

Task Grammar and Attitude¹

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This paper investigates the ability of perceivers to form impressions of tasks as part of the process of forming a task attitude. This ability is described as being partly given by a syntactic grammar that specifies both the primitive elements of tasks and the rules that structure these elements to form meaningful task impressions. The proposed grammar is shown to generate representations of task structure that can be mapped readily onto task attitudes. The paper concludes with a discussion of the implications of task grammar for research on task attitudes.

This paper investigates the ability of people to form attitudes about what they are doing. More specifically it seeks to further our understanding of how people are able to say such things as "Crossword puzzles are challenging" or "Mowing the lawn is tedious" or, if they are lucky "My work is interesting.

At present, little is known about how people form such impressions of tasks. Research on task attitudes has focused almost exclusively on how people organize existing task impressions to form a global assessment of attitude (e.g., Hackman & Oldham, 1976; Rosenberg, 1956). Along these lines, a number of task impressions have been identified as especially important in attitude formation (e.g., task variety identity complexity autonomy challenge). What is significantly missing from this work, however is any

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substantial concern for how these task impressions are formed in the first place (see reviews by Roberts & Glick, 1981, Staw 1984).³ This paper is intended to speak to this neglected concern. In so doing, it is intended to complement previous work that has focused on higher-order processes in which attitudes are inferred from already formed task impressions.

At a theoretical level, the problem is to explain correspondences between tasks and the impressions formed about them. The problem is analogous to that of the theory of natural languages. There, too, the goal is to explain correspondences between behavior (utterances) and impressions (meanings). The approach to this problem by modern linguistic theory (cf. Chomsky 1972) has been to describe the perceiver's competence to interpret utterances in terms of two distinct but complementary kinds of rule grammars: syntactic and semantic. The syntactic grammar consists of rules that generate structural representations of utterances both at the level of surface structure and at the level of deep structure. The semantic grammar consists of a second order of rules that associate surface and deep structures with interpretations of meaning.

This discussion begins with the supposition that the perceiver's competence to form impressions about tasks can be described similarly in terms of syntactic and semantic rule grammars. The purpose of this paper is to begin to describe the syntactic grammar of tasks. This paper seeks to identify the rules by which perceivers generate structural representations of tasks as part of the process of forming task impressions and a task attitude.

Viewed less abstractly and with a more practical bent, the paper can be seen as an attempt to account theoretically for the (seemingly general) preferences that are expressed for tasks having certain structures and not others. Answers are sought to such questions as why tasks are liked more when task events are tightly coupled as opposed to loosely coupled; why tasks are preferred when they are engaged freely as opposed to in response to external forces; why tasks are liked more when task behavior is preformed for its own sake (as an end in itself) as opposed to when it is performed for a purpose (as a means to an end); and why tasks that are complete are preferred to those that are not complete. As will be shown, in order to explain these commonplaces, it is necessary to know something about the perceiver's ability to comprehend task structure. Our purpose is to begin to describe this ability

³One reason why initial impressions of tasks have received little attention to date may be because they enter awareness directly—ready-made and unmediated by conscious symbolic processes, as a result, they have no obviousness about them that belies the complexity and subtlety of their perception.

OUTLINE

Because the principal concern here is with the formation of task impressions related to attitude, we begin with a discussion of the concept of task attitude and with a brief survey of properties of task structure known to yield task impressions relating to attitude. These considerations are adduced as a guide to the development of the proposed syntactic grammar. This grammar specifies a particular set of task elements and a particular set of transformation rules to indicate how task elements are structured. Although tentative, this grammar is shown to be consistent with recent research findings about task perception. The third section of the paper shows how information about task structure may be used in forming task impressions relating to attitude. The paper concludes with a discussion of how the study of task grammars enlarges the scope of research on task attitudes.

TASK ATTITUDE AND TASK STRUCTURE

Although the concept of attitude remains controversial (see, e.g., Fishbein & Ajzen, 1975), there is agreement on two general points. First, attitude is an inference about a specific object (e.g., person, thing, event, task), and thus is distinguished from the more general psychological concepts of "mood" or "feeling," which may or may not have a specific referent. Second, the attitude inference involves an evaluative aspect (Insko, 1967; Osgood, Suci, & Tannenbaum, 1957), and thus is distinguished from inferences of "belief" or "opinion" (Rokeach, 1972). As Zajonc (1980) points out, the affective aspect of attitude is rooted in the relationship perceived between the attitude object and the self. According to Coombs (1964), attitude may be defined operationally as a judgment along an evaluative dimension denoting the distance in psychological space between the attitude object and the self.⁴ Thus, our first insight about syntactic grammar is that it functions in attitude formation to define an impression of the relationship between the task and the self.

