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Mutual Adaptation and Relativity of Measurement

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Chapter 6

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An understanding of relationships and communication patterns, in my view, can proceed only by our asking questions about the association between *patterns* of message interchange between partners and the partners' experienced state of the relationship. Elsewhere I have called these kinds of questions third-order questions (Cappella, 1987, 1988), if only to distinguish them from simpler questions that could be asked about interpersonal communication. These simpler questions concern (1) the types and structures of behaviors enacted in interpersonal encounters, (2) the processes of encoding and decoding such behaviors, and (3) the magnitude and type of influence, if any, that one person's overt behavior has on the partner. This last group of questions focuses on processes that have been called adaptation, mutual influence, synchrony, congruence, coordination, and a variety of other names.

In this chapter I give primary attention to the ways in which the interaction patterns exhibited by couples like the Stones might be measured and the implications of measurement assumptions on the kinds of findings that might be generated. But, frankly, most research in personal and social relationships bypasses the actual interaction patterns in favor of more static features of the relationship. Why, indeed, should the Stone's interaction patterns be the focus of our research efforts, given the complexity and cost of obtaining such information in contrast to simpler and cheaper methods?

Why Study Patterns of Interaction

Mutual adaptation is arguably the essential characteristic of every interpersonal interaction. In this sense the Stones could not even be said to have an interpersonal communication unless they exhibit mutual adaptation. The basis for this argument is fourfold.

1. *Mutual adaptation is the defining characteristic of interpersonal communication.* If Cathy Stone's behaviors do not affect Michael's uniquely and mutually (see Cappella, 1987), then contingent responsiveness is not present and she cannot be said to be observably sensitive to alterations in his actions. Without such contingent responsiveness it would be impossible to distinguish interleaved action from interaction.

The implications of this definition are several. First, patterns of interpersonal communication can be categorized in terms of the degree and type of mutual adaptation present (Cappella, 1988). Second, mutual adaptation is not inherently good or bad for relationships. For example, reciprocity of hostile affect between husbands and wives like the Stones is a strong type of mutual adaptation that is also associated with greater marital distress (Gottman, 1979). Third, the interactional domain is analyzed separately from the domain of relational state and personal competency, thereby allowing the proper study of third-order questions. Fourth, without assessing mutual adaptation one cannot know the degree of sensitivity, if any, that persons show to the behavior of their partners. Not only can the absence of sensitivity be informative, but also excessive sensitivity to certain types of remarks and actions may be diagnostic of relational difficulties.

2. *Mutual adaptation in verbal & nonverbal behavior is pervasive in interpersonal encounters.* A substantial body of research indicates that social interactions exhibit mutual adaptation for behaviors as diverse as accents, speech rate, vocal intensity, postural and gestural behaviors, movement, gaze, facial affect, self-disclosure, and excuses (Cappella, 1981; 1985; in press). The variety of behaviors implicated in mutual adaptation is testimony to the centrality of this process and the mechanisms behind it in human interaction. Deciding whether the Stones exhibit mutual adaptation, however, would require a richer data base, including both kinesic and vocal information, and a much longer stream of dialogue.

3. *Mutual adaptation pervades relationships even from the first instances of infant–mother interaction.* Studies reviewed by Cappella (in press) and Field (1987) show that infants who are weeks and, in a few cases, even hours old adapt to their adult partners in vocal, gaze, facial, and

movement behaviors. Such evidence underscores the centrality of mutual adaptation in human social interaction.

4. *Mutual adaptation covaries with important relational and individual conditions.* Positive social evaluations have been associated with certain types of mutual adaptation in interaction. Welkowitz and Kuc (1973) found that partners who were rated higher on warmth also exhibited greater similarity on speech latency. Street (1982) constructed audiotapes in which an interviewee's speech rate, latency, and duration converged, partially converged, or diverged with respect to that of an interviewer. The divergent speech of interviewees was evaluated more negatively on social competence by observers. Similar findings on rate, content, and pronunciation were obtained by Giles and Smith (1979). These findings have been replicated in naturalistic contexts as well (Street, 1984).

