication, misunderstanding, incomplete understanding, communicative breakdown, and communication failure have been used to describe events during which participants fail to understand the intentions underlying each other's utterances (Coupland, Giles, & Wiemann, 1991; Gass & Varonis, 1991; Milroy, 1984). In our view, communication failures occur when one or more interlocutors perceive that something has "gone wrong" in the conversation. Even though communicative breakdowns are recognized, they may or may not be repaired. Our general concern in the present study is with the strategies and tactics that individuals use to ameliorate communication failures. We advance and test a theoretical framework that makes specific

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predictions about the verbal and nonverbal adjustments made by interactants in their attempts to make themselves understood.

A commonplace assumption made in the discourse processing literature is that individuals comprehend streams of action and discourse they observe by making inferences about the goals they believe others to be pursuing and the plans being used to attain those goals (Carberry, 1990; Cohen, Morgan, & Pollack, 1990; Green, 1989; Levinson, 1981; Lichtenstein & Brewer, 1980; Litman & Allen, 1987; Perrault & Allen, 1980; Schank & Abelson, 1977; Schmidt, 1976; Varonis & Gass, 1985; Wilensky, 1983). In these treatments, goals are viewed as cognitive representations of desired end-states for which individuals strive, while plans are hierarchically organized cognitive representations of action sequences used to achieve goals. In describing the crucial link between plan recognition and discourse understanding, Green (1989) asserts:

> Understanding a speaker's intention in saying what she said the way she said it amounts to inferring the speaker's plan, in all of its hierarchical glory, although there is room for considerable latitude regarding the details. (p. 14)

Not only do cognitive representations of goals and plans play a central role in action and discourse comprehension, it is widely assumed that they act to guide the production of action and discourse (Alterman, 1988; Berger, in press; Brand, 1984; Bratman, 1987; Hobbs & Evans, 1980; Krietler & Krietler, 1987; Levelt, 1989; Miller, Galanter, & Pribram, 1960; Pea & Hawkins, 1987; Sacerdoti, 1977; Srull & Wyer, 1986; Waldron, 1990; Wilensky, 1983). For instance, in describing how individuals move from intentions to articulation, Levelt (1989) discusses the macroplanning processes involved in creating subgoals to achieve a main goal, microplanning processes that further specify the speech act types generated during macroplanning, and phonetic plans that are used to translate preverbal messages into verbal messages. In a study that most likely provides a conservative estimate of planning activity during conversations, Waldron (1990) reported that of some 2,273 thoughts that persons reported having during their interactions with others, 44% were concerned with the goals they were pursuing and the plans they were using to attain these goals. Since plans influence the production of speech at levels not accessable to verbal report (Levelt, 1989), Waldron's data probably underestimate the degree to which plans guide social action in such situations. Thus, planning activity is relatively high during many social interactions.

A postulate common to many of these approaches to planning is that plans are hierarchically organized knowledge structures with abstract actions necessary for goal achievement located toward the tops of hierarchies and more specific actions nested beneath these more abstract actions. Thus, as part of a goal-directed sequence of actions to ingratiate one's self to another, a plan might specify the global action of being friendly. Nested under this global act could be specific verbalizations and nonverbal actions that would be used to instantiate the more abstract act. Smiling, slapping another on the back, and talking about sports might be such specific actions, and each one of these more specific actions might represent a more abstract category for even more specific actions such as a particular type of smile or a particular category of sports talk.

Obviously, persons may deploy plans in social interaction situations that fail to reach their goals. Given goal failure, and assuming that persons wish to continue

to pursue their interaction goals, how are action hierarchies altered to remedy goal failures? In a think-aloud study, designed to provide an initial answer to this question, individuals were asked to indicate what they would do next in the event that they failed to reach three different social goals (Berger & Jordan, 1991). Although these researchers found that individuals tended to alter their plans at relatively high levels of abstraction, they suggested that because participants in their investigation did not actually interact with the targets of their plans while they gave their responses, thus reducing the cognitive load placed on them, they were able to access consciously more abstract plan units and to modify them. By contrast, ongoing interactions require some degree of conscious monitoring of others involved in the interaction, thus deflecting limited cognitive resources away from direct monitoring of action production. Consequently, these researchers suggested that when people are engaged in ongoing interactions in which their goals are thwarted, they will tend to alter *less abstract* elements of their plans first, since such alterations are likely to require fewer cognitive resources for their implementation. This *hierarchy hypothesis* was examined directly in the present study.

The hierarchy hypothesis suggests that when individuals attempt to achieve social goals through verbal means and they are thwarted in so doing, the least demanding option available to them, assuming of course that they wish to continue to pursue the goal, is simply to reiterate what they said previously. Reiteration requires no significant alterations in either what is said or the order in which it is said. We assume that alterations of both content and sequencing of discourse require that more abstract plan units be reconceptualized, replaced, or reordered and that these alterations are resource intensive; whereas, changes in more concrete aspects of plans, such as those concerned with the vocal intensity or the speech rate at which the verbal message is delivered, do not require as many cognitive resources for their implementation. Consistent with the reasoning underlying the hierarchy hypothesis, Ringle and Bruce (1980) have argued that when communication failures occur in conversations, participants initially are likely to assume that the communication difficulties they have experienced are due to acoustic failures, precisely because such failures are relatively easy to repair. While their hypothesis makes a specific prediction regarding differences between pre- and post-failure vocal intensity, these researchers present no test of the hypothesis.

