

# Causal Chunking: Memory and Inference in Ongoing Interaction

William B. Swann Jr., Brett W. Pelham, and David C. Roberts  
University of Texas at Austin

We propose that people simplify their perceptions of their interactions by organizing them into discrete causal chunks. Once formed, these chunks presumably influence the extent to which people are aware of their influence on others, as well as their impressions of others. We anticipated that people would form *self-causal* chunks (e.g., my action causes my partner's action) when they possessed an offensive set and *other-causal* chunks when they possessed a defensive set. We also expected that a self-causal chunking strategy would make salient people's influence on their partners and thereby discourage them from concluding that their partners' behaviors reflected underlying dispositions. In contrast, we anticipated that an other-causal chunking strategy would obscure people's influence on their partners, thereby encouraging them to infer that their partners' behaviors reflected underlying dispositions. We tested these hypotheses by inducing participants to develop either a defensive or an offensive set prior to interacting with another person in a simulated arms race. After the interactions, we assessed the manner in which participants chunked their interactions, as well as their impressions of partners. The results supported our predictions. The implications of these findings for understanding conflict and misunderstanding in interpersonal relations are discussed.

... if, as they maintain, the best way to preserve peace is to prepare war, it is not altogether clear why all nations should regard the armaments of other nations as a menace to peace. However, they do so regard them, and are accordingly stimulated to increase their armaments to overtop the armaments by which they conceive themselves to be threatened. . . . Yet these greater armaments are in turn interpreted by neighbors as constituting a menace to themselves and so on. (C. E. M. Joad, 1939, p. 69)

To outside observers, participants in interactions such as the arms race often seem to be missing something. Such individuals frequently complain that the threatening overtures of their adversaries are forcing them to take appropriate precautions. Yet they completely overlook the fact that their own "precautions" are eliciting the very behaviors they find threatening. Such oversights lead to further difficulty. Unaware of the degree to which their own actions have provoked hostility, they conclude that the actions of their adversaries signal malicious intent. They therefore feel justified in taking additional defensive measures, which are, of course, seen as provocations by their counterparts.

Although underestimating the causal influence of one's own actions on others is an important potential source of conflict in interpersonal relations, conflict may also arise when people

overestimate their contribution to the outcome of the interaction. For example, coworkers sometimes overestimate their own input into joint projects (e.g., Johnston, 1967), married couples take too much credit for their own influence on decisions pertaining to their relationship, and athletes are overly impressed with their contributions to their teams' victories (Ross & Sicoly, 1979). These and similar instances suggest that people sometimes err in assuming that they have too much, rather than too little, influence on their interaction partners.

The fact that people seem to have difficulty accurately gauging their influence on others is interesting—and troubling—because such difficulties may cause them to behave in ways that promote conflict and misunderstanding. Given this, it is important to learn more about the psychological processes that underlie people's estimates of their influence on others.

## Interaction Sets, Chunking, and Social Inference

It is quite possible that people may deliberately misrepresent their actual level of awareness of their influence on others. For example, national leaders involved in the arms race may be fully aware of their constraining influence on their adversaries but may refuse to acknowledge such influence because doing so would undermine their claim to moral superiority. Although such conscious distortion of interaction sequences almost certainly occurs, in this article we are interested in unintentional distortions that grow out of the manner in which information is organized and stored in memory.

Our basic argument is that people's psychological sets influence the manner in which they *chunk*, or organize, their perceptions of their interactions, and that their chunking strategies, in turn, influence their impressions of their interaction partners. We should note that each component in our formulation has been carefully scrutinized by earlier researchers. Investigations

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This research and the preparation of this article were supported by research funds (MH 37598) and a research scientist development award (MH 00498) from the National Institute of Mental Health to the first author, and by a National Science Foundation graduate fellowship to the second author.

We are grateful to Dan Batson, Roy Baumeister, Dan Gilbert, Nancy Hazen, Charlie Lord, and Dan Wegner for comments on this research and to Debbie Fisher, Toni Giuliano, and Rick Siem for assistance in pilot investigations.