It is not only vocal features of speech that are related to evaluative social judgments. Davis and Martin (1978) found that the percentage of responsive comments, independent of their frequency, was positively related to attraction. Davis and Perkowitz (1979) observed that pleasurable shocks given by subjects to recipients depended on how responsive the recipient was and the appropriateness of the response by the recipient. Recent work by Bernieri (1988) found that judges' ratings of movement synchrony between high school students in a teacher–student setting were positively associated with the students' self-reports of rapport, a conclusion espoused by Tickle-Degnen and Rosenthal (1987) on the basis of their literature review. The research summarized above suggests that the presence of mutual adaptation is associated with positive assessments of interactions both by observers of the interaction and by participants.

Accumulating evidence is beginning to suggest that deviation from normal mutual adaptation processes may be characteristic of certain at-risk populations. Fararone and Hurtig (1985) studied socially skilled and unskilled males in interaction and found that conversations judged to be skilled ones showed a greater degree of sequential patterning than did the less skillful conversations. Feldstein, Konstantareas, Oxman, and Webster (1982) observed reciprocity in certain speech behaviors for counselors and parents of autistic children but not between the autistic children and their parents. Similar findings have been obtained with adult schizophrenics (Glaister, Feldstein, & Pollock, 1980) and depressives (Jaffe & Anderson, in press) who were less reciprocal than normals.

At the relationship level Gottman's (1979) widely cited findings are also relevant to the relationship between interaction and outcome. Although all of his couples tended to show reciprocity in hostile affect in discussions about common problems in their marriages, the less well adjusted couples showed greater hostile affect than the better adjusted couples. These find-

ings have been replicated by Gottman (1979) using the data of Raush, Barry, Hertel, and Swain (1974) and in other contexts by Margolin and Wampold (1981) and Schapp (1982). Pike and Sillars (1985) also found greater reciprocity in negative vocal affect for dissatisfied, as opposed to satisfied, married couples. In Noller's (1984) study, using face-directed gaze rather than negative affect as a dependent variable, satisfied couples exhibited greater correlation between partners than did the dissatisfied couples. Overall, partners in satisfying, established relationships appear to differ from those in less satisfying relationships in the type of mutual influence seen in their interaction. Obviously, the patterns of interaction exhibited by the Stones would have to be evaluated on several levels of verbal and nonverbal content to determine what, if any, patterns are followed. Patterns could be reciprocal on certain behaviors and compensatory on others. The association between patterns and relational outcomes is a relative one and would require comparable observations on other couples who differed from the Stones in their relational satisfaction.

Measuring Interaction

Once one has chosen to study the observable patterns of interaction in a relational setting, one is faced with important measurement decisions. These decisions have implications for the cost of the research (in time and money), for the level at which processes are studied (microscopic to macroscopic), for the kinds of adaptation patterns that are observed (from reciprocal to compensatory) and possibly for the kinds of associations between patterns and outcomes that could be obtained. Measurement tools are certainly not neutral devices through which information is acquired. Rather, they are researchers' theory-driven constructions of the social world.

Approaches to the measurement of behaviors expressed in interaction are limited only by the imaginations of researchers who carry out those measurements. It is not possible to offer a comprehensive characterization of measurement schemes for interaction both because of space limitations and the fact that such schemes can be made obsolete with the next inventive leap. I will, however, try to represent those approaches to measurement that are amenable to quantitative application and that are in wide use.*

All measurement approaches to interaction have certain features in common. The measurement of an interactional event is a representation of

*Actions expressed in interaction can obviously be assessed through qualitative means, as evidenced by the vast upsurge of research employing conversation-analytic, ethnographic, and interpretive approaches (Cheney & Tompkins, 1988; Jacobs, 1988; Zimmerman, 1988).

the event in a specified "frame of reference" through a set of rules of translation. The interactional events may be live or may already have been modified through representation in another media, for example, videotape, audio recording, or typescript. The representation in the new frame of reference will always be a homomorphic transformation; that is, the representation is less informationally complex than the original. The "rules of translation" that give rise to the representation can be implicit or explicit, can span the spectrum from machine algorithms to human perceptions, and can be incredibly simple (for example, speech and nonspeech according to the rules of Jaffe & Feldstein, 1970) or numbingly complex (facial affect according to Ekman & Friesen, 1978).