While the preceding discussion has emphasized differences in the likelihood of alteration of abstract versus concrete message plan attributes in response to communication failure, there are plan attributes that fall between these two extremes. Alterations to such attributes might involve no structural changes to the message plan but the addition of more detail to previously employed abstract plan elements. For example, in providing a second rendition of geographic directions to a non-understanding direction-seeker, a direction-giver might reiterate the same walk route given in the first rendition of the directions, thus preserving message structure, but increase the number of landmarks provided in the second set of directions. This kind of modification would be less demanding cognitively than creating an entirely new walk-route, but more demanding than simply reiterating the directions at a slower speed or in a louder voice.

The hierarchy hypothesis suggests, then, that when persons engaged in social interactions are thwarted and they continue to pursue their goals, they will tend to reiterate higher level plan units and to alter lower level ones. The hierarchy hypothesis provides a potential explanation for the often observed tendency among those interacting with others who do not speak their language well to repeat what they said previously to non-comprehending persons but to say it in a louder voice. This response to being misunderstood by those who are not proficient in one's language is apparently manifested even by experienced English as a second language (ESL) teachers.[1] In the present study, the hierarchy hypothesis was evaluated by leading individuals to believe that geographic directions they had just provided were not understood by their partners. Partners then asked direction-givers to give their directions a second time. Verbal and nonverbal attributes of the directions were compared between the two renditions to test the hierarchy hypothesis.

Considerable attention has been paid to communication failures and the strategies used to repair them in the context of both intercultural encounters (Gass & Varonis, 1991; Gumperz & Tannen, 1979; Milroy, 1984; Varonis & Gass, 1985) and intracultural interactions (Longhurst & Siegel, 1973). In this latter study, communication failure, created by introducing electronic distortion into a communication link between a sender and a receiver while they performed a referential communication task, had the effect of inducing senders to speak more slowly and to increase the length of their descriptions (Longhurst & Siegel, 1973). It is possible, of course, that different loci of communication failure might influence the direction of these adjustments. For example, senders inferring that a particular communication failure is due to limitations in the linguistic ability of their receivers might simplify, rather than make more complex, their subsequent descriptions, thus causing a decrease in the length of descriptions following the failure. These investigators also reported anecdotal evidence indicating that senders appeared to increase their vocal intensity levels when trying to overcome the effects of distortion. In the present study, the vocal intensity levels of direction-givers were examined systematically.

According to Gumperz and Tannen (1979) intercultural interactions are more difficult to carry out efficiently precisely because interlocutors lack shared background knowledge; as the fund of interlocutors' shared knowledge increases, the frequency of miscommunication is likely to decrease. With respect to the hierarchy hypothesis, if individuals either suspect or are certain that they are interacting with an individual who is a non-native speaker of their language, they may be more likely to make alterations in message plans at all levels *earlier* in their interactions rather than later, since they might infer that a non-native speaker is more prone to misunderstanding before any indication of misunderstanding actually manifests itself during the conversation. Moreover, they might make more demanding *higher level* alterations in their plans when interacting with a non-native speaker than they would when interacting with a native speaker since they might routinely infer that more modifications are necessary to induce non-native speakers to understand them. Consequently, attempts to anticipate and avoid communication failures involving non-native speakers, in contrast to repairs of communication failures with native speakers, should display both earlier and more abstract alterations in message plan attributes.

This second hypothesis was examined by varying the race of the person to whom individuals provided their directions. The intent was to determine whether physical cues alone, without any indication of communication failure, would induce direction-givers to make earlier and more abstract alterations.

As indicated previously, different loci of communication failure should produce differential verbal and nonverbal adjustments in messages that follow failure events. Longhurst and Siegel (1973) observed that individuals provided more lengthy and detailed descriptions in response to failures induced by distortions, distortions that created gaps in the descriptions being provided. However, had the communication failure emanated from another cause, a cause such as lack of facility in the language being spoken, subsequent descriptions might have become shorter rather than longer. Note that in this case the same message attribute is altered in response to failure, but the direction of the alteration is different, depending upon the locus of the failure. Of course, the hierarchical level at which alterations are made also could be affected by the locus of the failure; however, consistent with the spirit of the hierarchy hypothesis, thwarted interactants should begin alterations at relatively low levels, since alterations at these levels are less cognitively demanding. To assess the effects of failure locus on the levels and directions of modifications to various message plan attributes, individuals interacted with confederates who indicated that their inability to follow the directions was based on either their lack of facility with English or their inability to understand the details of the directions themselves.