Further insight into the nature and functioning of syntactic grammar can be gained by surveying the properties of task structure that are known to engender specific task impressions related to attitudes. Considered briefly

⁴The proposition that the "self" is an essential pole in affective judgment has been long recognized by theorists of emotion. Solomon (1976), for example, has said about affects that "they are always, whether implicitly or explicitly, judgments involving oneself as well as whatever else.

In every case the self is an essential pole of emotional judgment" (p. 189). Arnold (1960) similarly speaks of emotions as being centered on self: "To arouse an emotion, the object must be appraised as affecting me in some way, affecting me personally. (p. 171).

below are four such properties. Although obvious and familiar these properties provide a foundation for the proposed mode of syntactic grammar.

Segmentation into Units

Fritz Heider noted, a generation ago (1958), that although task behavior is continuous, it is experienced in discrete units. According to Heider the meaning and significance of any behavior depends on how it is organized according to its parts. This point can be illustrated in the following way. Consider a behavior sequence that corresponds roughly to factory piece-work: behavior-pay-behavior-pay-behavior-pay. Two ways this sequence could be segmented are (1) [behavior-pay] [behavior-pay] [behavior-pay] or (2). [pay-behavior] [pay-behavior] [pay-behavior]. In both cases, the sequence is the same—the only difference being how the sequence is segmented into units. Yet the two segmentations are likely to leave different impressions and lead to different assessments of attitude. In the first instance, the impression might be one of “striving” or of “instrumentality”—where task behavior is performed *in order to* receive pay. In the second instance, the impression might be one of “obligation” or “indebtedness”—where behavior is obligated by receipt of payments.

Arrangement of Task Elements

The arrangement of behaviors within a task also can affect attitude. Consider, for example, the behavior involved in playing a piano sonata (e.g., key strokes, pedal strokes). Almost certainly the sonata will leave different impressions if these behaviors are arranged in one order versus another. When arranged in the order prescribed by the composer's score, the behaviors correspond to a particular piece and can be said to be “music.” When arranged in some other order (literally out of order), they do not correspond to the same piece and to many listeners' ears may not be “music,” either.

Behavior-Outcome Relationship

The structural relationship between task behaviors and outcomes has figured importantly in previous work on task attitudes. Research on causal attribution, for example, has shown that this relationship can affect perceivers' impressions of their reasons for performing a task. Work by Deci (for a review see Deci & Ryan, 1981), in particular, suggests that reward outcomes are regarded as extrinsically motivating when they are awarded for merely performing a task, but are regarded as intrinsically motivating when they are awarded for performing a task well. According to Deci, the former reward outcome leaves an impression of controlling the perceiver's participation in

the task, whereas the latter reward outcome leaves an impression, not of control, but of the perceiver's competence. In general, Deci finds that reward outcomes that reflect competence are preferred to those that do not.

Behavior-Context Relationship

The structural relationship between task behaviors and context has figured similarly in previous work on task attitudes. Contextual variables, such as the presence/absence of surveillance or opportunities for choice, have been shown to affect perceivers' impressions of their reasons for performing a task. In general, tasks performed out of obligation or under the duress of surveillance are regarded as more externally motivated and are evaluated less favorably than tasks that are performed freely and without surveillance (for a review see Lepper & Greene, 1978).

These four observations about task structure and attitude serve as touchstones for the development of a grammar for task syntax. From them are gained the general and crucial insights that this grammar must enable the perceiver to distinguish among different segmentations of task behavior, different organizations of events within tasks, different relations between behaviors and outcomes, and different relations between behaviors and contexts. These observations thus establish minimum requirements for a syntactic grammar and serve as criteria for evaluating alternative models of this grammar

TOWARD A SYNTACTIC GRAMMAR OF TASKS

Having spoken of the general requirements for a syntactic grammar of tasks, a preliminary model of this grammar is proposed below. The model identifies key elements of tasks, and rules that describe how these elements are structured. No assumption is made that the perceiver is consciously aware of the nature or working of this grammar. Rather it is assumed that this grammar is akin to linguistic grammar which, as Chomsky (1972) repeatedly has emphasized, is quite outside the pale of awareness.