All rules of translation will be inferential to some degree. The degree of inference can vary from the low end, which focuses primarily on the brute features of the behavior (e.g., talk vs. silence, face-directed gaze vs. gaze aversion) to the high end, which concerns interpersonal functions (or meanings) that the behavior serves (e.g., hostile affect, dominance). Even rules of translation derived from machine-based measurements involve some level of inference. For example, the assessment of fundamental frequency of voice depends on the algorithms for analyzing speech signals (Scherer, 1982).

RULES OF TRANSLATION

Four major approaches to interactional measurement are considered in this chapter: coding, rating, participant judgment, and observer judgment. I have chosen these four because each of them has been used in programmatic quantitative studies of adaptation in interaction and represents a class of translation rules for measuring interactional events. Any quantitative measure of social interaction involves the assignment of a value on some scale to a segment of interaction. The segment may be a thought unit, a turn, a fixed unit of time and so forth (see Cappella, 1987; Folger, Hewes, & Poole, 1984).

In the coding approach, values are objectively assigned to segments of the interaction according to precise rules applied by analog devices (e.g., pitch detectors) or by trained coders (of, for example, facial muscle positions indicative of smiling). In the rating approach, values are assigned to segments of the interaction by trained raters according to rules indicating the approximate quantity of behavior within the segment (e.g., smiling on an 11-point scale from "none at all" to "constant"). The coding and rating approaches are based on rules of translation supplied by the researcher and are carried out by translation "devices," which can be machines or trained individuals. In general, coding and rating approaches have employed low-level inference rules of translation. They have focused primarily on the

more objective aspects of the interaction, rather than on aspects requiring more interpretive assessments. Neither approach requires low-level inferences in principle, but questions of reliability and validity (Cappella, 1987; Folger, Hewes, & Poole, 1984) certainly limit the use of high-level inference rating and coding systems.

In the judgment approach untrained persons, either participants or observers, act as judges, assigning values according to their perceptions of the "meaning" of the segment; for example, depending on the task, the segment may be perceived to be hostile or affiliative, synchronous or asynchronous, controlling or equalitarian and so on. The rules of translation in these approaches are supplied by the individual judges, either through their unique perspective on the interaction (e.g., as the partner of a participant) or their perspective as a competent member of the culture of observers. In general, the judgment approach has focused primarily on the more interpretive or meaningful, rather than the objective, aspects of the interaction. It makes little sense to have participants indicate frequency of certain types of acts when disinterested and trained observers can do so equally well or better. Despite this common practice one could use observers or participants as judges on low-level measurements about interactional events.

The record of the sample interaction of this volume, the Stones' dinner conversation, is a written transcript stripped of its rich vocal and kinesic textures. Despite this lack, the written transcript can be coded or rated by trained observers according to the dictates of the translation scheme adopted by the researcher. A group of judges, as cultural informants, can also be imported to evaluate segments of the interactional stream according to meaningful categories of judgment. Of course, the Stones themselves can do the same with regard to their own and their partner's behaviors.

APPLICATIONS IN STUDIES OF MUTUAL ADAPTATION

The above four approaches to measurement in social interaction have been chosen because each has been the method of choice of a particular research program committed to the study of mutual adaptation, and other facets of interaction as well. The coding approach characterizes my own approach to measurement (Cappella, Palmer, & Donzella, 1989; Cappella & Planalp, 1981; Street & Cappella, 1989). Gottman (1979) has employed both coding* and participant judgment procedures in his studies of distressed and nondistressed married couples. Recently, however, Levenson and Gottman (1985) have argued that the only appropriate measure of a couple's expressed affective state is that provided by the couple:

*Gottman's (1979) coding rules appear to be a mix of coding and rating procedures, depending upon the behavior being evaluated.