Finally, since communication failure based on lack of ability to understand a language necessitates at least a temporary redefinition of the goals of the particular communication task at hand, that is, refocusing on the goal of generating communication that is understandable to the other, language-based communication failure should present a more difficult task for participants than communication failure that is direction-based. Our expectation was that the greatest experienced difficulty would occur in the situation in which participants interacted with an apparently non-native English speaker under conditions of language-based communication failure. We also explored the relationships between experienced difficulty and message adaptations across the experimental conditions. While experienced difficulty might determine the direction of alteration of a specific message plan attribute, there should not necessarily be any systematic relationship between the degree of experienced difficulty and the hierarchical level at which alterations are made. For instance, individuals might report great difficulty interacting with a hearing-impaired individual, but simply reiterate in a louder voice what they say have said to such a person; thus, at times, low level, less demanding plan alterations might be used to overcome communication failures that are experienced as quite difficult.

METHOD

Participants and Design

Study participants were 48 female and 48 male undergraduate students at a major midwestern university who were awarded extra credit for participation in the experiment. Of these students, 85% were Caucasian-American, 7% were

Asian-American, and 7% were African-American. Crucial to the design of the study, English was the first language of all participants.

The study employed a completely crossed 2 (race: Asian or Caucasian) × 2 (locus of communication failure: language-based or direction-based) × 2 (time 1 directions vs. time 2 directions) factorial design, in which the first two factors were between subjects and the third factor within subjects. Confederates' race was varied to induce differential expectations concerning potential English language proficiency.

Procedure

Participants reported individually to the Communication Research Center. They were given instructions indicating that their task would be to give another person directions from the place where they were currently located to a well-known elevated train station near campus. The instructions also indicated that while they were giving the directions to the other person, they should not ask the other person any questions or engage them in dialogue. This constraint was introduced to avoid the introduction of a number of extraneous variables into the interaction that might undermine the tests of the hypotheses.

After receiving their instructions, participants were individually taken to an experimental room in which a confederate was waiting. Confederates were instructed not to engage their partners in conversation. Participants were seated and proceeded to give the directions. After completing the directions, confederates immediately indicated their lack of understanding and requested that participants go through the directions again. Upon completing the task a second time, participants were taken to another room where they filled out a questionnaire that asked them to make a number of judgments about the conversation and their partner. After completing this questionnaire, participants were debriefed. All of the interactions were videotaped.

Experimental Manipulations

A male student from Singapore and a female student from Taiwan represented the Asian condition of the race manipulation, while a Caucasian male and a Caucasian female from the United States represented the Caucasian condition. The language-based condition of the locus of communication failure manipulation was induced by having all confederates say, using a heavy accent, "I'm sorry, I don't understand English well. I had trouble following your directions. Could you give me the directions again?" The Caucasian confederates delivered these lines in an accent that a speaker of a European language might use, while the Asian confederates delivered the lines using their accent. Direction-based failure was instantiated by having the confederates indicate that while they could understand the participants' English well, they had difficulty following the directions. Minor variation in the content of these lines was allowed. These statements were made immediately after participants finished giving their directions the first time. After making these statements, confederates waited for the participants to repeat their directions to the train station. Each confederate interacted with an equal number of male and female participants, and each confederate acted in an equal number of language-based and direction-based communication failures.

Message Plan Alteration Indicators

The audio portions of the videotapes were transcribed and checked three times for their accuracy. Coders scored the transcripts and the videotapes for a number of variables representing different levels of message plan hierarchies.[2] Indicators at each hierarchical level are described below.

High level indicators. One of the most cognitively demanding alterations to a message plan would be a complete reformulation of it at the level of content. To index such activity, coders read and pre- and post-communication failure versions of each participant's directions to determine whether any changes were made in the route given in the directions. Coders indicated whether the same or a different route was given in the second set of directions. Two coders coded 20 protocols in common and agreed 100% of the time concerning their same-different judgments.

Mid-range indicators. Direction-givers could describe exactly the same route in their second set of directions, but vary the amount of detail given in the directions. In the direction-giving situation these details might involve such landmarks as buildings.[3] Our supposition was that adding details to the description of a route is less demanding cognitively than completely reformulating the route itself. Consequently, two coders counted the number of references made to specific buildings by each participant during each direction-giving attempt. Two coders again coded 20 protocols in common. Of the 329 judgments made by the coders, they agreed on 288 of them for a raw agreement rate of .88. A modified version of the kappa statistic (Brennan & Perditer, 1981) yielded a chance-corrected value of .79.

Low level indicators. These are aspects of communicative action that make the least stringent demands on the cognitive system for their implementation. Speech rate and vocal intensity were the variables examined in this category. Coders counted the number of words uttered by each participant during each direction-giving iteration. They also clocked the number of seconds each participant spoke during each iteration. Other coders judged vocal intensity. They observed a decibel (db) meter while listening to the tapes. The db meter was divided into five zones. Each coder had a coding sheet corresponding to the five zones of the videocassette recorder's db meter. During the first minute of each participant's direction giving, each time the needle of the meter moved out of the first zone and into progressively higher zones, the maximum zone to which the meter moved was coded. Each meter movement was scored one for lowest through five for highest. These scores for each one minute sample were summed and divided by the total number of scores, yielding an average vocal intensity score for the first minute of each direction-giving rendition. Because of the difficult nature of these judgments, coders coded 76 of the participants' recordings in common and achieved a Cronbach's alpha of .86.