Correspondence concerning this article should be addressed to William B. Swann, Jr., Department of Psychology, University of Texas, Austin, Texas 78712.

of the impact of psychological sets can be traced at least back to the seminal work of Bruner (1957) and Jones and Thibaut (1958) in the 1950s. Chunking has been an equally venerable topic within psychology, starting with the Gestalt psychologists and their discussions of "unit formations" (e.g., Koffka, 1935) and resurfacing later in theories of memory (Miller, 1956), cognition (e.g., Neisser, 1976), and communication (Watzlawick, Beavin, & Jackson, 1967). Several workers (Heider & Simmel, 1944; McArthur, 1978; Newton, 1976; Sillars, 1981; Watzlawick et al., 1967) have even considered possible relations between chunking-related phenomena and social inference processes.

We begin our analysis of the interplay between people's psychological sets, chunking, and inferences by identifying two distinct sets: an *offensive* and a *defensive* set. People often adopt an offensive set when they are intent on controlling or influencing someone's behavior. For example, consider the fighter struggling to subdue his opponent, the bully practicing the art of intimidation, or the politician hustling a vote. Because such individuals are trying to influence their interaction partners, they will be particularly attentive to the links between their actions and the actions of targets but will fail to notice that their partners' actions are influencing their own actions.

Individuals who adopt an offensive set, then, will tend to organize their perceptions of the interaction into successive chunks composed of "my action-partner's action" units. Such a *self-causal* chunking strategy makes salient the causal influence of the actor's own actions on the partners' actions but obscures the impact of their partners' actions on their own actions. Adopting a self-causal chunking strategy should therefore make people highly aware of the influence of their own actions on the actions of their partner. Furthermore, because this chunking strategy highlights the constraining influence of individuals on their interaction partners, it should discourage them from assuming that their partners' actions reflect underlying dispositions (e.g., Jones & Davis, 1965; Kelley, 1971).

In contrast, people should tend to develop a defensive set when they believe that they are in a subordinate or dangerous position and that they should therefore follow the lead of their interaction partners. Interviewees, students, or participants in the arms race often adopt this set. Because such individuals are trying to respond appropriately to the overtures of their interaction partners, they may be particularly attentive to the links between their partner's actions and their own actions but fail to notice evidence of their own influence on their partners.

This reasoning suggests that defensive sets may cause people to organize their perceptions of the interaction into "partner's action-my action" chunks. Such an *other-causal* chunking strategy highlights the causal influence of their partners' actions on their own actions and obscures the impact of their own actions on their partners' actions. People who adopt an other-causal chunking strategy should therefore be rather unaware of the influence of their own actions on the actions of their interaction partners. Moreover, because this chunking strategy obscures the constraining influence of their own actions on the actions of targets, it should encourage them to infer that the actions of their partners reflect underlying dispositions.

To test these hypotheses, we encouraged participants to form either an offensive or defensive set prior to interacting with an

other individual. During the interactions, participants played the roles of political leaders discussing the issue of nuclear arms by exchanging actual press releases taken from U.S. newspapers. After the interactions, we assessed causal chunking by a cued-recall procedure (the memory measure of chunking) and also by tapping the extent to which participants indicated that their interaction partners' behaviors were caused by their own actions versus their partners' dispositions (the verbal measure of chunking). In addition, we examined participants' impressions of their interaction partners.

We expected that individuals encouraged to form an offensive set would tend to organize their perceptions of the interaction into self-causal chunks and refrain from imputing dispositions to their partners. In contrast, we expected that those encouraged to form a defensive set would tend to organize the interaction into other-causal chunks and impute dispositions to their partners.

## Study 1

### Method

#### Participants

We recruited 48 male students from the University of Texas at Austin to participate in this experiment for credit in their introductory psychology course. We used only males because pilot testing revealed that they were particularly interested in the task and, consequently, were more inclined to attend to the instructions. Two pairs of participants in the offensive condition were dropped from the analysis for failing to follow instructions, and two individuals were dropped (one from each condition) because they completed the dependent measures improperly, leaving 42 participants in the sample.