Task Elements

A task is given by two kinds of structural elements: *contents* and *relations*. Contents consists of "states" and "events" (for convenience, all elements hereforth are denoted using capital letters). STATES are the static conditions of the task. They are invariant over the course of the task and include both conditions that are internal to the perceiver (e.g., psychological states such as emotion, mood, plans, or goals) and conditions

that are external to the perceiver (e.g., location in time and space, relations to other persons, objects). EVENTS, on the other hand, are the dynamic elements of the task. They vary over the course of the task and include both internal dynamics (e.g., cognitive practices, such as thinking, planning, remembering, and forgetting) and external dynamics (e.g., behaviors of self and others, changes in states of the environment).

Five kinds of relations are proposed to link the content of the task (STATES and EVENTS) to one another. First, contents may be unrelated (this relationship is denoted by the key word NULL). Second, contents may be related only by the fact that they are grouped together to form a unit of some kind (this relationship is denoted by the key word AND). Third, contents may be related by the fact that they occur at different times (this relationship is denoted by the key word THEN). Fourth, contents may be ordered both temporally and by the necessity that one occur before another (this relationship is denoted by the key word BEFORE). One example of this type of relationship is “causality” — causes necessarily precede effects in a time ordering of task contents. Finally contents may be related in a more complex way where the occurrence of one content element guarantees only that a single element from a limited set of elements will follow (this relationship is denoted by the key word CHOOSES). In this case, the first element “chooses” among a finite set of element possibilities — although use of the word *chooses* here is not meant to imply active or conscious deliberation. A case where this type of relation might be perceived is the game of tic-tac-toe wherein task events CHOOSE an outcome that must be either win or lose.

Although the precise distinctions between relations are important, relations also can be classified usefully according to the strength of the connection that they forge between content elements. In particular the relations of BEFORE and CHOOSES can be considered “strong” because they indicate a contingency between the occurrence of one element and the occurrence of another. In comparison, the relations of NULL, AND, and THEN can be considered “weak” because they do not indicate such a contingency. Later it will be shown how information about the strength of connections between content elements may be used in forming task attitudes.

Rules

The rules of syntactic grammar specify how task elements (i.e., STATES, EVENTS, relations of NULL, AND THEN, BEFORE, and CHOOSE) are organized to form meaningful impressions of the task. A grammar, consisting of five such rules, is proposed and detailed below. This grammar satisfies the requirements set forth above that it be able to distinguish among alternative (1) segmentations of task behavior, (2) arrangements of

task behavior (3) relations between behavior and outcomes, and (4) relations between behavior and context.

This grammar is offered, however in full appreciation of its limitations. There can be little conceit in a grammar that starts by assuming the existence of specific elements of content (STATES and EVENTS) and specific elements of relation (NULL, AND, THEN, BEFORE, and CHOOSES). To stipulate such elements is to confess ignorance of how they are known by the perceiver. It remains for future research to describe the competence that makes such knowledge possible.⁵ The proposed grammar sets for itself the more intermediate goal of outlining the rules by which these stipulated elements are organized in forming impressions of tasks.

Rule 1. STATES and EVENTS are categorized as belonging, or not belonging, to a particular task on the basis of their relationship to the task goal.

Rule 1 describes how tasks are identified in the stream of ongoing experience. According to this rule, STATES and EVENTS are included in a task when perceived to relate to the goal of the task, and are not included otherwise.

To illustrate this rule, consider the task of reading this paper. This task is defined by the collection of all STATES and EVENTS involved with the goal of reading the paper. In this case, the reading of *these very words* (with all the psychological and physiological STATES and EVENTS entailed) would be included as part of the structure of the task. So too, would be the reader's thoughts about what is being said, as well as his/her thoughts about the strangeness of a paper that talks about itself (to say nothing of the strangeness of a paper that talks about its own strangeness!). Also included in the structure of the task would be the various STATES and EVENTS that influence or constrain the course of reading (e.g., mood, distractions, interest, background, perhaps an obligation to review the paper, fatigue, time constraints, missing pages).