RESULTS

Manipulation Check and Post-Task Ratings

To check the effectiveness of the locus of communication failure manipulation, participants made a series of post-interaction ratings of the partner on a set

TABLE 1

MEANS AND STANDARD DEVIATIONS OF JUDGED ENGLISH PROFICIENCY AND PERCEIVED DIFFICULTY

	Confederate Race			
	Asian		Caucasian	
	Language-Based Failure (n = 24)	Direction-Based Failure (n = 23)	Language-Based Failure (n = 25)	Direction-Based Failure (n = 24)
English Proficiency	3.63 (2.60)	5.26 (2.52)	4.40 (2.06)	10.58 (3.02)
Perceived Difficulty	3.46 (1.38)	3.61 (1.12)	3.96 (1.14)	2.75 (1.03)

Standard deviations appear in parentheses.

of semantic differential scales. Among these seven-point scales were two bounded by the bipolar descriptors "Native-Foreign" and "English Proficient-English-Non-Proficient." These two scales showed a significant relationship with each other ($r = .70$, $p < .001$); consequently, they were summed and used to check this manipulation. The theoretical range of this scale was 2–14, and the scale was scored such that higher scores reflected greater English proficiency. The means and standard deviations for this scale are shown in Table 1.

An ANOVA of these English proficiency judgments revealed significant main effects for both confederate race and locus of failure; however, these main effects were qualified by a significant confederate race by locus of failure interaction, $F(1,92) = 18.76$, $p < .0001$, $w^2 = .09$. Individual comparisons of the cell means displayed in Table 1 indicated that the mean for those participants in the Caucasian-Direction-Based-Failure condition was significantly higher than the means for the other three conditions, all t-values in excess of 2.00, $p < .05$. No other comparisons were significant. Participants in the Caucasian-Direction-Based-Failure condition judged the confederates to be significantly more English proficient than did participants interacting in the other three conditions. Thus, Asian confederates were judged to be about as English non-proficient whether they displayed language-based or direction-based failure. By contrast, the Cauasian confederates were only judged to be English non-proficient when they manifested language-based failure. This result also suggests that participants may have inferred that the Caucasian confederates generally had higher levels of English proficiency before confederates provided any indication of misunderstanding.

Also included in the post-experiment questionnaire was a single item that asked participants to indicate on a five-point scale the extent to which they found the direction-giving task difficult. This item was scored such that higher numbers were associated with greater degrees of difficulty. The means and standard deviations for this item also are presented in Table 1. An ANOVA of the perceived difficulty measure revealed a significant main effect for locus of communication failure; however, this main effect was qualified by a significant race by locus of communication failure interaction, $F(1,92) = 8.04$, $p < .006$, $w^2 = .07$. Individual pairwise comparisons of the means contained in Table 1 revealed only a significant difference between the two locus of communication failure groups within the Caucasian condition, $t(92) = 1.98$, $p < .05$. Appar-

TABLE 2
INTERCORRELATIONS AMONG PLAN ADAPTATION INDICATORS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Route Change	—	−.04	.26*	−.10	.09	.01	.05
(2) Buildings/Words Time-1		—	.34**	−.17	−.09	−.11	−.01
(3) Buildings/Words Time-2			—	−.05	.07	.01	−.11
(4) Speech Rate Time-1				—	.54**	.05	−.01
(5) Speech Rate Time-2					—	.02	−.03
(6) Vocal Intensity Time-1						—	.74**
(7) Vocal Intensity Time-2							—
Mean	1.05	.02	.01	2.53	2.28	.92	1.05
Standard Deviation	.23	.02	.02	.57	.63	.60	.63

*$p < .01$.
**$p < .001$.

ently, the locus of communication variable induced larger differences in experienced difficulty when participants interacted with the Caucasian confederates than when they interacted with the Asian confederates. The interaction difficulty and English proficiency measures showed a moderate, inverse relationship with each other, $r = -.39, p < .01$.

Interrelationships Among Message Plan Alteration Indicators

Before embarking on tests of the hierarchy hypothesis, the intercorrelations among the four indicators discussed previously were examined. Three of the four indicators, buildings mentioned/words spoken, speech rate, and vocal intensity were measured at two points in time; however, the route change measure produced, by default, only a single score for each participant. The interrcorrelations among these indicators are displayed in Table 2.

As the correlations shown in Table 2 reveal, the time 1-time 2 correlations for speech rate, buildings mentioned/words spoken, and vocal intensity are all significant, and the route change measure shows only a modest positive relationship with the number of buildings/words spoken index during the second rendition of the directions. In general, then, setting the over-time relationships aside, the four indicators appear to be relatively independent of each other; thus justifying their treatment with separate analyses.

High level indicators. Analyses of the route change index revealed that only 5.2% of the 96 participants changed the route on which they based their directions during the second rendition. Given the extreme skew in the distribution of the route change variable, resulting in lack of variability in some cells of the design, it was not possible to compute an ANOVA for this indicator.