#### Procedure

To eliminate the possibility that participants might form impressions of one another on the basis of physical appearance, we seated participants in separate rooms during the experiment and allowed them to communicate with one another only through a simulated "hot line". A male experimenter introduced the study as an investigation of the social interactions of political leaders. He then asked participants to complete a background questionnaire about themselves that consisted of five 7-point bipolar trait scales (domineering, commanding, dominant, forceful, takes charge) embedded in a series of five distractor items (e.g., intellectual). This scale, which was designed to assess participants' self-perceived aggressiveness, proved to be internally consistent (coefficient  $\alpha = .88$ ).

After completing the background questionnaire, participants learned that they would be adopting the role of a national leader and discussing issues related to nuclear arms with a person seated in a nearby room. They learned further that they would be selecting statements from a booklet provided by the experimenter and then reading the statements into a simulated hot line.

*Set manipulation.* To test the possibility that the set manipulation would cause the members of each pair of participants to focus on precisely the opposite pattern of causality occurring in the interaction, we always gave both interaction partners the same set manipulation. Our expectation was that in the offensive set condition, both interaction partners would believe that they were controlling the interaction. In contrast, we anticipated that in the defensive set condition, both partners would believe that their partner was controlling the interaction.

Offensive set participants learned that their goal in the interaction would be to convince their partners that they were very powerful leaders who would initiate a first strike with nuclear weapons if conditions made it necessary. They were to accomplish this task by choosing and making statements that would let their partners know that they were not to be taken lightly and that would impress on their partners the strength of their positions.

In contrast, participants in the defensive set condition learned that their task would be to decide whether they would be willing to initiate a nuclear first-strike against their partners based on the statements their partners made during the interaction. The best way to achieve this goal, participants learned, was to attempt to match their partner's behavior by following each of his statements with a statement of their own that was equally aggressive.

All of the participants learned that they would take turns making statements until each one had made a total of six statements. The statements used in the interactions were derived from actual press releases made by political leaders and reported in major U.S. newspapers. The statements ranged from highly belligerent ones (e.g., "To continue your present nuclear build-up is to court disaster," "We will not tolerate any threats to our national security") to highly conciliatory ones (e.g., "Our goal is to establish a climate of mutual trust," "We desire only peaceful competition and cooperation with your people").

After participants indicated that they understood the procedure, the experimenter explained that he was also interested in how well people could remember their interactions when they were unable to see their interaction partner. To diminish the possibility that participants would feel any implicit demand to remember their interactions in the manner suggested by the set manipulation, the experimenter said that he would provide the participant who remembered his interaction most accurately a prize of \$15 at the completion of the project. He then indicated that a coin toss had determined which of the two participants would begin the interaction and signaled that participant to begin by reading his first statement. Participants then began reading their statements. After making their first and fourth statements, participants encountered a one-sentence written reminder of the set manipulation.

*Measures of chunking.* After their interactions, participants completed a memory and a verbal measure of chunking. The memory measure consisted of a cued-recall task. Participants received a sheet of paper with three columns and four rows on it. A "before column" ran down the left side of the page, a "cue column" ran down the middle, and an "after column" ran down the right side. Four memory cues appeared in the center column. These cues were always the 2nd, 5th, 8th, and 11th statements made during the interaction (order of cue presentation was randomized, however). In this way, we ensured that each participant would receive two of his own statements as cues and two of his partner's statements as cues.

Participants were asked to remember what statement occurred immediately before and after each cue statement. To assist them in their efforts, they received a randomly ordered list of all statements that could possibly have been made during the interactions. Each statement was numbered. After guessing which statement came just before and which came just after the cue statement, participants placed the appropriate number in the appropriate space in the *before* and *after* column.

Participants could achieve a perfect score on the recall test by correctly identifying the four statements that were made before the cue statements and the four statements that were made after the cue statements. Translated into the language of chunking, each participant could display evidence of a self-causal chunking strategy (my statement-my statement units) in two ways: (a) by reading the two cue statements that he had made and correctly identifying the two statements that his partner had made after each of his own statements, and (b) by reading the two cue statements that his partner had made and correctly identifying

the two statements that he himself had made before each of his partner's statements. In contrast, each participant could display evidence of an other-causal chunking strategy (his statement-my statement units) in two ways: (a) by reading the two cue statements that he had made and correctly identifying the two statements that his partner had made before his own statements, or (b) by reading the two cue statements that his partner had made and correctly identifying the two statements that he himself made after his partner's statements.