On the basis of recent work on categorization processes (cf. Rosch, 1978), it is proposed further that identification of a particular STATE or EVENT as belonging to a particular task is not an absolute matter. Some STATES and EVENTS are related more directly to the task goal than others. Fur

⁵The proposed grammar proceeds from the assumption that at the wellspring of all cognitions about tasks are basic processes involving recognitions of stimulus similarity, continuity (spatial and temporal), and covariation. Thus, it is assumed that receptions of both relations (e.g., NULL, AND, THEN, BEFORE, and CHOOSE) and contents (e.g., STATES, EVENTS) derive from a single calculus. For example, it might be supposed that in order for a relation of BEFORE to be perceived between two content elements, those elements must be identified as continuous and covarying. Or, it might be supposed that perceptions of STATES are based on identified similarities (and differences) among more primitive features of the task.

ther, many STATES and EVENTS are related to the goals of multiple tasks. Rather than viewing "task" as a distinct entity with absolute criteria defining its constituent STATES and EVENTS, it is more appropriate to view it as a "fuzzy set" into which certain STATES and EVENTS are classified unambiguously while others are classified more equivocally

Several additional points should be made about this rule. First, it highlights the importance of the task goal in determining what is and is not included in the task. Along these lines, consider how the task of painting a picture is constituted when the goal is to express an idea or feeling versus when the goal is to please the eye of an undiscerning public. In the first instance, the STATES and EVENTS related most directly to the goal of the task are the internal psychological states and expressive impulses of the artist. In the second, the STATES and EVENTS related most directly to the goal of the task are the tastes and buying tendencies of the public. By defining what STATES and EVENTS are included in the task, the goal influences how the task will be interpreted and what attitude will be formed about it.

Second, this rule recognizes the inherent fluidity of task boundaries. At any time, previously excluded STATES or EVENTS may be included, while previously included STATES or EVENTS may be excluded. An example from childhood is the sandlot baseball game wherein a friendly game turns vicious and players' goals evolve from winning the game to physically harming players on the other team. Whereas, initially such improprieties as "throwing at batters" or "high spiking" would not be included in the game, they might become an essential part of the game as the goal changes.

Finally this rule allows groupings of STATES and EVENTS into task units that differ according to the level at which task goals are conceptualized. Depending on the perceiver's goals, tasks can be perceived in terms of different units of behavior. In other words, any given stream of behavior can be analyzed in terms of different goal units (cf. Miller, Galanter, & Pribram, 1960). To return to the example of baseball, the behaviors of batting can be construed as a single task (where the goal is to hit the ball), as several tasks (where the goals might be to follow the pitch, swing the bat, and run to first base), or as a part of a larger task (where the goal might be to win the baseball game). Again, which of these units is perceived depends on the perceiver's goals.

Rule 2: Task STATES and EVENTS are grouped into three primary categories: (1) EVENT-STATE SEQUENCE, (2) SETTING, (3) INTENDED OUTCOME.

Rule 2a: The EVENT-STATE SEQUENCE consists of EVENTS and STATES intended by the perceiver to be part of the task.

Rule 2b: The SETTING consists of STATES and EVENTS perceived to constrain or influence the STATES and EVENTS of the EVENT-STATE SEQUENCE.

Rules 1 and 2 define the basic content of the task. Rule 1 defines what STATES and EVENTS are included and excluded. Rule 2 defines how these STATES and EVENTS are organized into primary categories within the task. To these rules can be added additional rules that specify which task structures are to be considered grammatical and which are to be considered ungrammatical. These rules simplify task perception by identifying classes of task structures that can and cannot be interpreted. Ungrammatical tasks, like ungrammatical sentences in language, are presumed to be nonsensical. Three of these rules are described below.

Rule 3. The categories of SETTING, EVENT-STATE SEQUENCE, and INTENDED OUTCOME may be related by AND, THEN, BEFORE, or CHOOSE, but not by NULL.

Rule 4: The EVENT-STATE SEQUENCE must come before the INTENDED OUTCOME (i.e., these two elements can occur only in this order and be related only by THEN, BEFORE, or CHOOSE).

Rule 5. The SETTING must come before the INTENDED OUTCOME (i.e., these two elements can occur only in this order and related only by THEN, BEFORE, or CHOOSE).

Rule 3 states that the three primary categories of SETTING, EVENT STATE SEQUENCE, and INTENDED OUTCOME may be related to one another by any of the proposed relations except NULL. This limitation is a logical one, since these categories are related minimally by the fact that all are members of the same task – and thus are joined minimally by the relation of AND. By this rule, an admissible or “proper” task *must include* a SETTING, an EVENT-STATE SEQUENCE, and an INTENDED OUTCOME.

Rules 4 and 5 pose two further constraints on the relations between primary structural categories. The first is that the EVENT-STATE SEQUENCE always must come before the INTENDED OUTCOME. The second is that although the SETTING may or may not occur prior to the EVENT-STATE SEQUENCE, it always must occur prior to the INTENDED OUTCOME.