> Compared with having an observer code or a professional rate marital satisfaction on the basis of a couple's behavior, the advantage of . . . having the couple provide affect ratings derives from a simple and perhaps obvious fact. The only observers who we can be certain are applying the appropriate normative metric to a couple's marital interaction are the husband and wife themselves. (p. 93)

Gottman (1979) reports that affect measured by coding and that measured by means of participant judgments are similar in the aggregate, but information on segment-by-segment similarity is not yet available.

Rating approaches have been employed by Burgoon (Baesler & Burgoon, 1987; Burgoon & Hale, 1988; Burgoon, Olney, & Coker, 1988) in her studies of interactional adaptation and in her other studies of nonverbal behavior. Advocates of rating argue that if trained, attentive raters can form reliable impressions of the interaction, then the more precise information provided by coding techniques may be unnecessary. Moreover, it is argued, participants may not process the features of social interaction as fully as coding approaches imply. In this view coding approaches are unnecessary both because of their cost and because they are more precise than participants' actual perceptions.

Observer judgment approaches have been the method of choice employed by Rosenthal and his colleagues (Bernieri, 1988; Bernieri, Rednick, & Rosenthal, 1988; Rosenthal, 1987). In this method, groups of observers are asked to make various judgments, often at a high level of inference, about multiple examples of interactional segments. The observers can be viewed as a group of cultural informants whose judgments of the segments, if reliable, could be treated as culturally accepted meanings. Reliability becomes as an effective reliability across judges and stimuli which are treated as replications (Rosenthal, 1987) so that high levels of correlation among judges are not necessary to achieve acceptable levels of reliability for the group.

Each of these approaches to measurement has had some predictive success in various domains, especially in studies of adaptation. Thus, predictive adequacy is not at issue. What appears to be at issue is which frame of reference offers the best representation of the reality that is being measured.

Some Comparisons of Measurement Approaches

The coding approach clearly has the capacity to provide more precise and accurate representations of interactional behaviors than other approaches. However, it does so at considerable cost in time and money. When multiple behaviors are to be coded, as is more and more frequently the case, researchers adopting a coding approach spend most of their time with training and coding activities. Coding approaches also implicitly assume that every

behavior at every temporal segment is equally important. This is a dubious assumption in terms of what participants in an interaction are capable of noticing and responding to. The information density of social stimulation and its temporal variability certainly imply that participants and observers will employ some sort of simplifying heuristics in processing the incoming flux of stimulation (Cappella & Street, 1989). Coding approaches are also typically, though not necessarily, brute representations of interactional behavior. The meanings or functions of the behaviors must be ascertained indirectly through their predictive adequacy.

Rating approaches are similar to coding approaches in that the brute features of interactional behaviors typically are the central focus, rather than the meanings of the behaviors. Rating approaches are also more easily adjusted to include higher-level inferences (for example, fluency ratings) but are likely to encounter reliability problems with very high level inferences such as dominance ratings. Ratings are certainly more cost-effective than coding procedures, since longer segments are evaluated. They also handle the problem of excessive detail by allowing raters to act as perceptual filters reducing the level of detail that coding approaches necessarily provide.

In buying these advantages, a certain cost is incurred. One does not know if the ratings are veridical measurements of what is actually occurring during interaction or if the ratings represent filtering through what might be cultural stereotypes. For example, in rating fluency first and eye gaze on another pass through the data, a rater with a stereotype that gaze and fluency are signs of social competence might offer consistently higher ratings on these behaviors to a person who appears to be a competent interactant. The person who must code such behaviors has a cognitively more difficult task and would have to operate at a surface level of perception. In any case, there is no evidence, to my knowledge, about the relationship between ratings and codings in terms of accuracy.

The predictive success of both Gottman's and Rosenthal's work suggests that the judgment approach to measuring social interaction is an effective one. Certainly, the judgment approach is more efficient than either the rating or coding approaches in that it bypasses the problem of excessively detailed information that both ratings and codings provide and moves directly to the meanings that the participants or cultural observers would offer. Instead of representations of brute behaviors, the meanings of those behaviors are typically provided. Also, judgment approaches replace researcher-defined norms with norms from two privileged groups: those responding to the behavior and those representing the cultural group's norms.