After completing the memory measure, participants completed a verbal measure of chunking. Participants first indicated their perceptions of why their partners behaved as they did, on a scale ranging from *the type of person partner is* (1) to *the statements I chose* (7). After completing the measures of impressions (described next), participants indicated why they behaved as they did on a scale ranging from *the type of person I am* (1) to *the statements my partner chose* (7).

*Measures of impressions.* Participants completed two measures of impressions. First, participants estimated their partners' willingness to initiate a first strike with nuclear weapons on a scale ranging from *not at all willing* (1) to *very willing* (7). Second, participants indicated their impressions of their partners' dispositional aggressiveness by rating them on ten 7-point bipolar scales (e.g., aggressive, hostile, seeks harmony). Before summing these items, we performed an item analysis that revealed that one item ("commanding") diminished the internal consistency of the scale. We accordingly deleted this item, raising the coefficient alpha of the measure of perceived aggressiveness to .83.

*Measure of final self-perceptions.* To determine whether the set manipulation influenced participants' perceptions of themselves, we asked them to indicate their own willingness to initiate a first strike on a scale ranging from *not at all willing* (1) to *very willing* (7).

*Other measures.* To assess whether the set manipulation influenced participants' global attributions about the causes of their partners' behaviors, we asked them to indicate why their partners behaved as they did by completing scales ranging from *the type of person partner is* (1) to *nature of the situation* (7). In addition, we asked them to indicate why they behaved as they did on analogous scales. Finally, participants indicated how certain they were of their ratings on each of the 10 aggressiveness scales, ranging from *very uncertain* (1) to *very certain* (10). None of these measures were influenced by the set manipulation and will not be discussed further.

## Results and Discussion

We examined the effect of the set manipulation on participants' chunking strategies, impressions of their partners, and perceptions of self.

### Chunking

We expected that participants in the offensive condition would tend to chunk the interaction into self-causal units and that participants in the defensive condition would tend to chunk the interaction into other-causal units. The means displayed in rows 1 and 2 of Table 1 support these predictions (ignore the right-hand column for the moment). That is, whereas participants in the offensive condition displayed evidence of a self-causal chunking strategy, those in the defensive condition displayed evidence of an other-causal chunking strategy. In support of this, a  $2 \times 2$  (Set [offensive vs. defensive]  $\times$  Chunking Strategy [self-causal vs. other causal] within-subjects) analysis of variance (ANOVA) revealed an interaction on both the verbal

Table 1  
*The Impact of Set on Chunking, Impressions,  
 and Self-Perceptions*

Measure	Set		
	Offensive	Defensive	Yoked control
<i>n</i>	23	19	30
Memorial chunking <sup>a</sup>	0.30	-0.63	-0.23
Verbal chunking <sup>b</sup>	1.13	-0.37	0.17
Perceptions of partner's aggressiveness <sup>c</sup>	33.20	36.70	35.00
Perceptions of partner's first-strike willingness <sup>d</sup>	3.10	3.80	3.00
Participant's own first-strike willingness <sup>e</sup>	4.40	3.00	3.50

<sup>a</sup> Number of self-causal chunks remembered minus number of other-causal chunks remembered. Thus, more positive numbers indicate more self-causal chunking and more negative numbers indicate more other-causal chunking.

<sup>b</sup> Extent to which participants felt they controlled the interaction minus the extent to which they felt their partners controlled the interaction. Thus, more positive numbers indicate more self-causal chunking and more negative numbers indicate more other-causal chunking.

<sup>c</sup> Higher means indicate greater perceived aggressiveness in partner.

<sup>d</sup> Higher means indicate greater perceived probability that partner will initiate a nuclear first strike.