Research Evidence

Although the five grammatical rules outlined above are offered tentatively – to stimulate interest and discussion – it is important, nevertheless, to note that they are consistent with what currently is known about task perception processes. Newton and his colleagues (see Newton, 1976) studied units of task perception using a simple marking procedure. Subjects were shown sequences of behavior on film or videotape and were instructed to

press a button attached to a recording device when, in their judgment, one meaningful action ended and the next began. They found that the “break points” so identified were patterned reliably both within and across perceivers (Newtson, 1973; Newtson & Enquist, 1974). More important, they found that breakpoints occurred at points in action sequences where the actors’ goals could be inferred. This finding is consistent with the ideas that INTENDED OUTCOMES mark boundaries between task units and that they may function as the basis for organizing task information in perception. Research on behavioral scripts (cf. Bower Black, & Turner, 1979) and story comprehension (cf. Mandler & Johnson, 1977) points to the same conclusion. Behavior sequences appear to be perceived on the basis of meaning units demarcated by goal states (i.e., INTENDED OUTCOMES).

Further evidence for the proposed rule grammar comes from a recent study by Sandelands and Calder (1985). This study investigated perceptions of tasks using an adaptation of the “click migration” paradigm from psycholinguistics. In the click migration studies, the perceptual reality of linguistic grammars is tested by interrupting recorded sentences with a clicking noise and then assessing where in the structure of the sentence subjects are best able to recall the occurrence of the noise. A basic finding of these studies is that clicks are better recognized when they occur at grammatical break points. Sandelands and Calder applied this logic to perceptions of tasks.

Paralleling the click migration studies, Sandelands and Calder investigated whether the grammatical structure of tasks (like the grammatical structure of sentences) could be detected by subjects’ ability to detect intrusive stimuli. The grammatical structure of a multiple-trial problem-solving task was manipulated to vary the strength of the relationship between its EVENT STATE SEQUENCE and INTENDED OUTCOME — in one case establishing a strong relationship of CHOOSES between these structural elements, and in the other establishing a weak relationship AND. Task behaviors (EVENT STATE SEQUENCES) and task outcomes (INTENDED OUTCOMES) were separated by brief rest periods, during which music was played in the background. The music thus served as the intrusive stimuli for which recognition could be tested. As predicted, music recognition was higher in the weak relationship condition — ostensibly because the rest period between task behaviors and task outcomes was more of a perceptual break point in this condition. This result suggests the perceptual reality of the grammatical distinction between the relations of AND and CHOOSE.

Summary of Proposed Syntactic Grammar

The proposed grammar of task syntax is summarized in line 1 of Figure 2. As shown, the structure of the perceived task is given by three primary categories (SETTING, EVENT-STATE SEQUENCE, and INTENDED

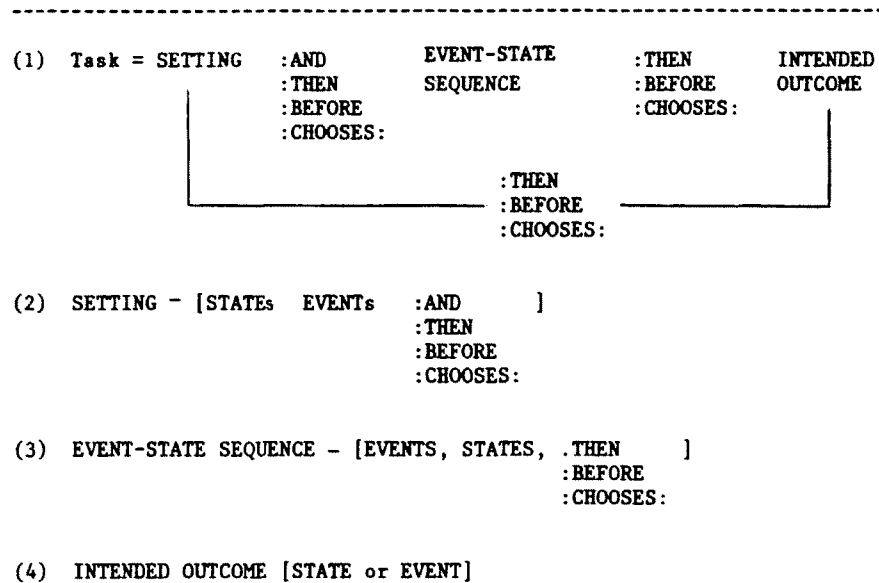


Fig. 2. Structure of task perceptions.