Mid-range indicators. Since the number of buildings mentioned by each participant might be related to the length of the directions they gave, the number of building mentioned during each rendering of the directions was divided by the number of words uttered during each set of directions to derive a rate measure which controlled for verbosity. This rate measure, buildings mentioned/words uttered, was entered as the dependent variable in a 2 × 2 × 2 ANOVA employing race, locus of communication failure and as independent variables

TABLE 3

MEANS AND STANDARD DEVIATIONS OF SPEECH RATE IN WORDS/SECOND

	Confederate Race			
	Asian		Caucasian	
	Language-Based Failure (n = 24)	Direction-Based Failure (n = 23)	Language-Based Failure (n = 25)	Direction-Based Failure (n = 24)
Time 1	2.50 (.62)	2.53 (.65)	2.43 (.44)	2.66 (.51)
Time 2	2.15 (.75)	2.26 (.58)	1.73 (.75)	2.61 (.47)

Standard deviations appear in parentheses.

with rendition (time 1 versus time 2) as a repeated measure. This analysis revealed a significant main effect for rendition, $F(1,92) = 8.48$, $p < .004$, $w^2 = .02$. Participants showed higher rates of buildings/words uttered during their first directions than they evidenced during the second rendering of their directions ($M_{t1} = .018$; $M_{t2} = .013$). No other main or interaction effects were significant. Since the buildings/words index consisted of proportions, an arcsine transformation was performed on this variable and a second ANOVA computed. This ANOVA yielded results identical to those obtained using the untransformed data.

Low level indicators. The vocal intensity measure was employed as a dependent variable in the same design as that used to analyze the buildings/words uttered variable. This ANOVA again yielded a significant main effect for rendition, $F(1,92) = 5.96$, $p < .02$, $w^2 = .05$. In the case of vocal intensity, persons demonstrated higher vocal intensity levels while giving their directions the second time than they did when giving their directions the first time. No other main effects or interaction effects were significant.

The speech rate variable was used as the dependent variable in the same design as that used to analyze the vocal intensity measure. The means and standard deviations for the speech rate measure are displayed in Table 3. The ANOVA of the speech rate measure not only revealed significant main effects for locus of communication failure and rendition, significant first order interactions were observed between race and locus of communication failure, and locus of communication failure and rendition. In addition, the triple interaction among race, locus of communication failure, and rendition was also significant, $F(1,92) = 4.73$, $p < .032$, $w^2 = .03$. As a consequence, this interaction was decomposed to determine its structure. Individual comparisons between the two renditions within each of the four experimental conditions revealed that the significant overall decrease in speech rate from rendition 1 to rendition 2, $F(1,92) = 26.33$, $p < .0001$, $w^2 = .19$, was due to the extreme drop in speech rate shown in the Caucasian-Language-Based–Failure condition, t (92) = 2.12, $p < .05$. Individual comparisons between the two time periods for the other three conditions failed to reach conventional levels of significance.

TABLE 4

CORRELATIONS BETWEEN PERCEIVED DIFFICULTY, ENGLISH PROFICIENCY, AND PLAN ADAPTATION INDICATORS

	English Proficiency		Perceived Difficulty	
	r	*p*	r	*p*
Route Change	.09	ns	.04	ns
Buildings/Words-Time 1	−.03	ns	−.05	ns
Buildings/Words-Time 2	.14	ns	−.11	ns
Speech Rate-Time 1	.11	ns	.01	ns
Speech Rate-Time 2	.35	.01	−.48	.001
Vocal Intensity-Time 1	−.14	ns	.11	ns
Vocal Intensity-Time 2	−.20	ns	.07	ns

English Fluency, Experienced Difficulty, and Adaptation

Correlations were computed between the perceived difficulty item, the perceived English proficiency item, and the parameters used to index adaptation at the various levels. These correlations are presented in Table 4.

As the correlations in Table 4 indicate, variations in the phenomenal difficulty of communicating with confederates is significantly related to speech rate during the second rendition of the directions. Persons who reported more difficulty decreased their rate of speech more while giving the directions a second time. The phenomenal experience of communication difficulty was not significantly related to any of the other indicators of plan adaptation. Table 4 also arrays the correlations computed between participants' judgments of confederates' English proficiency and the speech parameters used to index plan adaptation. The pattern of correlations for this variable is almost identical to the pattern for the perceived difficulty item. As was the case with the perceived difficulty item, the only significant correlation is between judged English proficiency and speech rate at time 2; as judged proficiency increases, speech rate also increases.

DISCUSSION

The results of this study generally provide support for the hierarchy hypothesis. This hypothesis asserts that when communicative action directed toward goals is thwarted, individuals will modify their message plans such that alterations that involve the least expenditure of cognitive resources will be made first. Several findings comport closely with this hypothesis. First, almost 95% of the participants involved in this study did not alter the route they used to convey their directions after experiencing communication failure. Second, a significant reduction was observed in speech rate from rendition 1 to rendition 2. Finally, a significant increase in vocal intensity occurred across renditions. In contrast to route alterations, these latter two indicators were posited to be lower level adaptations requiring fewer cognitive resources.

In spite of these relatively clear-cut findings, there were other results that complicate the picture to some degree. First, we suggested that an intermediate level strategy for altering a message plan in the face of communication failure would be to maintain the same route in the second set of directions but to

increase or decrease the level of detail in the directions, depending upon the locus of the communication failure. Contrary to our reasoning, however, the number of buildings mentioned, while controlling for the length of the directions given, showed a significant overall decrease in the second set of directions, and no indication of an interaction with locus of communication failure; thus suggesting a general diminution of message detail in response to communication failure. In retrospect, this finding may not be as surprising as may appear at first blush since a reasonable strategy for dealing with communication failure with respect to the task used in the present study would be to *simplify* the directions rather than to make them more complex. This simplification strategy would act to reduce the cognitive and communicative loads on both the participants and the confederates.