<sup>e</sup> Higher means indicate greater willingness to initiate a nuclear first strike.

measure of chunking,  $F(1, 40) = 5.66, p = .02$ , and the memory measure of chunking,  $F(1, 40) = 7.40, p < .01$ .<sup>1</sup>

Closer examination of the data revealed that set had symmetrical effects on the verbal measure of chunking but not on the memory measure. That is, analysis of the verbal measure of chunking revealed that just as participants in the defensive set condition were more inclined to form other-causal chunks than participants in the offensive set condition ( $M_s = 4.42$  and  $3.52$ , respectively), participants in the offensive set were more inclined to form self-causal chunks than were participants in the defensive set ( $M_s = 4.65$  and  $4.05$ , respectively). Neither of the simple effects tests were reliable, indicating that the overall interaction was due to the influence of both sets. In contrast, analyses of the memory measure of chunking indicated that although participants in the defensive set condition were more inclined to form other-causal chunks than were participants in the offensive set condition,  $F(1, 40) = 10.66, p < .002$  ( $M_s = 1.89$  and  $0.91$ , respectively), set had no impact on the tendency of participants to form self-causal chunks ( $F < 1$ ). Thus, there is some hint that it may be more difficult to alter the extent to which people use a self-causal chunking strategy as compared with an other-causal chunking strategy.

Further analyses indicated that the impact of the set manipulation on memory was not due to the salience of participants' own statements relative to their partners' statements. That is, the identical pattern occurred whether we examined responses cued only by participants' own statements,  $F(1, 40) = 2.62$ ,

$p = .11$ , or responses cued solely by their partners' statements,  $F(1, 40) = 3.31, p = .08$ .

In addition, an overall ANOVA that incorporated order into the analyses indicated that order (whether the participant went first or second) did not qualify the effect of set on chunking (all  $F_s < 1.04, ns$ ). Order did influence chunking strategy independent of set, however, in that participants who initiated the interaction were especially likely to remember self-causal chunks and their partners were particularly inclined to remember other-causal chunks,  $F(1, 38) = 17.39, p < .002$ . Order had no impact on any other dependent variables.

### Impressions

We expected that participants in the defensive condition would see their partners as more aggressive and more willing to initiate a first strike than would participants in the offensive condition. The means shown in rows 3 and 4 of Table 1 indicate that this was the case. An analysis of covariance controlling for participants' own self-reported aggressiveness ( $F_{cov} = 4.40, p < .05$ ) revealed a reliable effect of the set variable on participants' perceptions of their partners' aggressiveness,  $F(1, 39) = 4.05, p < .05$ . Although participants in the defensive condition were also more inclined to indicate that their partners would initiate a first strike than were participants in the offensive condition, an ANOVA indicated that this effect was not statistically reliable,  $F(1, 40) = 2.31, p = .14$ .<sup>2</sup>

These findings suggest that when pairs of participants adopt defensive sets, they come to regard one another as particularly aggressive. In contrast, when pairs of participants adopt offensive sets, they appear relatively reluctant to impute aggressiveness to one another.

### Perceptions of Self

We wondered if the set manipulation might influence participants' willingness to initiate a nuclear first-strike against their

<sup>1</sup> Because we were concerned that our analysis of the responses of individual participants might violate assumptions of statistical independence, we ensured that participants did not meet prior to or during their interactions, thereby avoiding several potential sources of nonindependence. Our efforts were apparently successful, in that the responses of interaction partners on the primary dependent variables were statistically independent. Most relevant, there was no correlation between the first-strike willingness of participants and their partners ( $r = -.09$ ). There was also no relation between participants' expressed willingness to initiate a first strike and their partners' perceptions of their willingness ( $r = -.02$ ). These relationships were slightly stronger when we controlled for the effects of order and condition,  $r_s = -.29$  and  $.08$ , respectively.

Also, an analysis of the impact of participants' self-perceived aggressiveness on the measures of chunking and inference indicated that this variable had no impact on the measures of chunking and impressions (all  $F_s < 1.23$ ).

<sup>2</sup> Although an analysis of the impact of set on perceptions of partner's first-strike willingness was highly reliable when we controlled for participants' own first-strike willingness, the results of this analysis are difficult to interpret because we measured first-strike willingness *after* the interactions.

partners. It did. As can be seen by the means displayed in row 5 of Table 1, participants in the offensive condition indicated greater willingness to initiate a first strike than did participants in the defensive condition,  $F(1, 40) = 8.10, p < .01$ . Ironically, it appears that although participants in the offensive condition did not succeed in convincing their interaction partners that they were especially likely to initiate a first strike (at least no more so than those in the defensive condition), they did succeed in convincing themselves. Conceivably, the offensive set induced participants to become especially aggressive. On observing their own behavior, they inferred that they were indeed highly aggressive, just as self-perception theory would suggest (e.g., Bem, 1972). The results of Study 3 in this article support this interpretation.