OUTCOME) and four types of relation (AND, THEN, BEFORE, and CHOOSES). Lines 2 through 4 are “rewrite rules. They specify substructures for each of the three categories. Line 2, for example, indicates that the SETTING can be made up of any number of STATES and EVENTS that may be related in any of the indicated ways. (Note: the relation of NULL is excluded—by being categorized together as part of the SETTING, all STATES and EVENTS are at least related by AND) Line 3 details the substructure of the EVENT-STATE SEQUENCE. As shown, it too may consist of any number of STATES and EVENTS, and these elements also may be related in any of the indicated ways (again NULL is excluded). Finally Line 4 outlines the substructure of the INTENDED OUTCOME and makes explicit the singular character of the STATE or EVENT that is the task goal.

The proposed grammar is perhaps best summarized with examples. Figure 3 and 4 depict the grammatical structure of two tasks—grading exams and writing poetry. Following the proposed grammatical rules, the STATES and EVENTS making up these structures are organized into the prescribed categories of SETTING, EVENT-STATE SEQUENCE, and INTENDED OUTCOME. Also, following these rules, all task contents (STATES, EVENTS, and the three primary categories) are linked by the relations: AND THEN, BEFORE, and CHOOSES.

Despite surface similarities, these figures clearly depict different grammatical structures. One critical difference is how STATES and EVENTS are organized within the primary categories of structure. For example, STATES and EVENTS in the EVENT-STATE SEQUENCE are linked more strongly

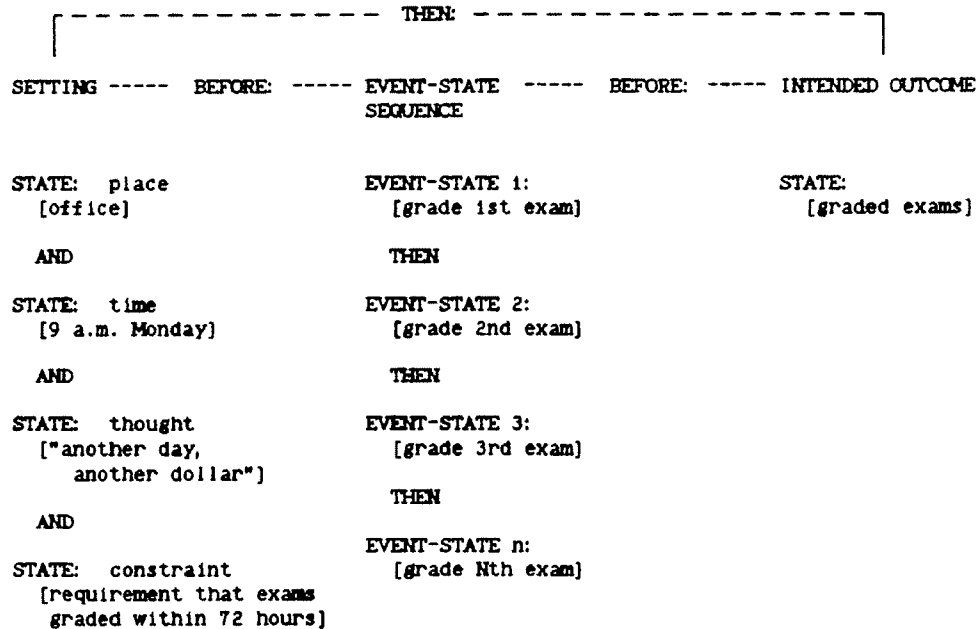


Fig. 3. Structure of grading task.

in poetry writing than in exam grading. This is indicated by the number of strong connections of BEFORE and CHOOSES relative to the number of weak connections of AND and THEN. Other important differences are how the primary categories are related to one another. The SETTING and EVENT STATE SEQUENCE are linked by the relation of BEFORE in the grading task (because of the school deadline of 72 hours to complete the task) and by the relation of AND in the poetry task (because it is entered into voluntarily). Also, the EVENT-STATE SEQUENCE and INTENDED OUTCOME are connected by BEFORE in the grading task and by CHOOSES in the poetry task. This difference reflects the fact that grading is certain to produce the goal of a pile of graded exams, whereas writing poetry is not certain to produce the intended outcome of expressing an idea. In the latter instance, the writing of the poem is meant to resolve or “choose” whether or not the intended idea is expressed.⁶

⁶One point made clear by these examples is that task structuring is likely to be sensitive to even slight variations in task content, context and goals. To wit, in a different, less coercive context, the grading task could be construed as a race against the clock, where the goal is defined as whether or not the exams are graded in time. In this event, its structure would more closely resemble that described for poetry writing (see Figure 4). As anyone who has ever played with children can attest, a recreation or “game” can be made of almost anything. Conversely, in a different, perhaps more coercive context, the goal of writing poetry could be defined in more instrumental terms (such as to kill time, or express latent tensions). Here, the structure would more closely resemble that described for exam grading (see Figure 3). As anyone who has ever played with adults can attest, any recreation or art can be made to seem like drudgery.