A second and more complex set of results was obtained for the speech rate measure. While there was a robust decrease in speech rate in response to communication failure, a result that is consistent with those reported by Longhurst and Siegel (1973), this main effect was qualified by a complex triple interaction involving the race of the confederate, the locus of the communication failure, and change over renditions. Specifically, the magnitude of speech rate decrease from the first to the second rendition of the directions in the Caucasian-language-based-failure condition was twice or more as much as the decreases observed in the other three conditions. This finding seems to be somewhat counter-intuitive at first glance, since one might expect such decreases to be even more pronounced in the interactions involving the Asian confederates. Our explanation for this complex interaction effect is that because the participants expected the Caucasian confederates to be fluent in English, they were more surprised to find that these confederates had difficulty understanding English in the language-based communication failure condition. Recall that when the participants gave the first rendition of their directions, by design they were completely unaware of the linguistic status of the confederates. It was only after they finished giving the directions the first time that they learned of the limited ability of their partner to understand English.

This violation of expectations also may be reflected in the difficulty ratings made by the participants. Here it was found that those interacting with the Asian confederates showed no differential levels of felt difficulty whether they were in the language-based or direction-based failure conditions; however, those participants interacting with the Caucasian confederates in the language-based-failure condition expressed significantly higher levels of felt difficulty in their interactions than did those interacting in the direction-based-failure condition. Since speech rate during the second rendition of the directions was the only communication parameter that showed a significant correlation with perceived difficulty, these findings suggest that the decreases in speech rate observed in the present study were not only the result of the locus of communication failure, they were also influenced by the level of difficulty participants felt during their interactions with their partners.

In view of the relatively complex interaction found for speech rate, a third and somewhat puzzling finding concerns the vocal intensity parameter. Here we found support for the often observed phenomenon that people will increase their levels of vocal intensity when others fail to understand them, even when

others do not suffer from hearing impairments. Although this finding seems quite straightforward and in line with the hierarchy hypothesis, the fact that speech rate and perceived difficulty were both sensitive to the race and locus of communication failure variations while vocal intensity was not is somewhat unexpected. One potential explanation for this divergence in patterns between speech rate and vocal intensity has to do with the relative amount of attention participants may have paid to making these alterations while their interactions were in progress. Recall that no significant correlations were observed between vocal intensity and perceived difficulty within either rendition of the directions, while speech rate during the second rendition was significantly correlated with perceived difficulty. Our supposition is that because participants may have focused their attention on speaking more slowly in response to communication failure and because they may have consciously altered their speech rate in line with the difficulty they experienced in their interaction, they did not have the requisite processing capacity available to draw consciously specific relationships between felt difficulty and any additional alterations in speech parameters. That is, because participants focused on speech rate and its relationship to both characteristics of the speaker (race) and characteristics of the communication failure (language-based versus direction-based), additional capacity was not available with which to make the same fine discriminations with reference to other speech parameters. The correlational data show that speech rate and vocal intensity are independent of each other. Had there been some reasonable degree of correlation between them, then a potential expectation might have been for them to show the same pattern of interactions with race and locus of communication failure. However, it should be kept in mind that vocal intensity did show a significant overall increase from the first to the second rendition.

Taken together, the findings for the speech rate and vocal intensity parameters suggest that within levels of message plan hierarchies there may be a number of sublevels. Clearly, some kind of implicit hypothesis or rule exerted control over the vocal intensity parameter; however, the phenomenal experience of communication difficulty was unrelated to it. By contrast, in the case of speech rate we see both a moderate overall relationship with perceived difficulty and a differential sensitivity to communicator characteristics and the locus of communication failure. Perhaps vocal intensity is only sensitive to the most general characteristics of the communication situation. Thus, for example, the rule underlying variations in vocal intensity might simply assert that when difficulties in communication arise, by default one should raise one's vocal intensity level. Whereas, for the speech rate parameter, the rule incorporates more data about the person and the interaction context and allows for the possibility that under certain conditions, speech rate might not be altered in the face of communication failure, as was observed in the Caucasian-direction-based-failure condition of the present study.

As suggested previously, another possible way to explain the divergences between the speech rate and vocal intensity parameters, which makes no particular reference to rules, is to assume that when persons direct their attention toward the conscious control of one attribute of their speech, say speech rate, they may become incapable of attending to other speech attributes. Consequently, finer discriminations with reference to environmental cues are

made on the attribute that is being monitored consciously and less fine discriminations are made on the characteristics not being monitored. This explanation would allow for the possibility that under some conditions vocal intensity might show differential relationships with communicator characteristics and the communication task; while speech rate might show relatively gross variations that are not subject to subtle differences in the communication situation. Such an explanation would have to stipulate what aspects of communicators and communication situations make these different speech parameters subject to different levels of monitoring. Clearly, more work needs to be done to explore the mechanisms underlying these differences and to test potential alternative explanations.