### Covariation Between Measures

As expected, the memorial and verbal measures of chunking were reliably related to one another,  $r(40) = .42, p < .01$ , and the two measures of impressions of partners were also correlated,  $r(40) = .34, p = .01$ . The measures of chunking were related to the measures of inference, but not as strongly. That is, although neither the memorial nor the verbal measures of chunking were reliably related to participants' perceptions of their partners' aggressiveness index,  $rs(40) = -.16$  and  $-.17$ , respectively, both chunking measures were related to participants' perceptions of their partners' willingness to initiate a first strike,  $rs(40) = -.31$  and  $-.34$ , both  $ps < .03$ , respectively. Therefore, regardless of set, participants who organized their interactions predominantly into other-causal units rather than self-causal units drew more extreme inferences about their partners.<sup>3</sup>

### Study 2

Although the results of Study 1 were generally consistent with our expectations, they left several questions unanswered. First, we worried that something about the nature of the interactions in Study 1 might explain the responses of participants. For example, there may have been something about the particular statements selected, the juxtaposition of the statements made by partners or the order in which they were selected, that were responsible for chunking strategies and inferences of participants. Second, because Study 1 lacked a baseline control group against which to compare the responses of individuals in the two set conditions, it is impossible to determine if the differences between the two conditions should be attributed to the effectiveness of the offensive set, the defensive set, or both. Study 2 was designed to address both of these concerns.

### Method

A total of 30 men were yoked to a random sample of individuals who participated in Study 1. As in Study 1, individuals took part in the study in pairs. Yoked participants received exactly the same instructions and dependent measures as those who participated in Study 1, except that they were given no set manipulation and no choice as to the statements they would make during their interactions (research by Gilbert & Jones, 1986, and Swann & Giuliano, 1982, indicates that choice has no impact

on people's inferences about their partners under somewhat similar circumstances). Instead, participants simply learned that their task would be to communicate with another person, using the statements provided by the experimenter. The statements each pair of participants received were those that had been chosen by the individuals to whom they were yoked in Study 1.

### Results and Discussion

Were the results of Study 1 a function of characteristics of the interactions themselves? It appears not. In contrast to the results of Study 1, participants yoked to the offensive set condition did not differ from those yoked to the defensive set condition on any measures of memory or impressions (all  $F_s < 1.4, ns$ ). Accordingly, we combined the responses of the two yoked conditions. As can be seen in column 3 of Table 1, the combined means of the two yoked groups fell in between the means associated with the offensive and defensive set conditions on every measure except the perceptions of first-strike willingness variable. These data therefore suggest that both set manipulations influenced the responses of participants in Study 1.

### Study 3

Study 3 was designed to address the possibility that the inferences of participants in Study 1 may have reflected the level of aggressive content that occurred during the interactions. It could be, for example, that the defensive set manipulation made participants wary of their partners and they therefore selected highly aggressive statements. If so, then individuals in the defensive set condition may have imputed more aggressiveness to their partners than to individuals in the offensive set condition because their partners actually were more aggressive.

### Method

Fifty judges (33 men and 17 women) rated the aggressiveness of the statements used in Study 1. One man was dropped from the sample because he failed to complete the materials properly, leaving a total of 49 individuals in the final sample. Judges rated the aggressiveness of each of the statements on 9-point scales ranging from *not at all aggressive* (1) to *extremely aggressive* (9). This allowed us to assign an average aggressiveness rating to each statement. To compute an aggressiveness index for the statements made by particular individuals, we simply averaged the ratings judges assigned to the six statements they made.