QUENCE, and INTENDED OUTCOME. It can be described along dimensions of (1) the number of content elements, (2) types of elements (e.g. internal versus external STATES and EVENTS), and (3) pattern of relations between elements.

The importance of microstructure in attitude formation can be illustrated anecdotally by comparing the tasks of exam grading and poetry writing, described in Figures 3 and 4. As previously noted, one crucial difference in the structure of these tasks is the strength with which STATES and EVENTS in the EVENT-STATE SEQUENCE are related to one another. In poetry writing, STATES and EVENTS are linked strongly. Where and how one begins affects where and how one proceeds, which further affects how the task unfolds to completion. In exam grading, STATES and EVENTS are joined more tenuously. Grading one exam has little to do with grading other exams. Associated with this difference in microstructure, to this author's experience at least, is a difference in the sense of continuity or "flow" (for intriguing insights into the phenomenology of "flow" see Csikszentmihalyi, 1974). In poetry writing there is a feeling of being pulled along by the task. In exam grading there is the feeling that without constant effort, the task would never get done. Because attention is drawn more fully and effectively by the former, in comparison to the latter, it seems likely that greater interest and a more positive attitude would be inferred.

Lest we be accused of maligning the task of grading exams unduly it can be said in its defense that it may have other, more redeeming, qualities. For example, the sheer repetition of grading may evoke a sense of "rhythm, a sort of easy predictability that could be experienced as comforting. Where grading requires little direct attention (as in the case of multiple choice exams), such rhythms could evoke trains of thought or daydreams that are really quite pleasurable.

These intuitions about the attitude implications of microstructure are but two of many possible examples. It remains for future investigation to articulate these and other such intuitions in greater depth and detail.

Macrostructure and Attitude

The macroscopic structure of tasks is defined by the patterning of relations among the primary categories of SETTING, EVENT-STATE SEQUENCE, and INTENDED OUTCOME. Like microstructure, macrostructure can influence attitude by suggesting relationships between the task and self. However, because it is much less varied than microstructure (in the sense that it admits of few alternatives), it is probably less able to convey such subtle "feeling" qualities as "flow" or "rhythm.

The importance of macrostructure in attitude formation can be demonstrated simply, albeit crudely by comparing attitudes between

		Strength of Relation Between EVENT-STATE SEQUENCE and INTENDED OUTCOME	
		Weak	Strong
Strength of Relation Between SETTING and EVENT-STATE SEQUENCE	Weak	<u>TYPE 1</u> Instrumental	<u>TYPE 2</u> Play
	Strong	<u>TYPE 3</u> Obligated/Instrumental	<u>TYPE 4</u> Obligated/Play

Fig. 5. Basic types of macrostructure.

different structural forms. Such comparisons are possible among the four structural types defined by combining a weak or strong relationship between SETTING and EVENT-STATE SEQUENCE with a weak or strong relationship between EVENT-STATE SEQUENCE and INTENDED OUTCOME (see Figure 5).

Although no empirical studies simultaneously compare attitudes among all four of these task types, several compare attitudes between pairs of these types. For example, as part of the study by Sandelands and Calder (1985) described previously attitudes were compared for tasks having a strong versus weak relationship between the EVENT-STATE SEQUENCE and INTENDED OUTCOME. A strong relationship was created by making performance outcomes contingent on task behavior. A weak relationship was created by denying any connection between performance outcomes and task behavior. Participation in both versions of the task was completely voluntary (suggesting a weak relationship between SETTING and EVENT-STATE SEQUENCE). Thus, this study amounted to a comparison of task Types 1 and 2 above. It was found that attitudes were more positive in the Type 2 task than in the Type 1 task.

Swann and Pittman (1977) compared children's liking for creativity tasks in which there was a strong relationship between task behavior (EVENT STATE SEQUENCE) and performance outcomes (INTENDED OUTCOME). In one condition, the task was chosen by the child (weak relationship between SETTING and EVENT-STATE SEQUENCE). In another condition, the task was chosen for the child by an adult caretaker (strong relationship between SETTING and EVENT-STATE SEQUENCE). Thus, this study compared task Types 2 and 4. In a free-play measure of persistence, children were found to play longer in the Type 2 task than in the Type 4 task.