While the differential attention explanation may appear to contradict the notion that alterations to lower level attributes are less demanding cognitively, we do not believe this is the case. Attentional resources can be deployed to any hierarchical level and these deployments can shift over time; however, crucial to our position is the fact that the cognitive work that must be done to accomplish alterations at a given hierarchical level will vary as a function of height in the hierarchy. While it is certainly the case that low level alterations may frequently be carried out in the absence of conscious monitoring, precisely because they require fewer cognitive resources for their implementation, if individuals choose to do so, they can, and sometimes do focus their attention on these low level attributes. The hierarchy hypothesis would predict that the instances during which low level attributes are monitored for purposes of altering them are of shorter duration than the instances during which higher level attributes are monitored because of the differential loads such alteration place on the cognitive system (see Note 2). Moreover, we assume that when alterations are carried out below levels of conscious awareness, the same cognitive load differentials postulated among hierarchical levels also obtain.

A potentially plausible alternative explanation for our results focuses on the induction of negative affect. Srull and Wyer (1986) have suggested that when goal-directed action is blocked, negative affect is likely to be generated. Such negative affect might be expressed as anger that, in turn, might be indicated by both increased vocal intensity and increased speech rate (Scherer, 1981). The general increase in vocal intensity observed after thwarting fits well with this potential explanation; however, the fact that speech rate was uncorrelated with vocal intensity and showed significant *decreases* after thwarting sheds considerable doubt on the viability of this emotion-based explanation for the present findings. Furthermore, a more general explanation based on differential arousal, rather than affective valence, also fails to comport well with the speech rate findings (Siegman, 1987).

As we expected, even when the Asian confederates in the direction-based failure condition indicated that they understood participants' English well but did not follow the directions, participants tended to judge them to be as non-proficient in English as those participants who interacted with Asian confederates in the language-based–failure condition. By contrast, the English language proficiency of Caucasian confederates was judged to be extremely high in the direction-based–failure condition but as low as that of the Asian confederates in the language-based–failure condition. These judgments, no

doubt, were based on the inference that the Asian confederates did not, in fact, have a very good command of English, even when they indicated that they could understand the words well but not the directions provided in the direction-based-failure condition. However, judged English proficiency was only moderately related to perceived difficulty of carrying out the task; although, both judged English proficiency and perceived difficulty were related to speech rate during the second rendition. This pattern of results suggests that both perceived difficulty of conversing and judged English proficiency each made relatively independent but modest contributions to reductions in speech rate at time 2. Neither perceived difficulty nor judged English proficiency, however, demonstrated significant relationships with any of the other speech parameters.

During the initial rendering of the directions, race did not exert a particularly strong effect on the communication parameters examined in this study. Since the participants did not interact with the confederates prior to giving their directions the first time, the communication parameters measured during the first rendition of the directions should have been subject to maximal influence by the race variable alone. However, no interaction effects involving race and time were observed for the buildings mentioned/words or the vocal intensity parameters and race was a significant predictor of speech rate only in the context of interactions with locus of communication failure and time. Thus, by itself the race of the confederates in this study exerted little effect upon communicative action during the period in which the directions first were given. We had hypothesized that based upon inferences predicated on physically visible attributes alone direction-givers might alter their message plan hierarchies before delivering their directions the first time. Clearly, such alterations were not made.

One reason we may have failed to observe any effects of race on communicative action during the initial direction-giving period has to do with the way in which the experimental situation was structured. Even though participants were taken into the communication situation immediately after reading their instructions, there is the possibility that they were able to formulate their directions before seeing the confederate with whom they interacted. Perhaps a better test of this anticipatory message plan alteration hypothesis would be to have some persons formulate messages in the absence of targets and to have others be fully aware of the persons with whom they will be interacting. Such a manipulation might produce alterations in message plan hierarchies that reflect differential inferencing as a function of information about the target. These inferences could then be tied to variations in both message plans and to actual communication parameters in the interactions themselves.

Another result worthy of note is the modest correlation obtained between the route change and the buildings mentioned/words at time 2 indices. Apparently, the few participants who actually altered the route during the second rendering of their directions also displayed a propensity to include more detail in the form of specific references to buildings in their second directions. This does not seem to be some type of stable individual difference characteristic; since the route change and buildings mentioned/words time 1 measures were not significantly correlated. What seems to have occurred in this case is that for a very limited number of participants in this study, communication failure activated more

abstract message planning processes that produced both reformulation of the route described in the second version of the directions and greater detail. Precisely why these two aspects of message plan adaptation operate in parallel is not clear; however, the correlational data suggest that the propensity to reformulate message plans at these higher levels did not influence lower level actions, since route change was unrelated to such lower level processes as vocal intensity and speech rate. Again, it is difficult to draw definitive conclusions from these analyses because of the relatively few participants who demonstrated changes in the routes given in their second directions.