However, the judgment approach provides no insight into which objective features of the interaction, if any, produce the participants' and observers' perceptions. Without information about how actual interactional behavior is translated into perceptual judgments, the pragmatic value of

interactional research is limited. Training programs aimed at improving communication cannot be based merely on the perceptions that interaction creates but must be based on the features of the interaction that give rise to the perceptions. In effect, the knowledge about effective social interaction that is being generated by the judgment approach is at least one step removed from the interaction process itself, and conclusions about how interaction functions are really conclusions about how perception functions.

An Analogy

The four approaches to measuring social interaction provide four quite different frames of reference. The approaches can be compared on criteria such as precision, completeness, susceptibility to distortion, efficiency, meaningfulness, psychological reality (processing limitations), and utility. Each satisfies certain desirable criteria while failing on others. Can we choose among these approaches? Shall our studies of social interaction be measurement dependent so that, for example, the nature of mutual adaptation processes will depend on the frame of reference within which studies are conducted?

I think that these are the wrong questions. Consider an analogy. In the physical sciences the trajectories that projectiles are observed to follow depend on the frame of reference from which one does the observation (Hawking, 1988). Such apparent complexity does not lead to the conclusion that the physics of projectile motion is unique to each frame of reference. Rather, the physicist is led to search for methods of transforming the findings within one frame of reference to other frames of reference. The physics of projectile motion remains the same in all frames of reference, but the superficial manifestations differ as a function of the frame of reference of the observer.

My proposal is simply that the search for the privileged frame of reference for measuring social interaction not even begin. Instead, our search should be directed at transforming the results from one frame of reference to another by developing mappings from the more objective measurement frames to those represented by participant and observer judgments.

Research Strategies

The research being suggested is not simply a set of studies in the decoding tradition of verbal and nonverbal research (Duncan, 1969; Rosenthal, 1987). Such research is voluminous (Burgoon, Buller, & Woodall, 1989; Cappella & Palmer, 1989) but tends to be univariate rather than multivariate, static rather than dynamic, and aggregated at the group level rather than at the individual level.

To study the process of transformation from one frame of reference to another, one must have process data on codings, ratings, and participant

and observer judgments for a representative set of interactions. Two studies directly relevant to the transformation question have been conducted in our laboratory. On the basis of the static studies of interpersonal dominance, Palmer (1989a) reasoned that turn-by-turn judgments of dominance should be related to the degree of floor holding and topical switching at each interactional turn. To test this hypothesis, he divided a transcript of a nondirected conversation into turns. One group of observers judged the degree of dominance by one partner or the other at each turn; another group judged the degree of topical relatedness to the previous conversational turn. The length of the turn was based on the number of words in each turn. Thus, three series of data were produced at each turn: degree of topic relatedness, turn length, and judged dominance.

Using time series regression procedures, dominance judgments were predicted from current and prior values of turn length and topic relatedness. Turn length was positively associated with judged dominance, and relatedness was negatively associated with it. These findings mean that the person holding the floor longer was seen as the more dominant, and the person whose topic differed to a greater extent from that of the partner's prior topic was seen as more dominant. Importantly, these judgments changed as turns evolved temporally, and more of the variance in judged dominance was carried by the topic differences than the turn length.

Although this study was limited in scope, its findings are significant for claiming that length of speaking turn and topic unrelatedness are perceived, at least by observers, as signs of interpersonal control. The study did not have participants' judgments or ratings of turn duration and so is of limited usefulness to the study of transformations.

A later study by Palmer (1989b) used a larger number of coded nonverbal behaviors, observers who judged both affiliation and dominance, and a larger set of stimuli. The study was unsuccessful. In this case, the temporal cross-correlations between the nonverbal codes (and various combinations of codes) did not predict reliable observers' judgments of either dominance or affiliation even though there was variance in these judgments.

With the little data that we have thus far we must conclude that the possibility of discovering transformations from one frame of reference for interactional meaning to another is uncertain. I believe, however, that the continued search is worth the effort.