### Results and Discussion

An ANOVA of the aggressiveness ratings indicated that although judges detected differences in the aggressiveness of the statements made by participants in the two conditions,  $F(1, 40) = 10.49, p < .01$ , they imputed more aggressiveness to those

<sup>3</sup> Although a psychological demand explanation offers a reasonable alternative explanation of the impact of set on the verbal measure of chunking, it has difficulty explaining the overall pattern of results, especially the impact of set on the memorial measure of chunking (because the offer of a prize presumably encouraged participants to *avoid* any memory biases) and the correlation between the memory measure and participants' perceptions of their partners.

in the offensive than in the defensive set conditions ( $M_s = 5.13$  and  $4.47$ , respectively). Apparently, offensive participants took seriously their instructions to convince their partners of their willingness to initiate a first strike and chose relatively aggressive statements. This is probably why participants in the offensive set condition attributed more aggressiveness to themselves than did those in the defensive set condition. These data make it all the more surprising, however, that participants in the defensive conditions attributed more aggressiveness to their partners than did participants in the offensive condition. Indeed, it appears that our participants' sets were so powerful that they led them to form perceptions of their partners that were quite at odds with the perceptions of objective observers.

### General Discussion

A basic tenet of social psychology is that social interaction can be understood as a fairly continuous stream of causes and effects, with each person's actions influencing the subsequent actions of their interaction partners (e.g., Jones & Gerard, 1967). Yet our findings suggest that people who are actually engaged in social interaction do not always see things this way. Instead, they organize their interactions into a series of discrete causal chunks.

Our findings suggest further that the manner in which people chunk their interactions is determined by their psychological sets. In particular, participants who adopted an offensive set tended to chunk the interaction into self-causal units that highlighted the influence of their own actions on their partners' actions. In contrast, those who adopted defensive sets tended to chunk the interaction into other-causal units that highlighted the impact of their partner's actions on their own actions. People's chunking strategies were, in turn, associated with the impressions they formed of their interaction partners. Those who adopted self-causal chunking strategies refrained from attributing their partners' actions to dispositions; those who adopted other-causal chunking strategies tended to attribute their partners' actions to dispositions.

Although it is fairly clear that our participants' sets influenced their chunking strategies, we have no clear evidence that their chunking strategies determined the impressions they formed of their partners. Just as their chunking strategies may have influenced their impressions, their impressions may have influenced their chunking strategies. In fact, we suspect that in naturally occurring situations, chunking strategies and impressions are mutually causal.

Consider an aggressive interchange such as the arms race. At times, participants chunk such interactions as they unfold and only later make inferences. In such instances, people's impressions can be understood as logical consequences of their chunking strategies. For example, once one organizes a hostile encounter into other-causal chunks, it is given that the other person is a villain. Yet inferring that the other person is a villain may influence one's subsequent chunking strategy. One might, for example, decide that one's adversary is so villainous that it is time to shift from a defensive to an offensive strategy. This new set may, in turn, lead to a corresponding change in one's chunking strategy. In such instances, people's chunking strate-

gies are obviously the effects rather than the causes of their impressions. Nevertheless, their chunking strategies may still determine the subsequent fate of their impressions because beliefs must often be sustained by an appropriate causal understanding of the interaction.

Our point here, then, is that whether the chunking process precedes or follows the initial formation of an impression, it may ultimately feed into and sustain that impression. Furthermore, we suspect that in naturally occurring situations, chunking and impression formation occur almost simultaneously, thereby making it difficult—and perhaps relatively unimportant—to determine which comes first.

We should add an important caveat at this point: Any given chunking strategy may pertain only to *particular* forms of causal influence that occur in an interaction. That is, most interactions involve many, partially independent, patterns of cause and effect that may be chunked quite differently. For example, teachers may chunk their interactions with students in ways that make salient the extent to which their students are responding to their instructions but overlook the fact that they are treating their male and female pupils in ways that encourage sex-typed behavior (cf. Serbin, O'Leary, Kent, & Tonick, 1973). Similarly, therapists may chunk their interactions in ways that highlight the positive impact of their actions on their clients but that obscure the fact that these same actions are subtly encouraging their clients to say and do things that confirm their theoretical predilections (cf. Frank, 1973; Marwit & Marcia, 1967; Troffer & Tart, 1964). In these and many similar instances, people may remain blissfully unaware of the self-fulfilling consequences of their own beliefs (e.g., Rosenthal & Rubin, 1978; Snyder, 1984; Swann, in press).