While it is certainly true that the kinds of communication failures we employed as experimental inductions in the present study may be relatively infrequent events in the lives of many persons, it is probably the case that less severe communication failures and misunderstandings are considerably more frequent in many persons' daily experiences. We would note, however, that the diverse waves of immigration into the United States during its history may have increased the frequency with which more extreme instances of communication failure occur. Nonetheless, even in less extreme instances of communication failure or misunderstanding, some of the same communicative adaptations observed in the present study very likely would be employed to ameliorate these problems. Thus, for example, when persons engage in conflict episodes, they typically raise their voices and may speak more slowly at some points in the episode to try to induce their partner to understand their position on the issue at hand. Even though participants share a language code, their level of communication failure may be as profound as that experienced by persons who do not speak the same language. Consequently, our experimental inductions, while somewhat limited, provide relatively realistic analogues to extra-laboratory communication failures involving other communication goals.

There are a number of additional message attributes that could be employed to test the hierarchy hypothesis (Grosz, 1981; Rubin, 1980). Examining alterations in the grammatical structure of messages, shifts in gesticulation, and eye-gaze patterns following communication failures might provide additional insights into the viability of the hypothesis. However, since additional evidence suggests that, within the framework of the task employed in the present study, the message plan adaptations of route alteration, landmarks, and speech rate order themselves along a cognitive load continuum in the manner we have hypothesized (see Note 2), and that we and others (Ringle & Bruce, 1980) have argued that alterations to vocal intensity are demanding of relatively few cognitive resources, we are confident that these empirical indicators in fact represent various hierarchical levels. Of course, we would not claim that the sample is in any sense exhaustive, but we would argue that it is representative.

In addition to those issues already discussed are a number of questions for future research. First, the present study constrained participants by not allowing them to question the confederates concerning specific aspects of their failure to understand. Especially in the direction-based-failure condition, a few participants actually asked confederates what it was about the directions that they did not understand. Participants who asked this question quickly realized that their instructions prohibited them from doing so and they went on with the second round of directions. Obviously, it is important to understand how persons go

about diagnosing communication failures and misunderstandings. For it is these diagnoses that partially determine the strategies that will be used to deal with the problem. Thus, future research needs to be focused on the ways in which interactants go about deciding what the problem with the conversation is before they initiate repair efforts. In this vein, Reilly (1987) has presented a list of communication failures that can occur in dialogues; however, such lists do not tell us how persons involved in interactions actually find out what has gone wrong with conversation.

A second problem area that must be considered seriously concerns the idea that sometimes, for strategic reasons, persons may either try to make others misunderstand them or ensure that they will misunderstand their conversational partner. Many treatments of miscommunication and misunderstanding are predicated on the assumption that social interactants are simply innocent victims of communication gone awry. While this may be the case frequently, it is also true that attempts at deception may involve the obfuscation of intent through both verbal and nonverbal means. In fact, when deceivers are caught in their lies, they may try to extricate themselves from them by claiming that the party who has been deceived has merely "misunderstood" their intent and that they meant no harm. In any event, it would be short-sighted to assume that communication failures and misunderstandings are always events that simply happen to innocent parties. Indeed, they are sometimes calculated (Bavelas, Black, Chovil, & Mullett, 1990; Goffman, 1969).

Finally, the present study suggests that insights about the cognitive processes that subserve the production of communicative action can be gained from the study of communication failure. As discussed previously, the differential alterations of speech rate, vocal intensity, and message detail raise some interesting questions about the cognitive control of such communication parameters. Although we have offered some hypotheses regarding these processes, they remain to be tested by future research. Since in any system, including cognitive systems, constraints and limitations tend to force prioritization of resources and functions, we believe that the study of communication failures and misunderstandings may shed considerable light on the priorities underlying the allocation of scarce cognitive resources and functions during strategic communication eposides.

ENDNOTES

[1] Prior to designing this study, we had several conversations with ESL teachers and with persons who have observed ESL teachers interacting with their students. Of those persons with whom we spoke, there seemed to be a consensus that even experienced ESL teachers tend to increase their vocal intensity when they are not being understood by their students. However, observers of the teachers seemed to be more prone to note this phenomenon than the teachers themselves; although, several ESL teachers acknowledged that they increase their vocal intensity on occasion.

[2] Some direct evidence for the degree to which alterations at different levels of message plan hierarchies place differential loads on the cognitive system has been obtained in two unpublished studies. In both of these studies, participants asked to provide geographic directions a second time because they spoke too quickly during the first rendition of the directions showed significantly shorter speech onset latencies before providing the second set of directions than individuals who were asked to provide a different route in their second set of directions. In one of the two studies, those asked to make route changes took three times longer to begin than those asked to speak more slowly. Moreover, in one of the two studies some participants were asked to provide more landmarks in their second set of directions. The mean speech onset latency for this group was significantly less than the mean observed for the route change group but significantly greater than the mean observed for the speech rate group. Assuming that speech onset

latency is an indicator of cognitive load, as has frequently been done in a number of other studies, these results suggest that route changes are more cognitively demanding than the addition of details, and that the addition of details to messages place more demands on the cognitive system than do modifications in such parameters as speech rate. Neither of these studies examined the effects of requesting alterations in vocal intensity on speech onset latency; however, we assume that, like changes in speech rate, alterations in vocal intensity require relatively few cognitive resources for their accomplishment.

[3]Since the study was conducted in an urban setting, buildings, as opposed to other landmarks, were more frequently referenced in the directions. Consequently, we confined our analysis to these landmarks.

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