Conclusion

Research on communication and personal relationships in my work takes the form of studying certain basic processes. These are the processes of mutual adaptation and the relativity of meaning across systems of coding.

The rationale for focusing on adaptation processes is, first, that adaptation is a defining feature of interpersonal communication. Its absence implies an insensitivity to the partner's behavior that undermines the apparent interpersonal character of face-to-face encounters. Second, adaptation is a process central to the functioning of the human organism and is perhaps diagnostic of interpersonal and individual competence. Although all the chapters of this book are aimed at evaluating the Stones' interaction, such work is atypical of the published research in personal and social relationships.

Studies of adaptation are difficult to carry out, being labor-intensive and employing techniques not generally taught in standard methodology courses. As one moves from studying adaptation per se to the relationship between patterns of adaptation and relational outcomes, issues of statistical power become significant. At a different level, the nature of the adaptive pattern likely to discriminate between relational types will depend on the kind of behavior to which adaptation is being made (Cappella, 1988). Thus, in a sense, it is not adaptation per se that is related to interpersonal outcome or to individual state but the adaptation by content interaction that is predictive.

One of the ways to understand the nature of interactional content is through its measurement from different frames of reference. To claim that the same content may be evaluated differently from different frames of reference (or measurement systems, since measurement is nothing more than a means of translation) is to make an uncontroversial claim. What is controversial and, in my opinion, deserving of thorough empirical scrutiny is whether alternative frames of reference can be transformed from one to another.

A variety of practical and theoretical outcomes could be realized from research on the mappings among measurement frames. First, the motivating question for this research asks whether participant or observer judgments of the meaning of social interaction can be accounted for in terms of more objective features of the interactions revealed by codings and ratings. If a mapping from objective interactional features to judgments can be found, then (1) training in the affected populations can be aimed at behaviors that give rise to interpretations deleterious to the functioning of the relationship, (2) the judgment approach to interactional measurement can be said to be a viable procedure for measuring interaction, rather than simply a nebulous form of global judgment, and (3) findings about relational outcomes based on the judgment approach to interaction can be viewed as statements about what is actually happening interactionally. If a mapping from codings and ratings to judgments cannot be found, then the judgment approach to measuring social interaction must be called into question. Since participants' judgments do predict relational satisfaction, the judgments must be based on some aspect of the setting not captured by the in-

teractional features themselves. Judgments would still predict relational outcomes but would be unrelated to interactional patterns.

Second, if a mapping from codings and ratings to judgments can be found, then the data base for research into on-line impression formation will be significantly enhanced (Hastie & Park, 1986; Basili, 1989). People in interaction clearly cannot be processing all the sensory features of the stimuli to which they are being exposed. They must be using some shortcuts or heuristics in moving from the dynamic and information-rich interaction to judgments about it and the other person (Cappella & Street, 1989; Cappella & Palmer, 1989). The mappings from codings and ratings to judgments, if they can be found, would have the capacity to illuminate just what these shortcuts might be.

Third, the assumption of attribution theorists that participants in an interaction make judgments different from the judgments of observers (Cappella & Street, 1989; Jones & Nisbett, 1971; Kelley & Michela, 1980) can be tested by comparing the judgments of observers and participants in their continuous on-line perceptions of the interaction.

Fourth, the effectiveness of coding and rating approaches can be compared. Coding interaction is costly and labor-intensive, but it is also precise and less susceptible to bias. Rating interaction is more efficient in time and cost but also less precise and more likely to introduce biased scores; with ratings one can never be certain of the relationship between the ratings and what has actually transpired in the interaction. If, however, it can be shown that ratings predict judgments better than codings do, then they should be preferred to codings.

Fifth, a mapping between codings or ratings and judgments will provide information about the social meanings of objective behaviors in a way that is especially pertinent to their function in interpersonal encounters. Objective codings of interaction without knowledge of their meanings to the participants and to the culture at large (observers) are as useless as perceptions of the interaction without firm knowledge of what the perceptions are based on.

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