Another complexity is introduced by the fact that chunking processes do not occur in a social vacuum, with one interaction partner engaging in chunking and the other standing by idly. Rather, both participants in dyadic interactions ordinarily engage in chunking, and the manner in which the chunking strategies of interaction partners are articulated with one another may be extremely important. In general, as long as interaction partners agree about who is driving, or controlling, the interaction, harmony will prevail in the relationship. Conflict may arise, however, when the chunking strategies of one partner foster a perception of the interaction that is different from the perception of the other partner. For example, conflict may arise when both members of an interaction sequence adopt self-causal chunking strategies. Take, for example, a pair of collaborators, each of whom is convinced that he or she is more capable than the other. In such instances, the high levels of self-confidence of both individuals may encourage them to decide that their task is to enlighten their partner. Such a self-causal chunking strategy may encourage both members of the pair to overestimate their respective contributions to the project, thereby setting the stage for conflict.

Conflict may also occur when both parties adopt an other-causal chunking strategy. A case in point is the wife who nags her husband, whose passive withdrawal incites her to nag more vehemently, which in turn promotes greater withdrawal on his part, and so on (e.g., Watzlawick et al., 1967). Often, both parties in such interactions possess a defensive set and conse-

quently organize their perceptions of the interaction sequence into other-causal chunks. The husband therefore construes his withdrawal as a defense against his wife's nagging just as his wife believes that her nagging is instigated by her husband's passivity.

A similar set of mismatched perceptions may fuel interaction sequences such as the arms race. Witness the opposing perspectives of leaders of countries involved in such clashes (e.g., Jervis, 1976; Rosenberg & Wolfsfeld, 1977). Participants in such interactions generally construe their own acquisitions of arms as reactions to the accumulations by the opposition. Here again, by adopting a defensive set and organizing the interaction into other-causal chunks, both parties may overlook the causal impact of their own actions on the other. And so, the vicious cycle is perpetuated, with both sides feeling progressively more self-righteous in their condemnation of the other.

The optimistic possibility raised by our findings is that it may be possible to interrupt or avoid vicious cycles by bringing people to chunk the interaction in a manner that sensitizes them to their influence on others. In our research, at least, participants who organized the interaction into self-causal chunks tended to refrain from imputing the behavior of their interaction partners to dispositions. Nevertheless, we hesitate to suggest that a self-causal chunking strategy will completely eradicate the tendency for people to overestimate the role of dispositional factors when interpreting the behavior of others. After all, the tendency to overemphasize dispositional causes of others' behavior is so pervasive that one theorist (Ross, 1977) has dubbed it the "fundamental attribution error" (see also Jones, 1979). Furthermore, some evidence (e.g., Gilbert & Jones, 1986; Gilbert, Pelham, & Krull, 1987; Jones & Harris, 1967) and theorizing (Gilbert, 1987) suggests that it may be impossible to completely wipe out the tendency for people to regard the behaviors of others as reflections of underlying traits. Despite these qualifications, the fact that a self-causal chunking strategy led to fewer dispositional inferences than an other-causal strategy suggests that it may be possible to diminish the extent to which people fall victim to the fundamental attribution error.

### Conclusions

Our research differs from most research on person perception and social memory in that our participants were interacting rather than passively observing one another. Perhaps the basic challenge to such active participants in the person perception process is doing everything they need to do: planning how to behave, enacting behaviors, and constantly monitoring their partners' actions and making appropriate inferences. We propose here that active perceivers strive to cope with these multiple demands by chunking their perceptions of their social interactions. Chunking processes, then, are an essential means through which people give meaning to the interaction sequences in which they are involved. In fact, in the minds of perceivers, chunking processes may define the very nature of relationships, telling them who is strong and who is weak, who is aggressive and who is passive, who is good and who is bad.

Perhaps what is most interesting about chunking processes is that they encourage interaction partners to develop completely different understandings of the same interaction, understand-

ings that sometimes emphasize the causal impact of one person on the other at the expense of a clear understanding of the mutually determined, reciprocal relation. From this vantage point, although chunking processes may be an indispensable mechanism through which people make sense of their ongoing social interactions, they may sometimes lead to highly idiosyncratic interpretations of their interactions, which may sow seeds of conflict in interpersonal relations.

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Received July 22, 1985

Revision received April 6, 1987

Accepted April 8, 1987 ■

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