Pinder (1976) compared attitudes toward two tasks in which the promise of pay established a strong relationship between the context (SETTING) and task behavior (EVENT-STATE SEQUENCE). One task was to assem-

ble several small groups of blocks into simple models for 1 hour (weak relationship between EVENT-STATE SEQUENCE and INTENDED OUTCOME). The other task was to construct an elaborate model of an automobile, regardless of how much time it took (strong relationship between EVENT-STATE SEQUENCE and INTENDED OUTCOME). Thus, this study compared task Types 3 and 4. Subjects reported greater satisfaction in performing the Type 4 task.

Finally Weick (1964) compared attitudes toward two versions of a concept attainment task in which subjects were given no performance goal and were interrupted after 20 minutes (weak relationship between EVENT-STATE SEQUENCE and INTENDED OUTCOME). In one version, subjects performed the task voluntarily after being denied course credit (weak relationship between SETTING and EVENT-STATE SEQUENCE). In the other subjects performed the task for course credit (strong relationship between SETTING and EVENT-STATE SEQUENCE). Thus, this study compared task Types 1 and 3. Subjects reported greater interest in the Type 1 task than in the Type 3 task.

The findings of these four studies are interpretable in terms of the impressions the perceiver might be expected to form about the four types of macrostructure. Type 1 tasks invite the impression that the task is a means to an end, an "instrumentality" Task behavior is chosen freely and is directed toward an outcome that is not *of* the behavior itself but rather is associated *with* it – as if by convention. An example of this type of task is "piece work, where the task is performed in order to receive pay In contrast, Type 2 tasks invite the impression that the task is "play" an end unto itself. Task behavior again is engaged freely but, in this case, it is directed toward an outcome that is a natural extension or consequence of the behavior itself. Examples of this types of task are art making and game playing. Task Types 3 and 4 are more complex because they invite multiple and contradictory impressions. In both cases, however, the impression of "obligation" is suggested by the fact that task behavior is not engaged freely but is compelled by its setting. For Type 3 tasks, there is the further hint of "instrumentality" (as in Type 1). An example of this type of task is when one finds it necessary to work to earn money For Type 4 tasks, there is the further hint of "play " Here, an example might be when, as a child, one was told by adults to "go play" (an injunction rather like being told to "be spontaneous"!). With these interpretations of the four task types as a guide, it is possible to explain attitude differences among these types simply by assuming that the impression of play is preferred to that of instrumentality and that the sense of not being obligated is preferred to that of being obligated.

Looking beyond these abstract task types, we can compare also the macrostructures of exam grading and poetry writing to see how they might differ in the impressions they leave the perceiver This comparison suggests

different impressions of “challenge” and “obligation.” The macrostructure of poetry writing suggests challenge by the fact that its EVENT-STATE SEQUENCE and INTENDED OUTCOME are connected by the relation of CHOOSE. Challenge is invested in the fact that the writing does not guarantee that the intended idea will be expressed. This contrasts with exam grading, where it is perfectly clear that the grading will lead to the intended stack of graded exams – as suggested by the relation of BEFORE between its EVENT STATE SEQUENCE and INTENDED OUTCOME.

The macrostructure of exam grading suggests the further impression that it is obligated or more generally externally controlled. Its SETTING is linked strongly to its EVENT-STATE SEQUENCE by the relation of BEFORE. Task behavior is obligated by the SETTING STATE of a school policy of a 72-hour grading period. This contrasts with the macrostructure of poetry writing, which details a weak relation of AND between its SETTING and EVENT-STATE SEQUENCE. Here, the impression is that task behavior originates with the person, not the context.

These examples, together with the studies reviewed above, suggest that a variety of attitudinally relevant impressions may be signified by macrostructure. It should be emphasized that still other impressions may be similarly signified – e.g., internal causation (Deci & Ryan, 1981), self-efficacy (Bandura, 1977), competence (White, 1959), achievement (Atkinson, 1956), and self-expressiveness (Sandelands, Ashford, & Dutton, 1983). Certainly one direction for future research should be to identify the macrostructural bases of these impressions as well.⁷

Grammaticalness and Attitude

The discussion of micro- and macrostructure attests to the potential role of the proposed grammar in forming a task attitude. However, it is important also to ask what happens when the grammar itself is violated. What happens when the structure of a task is incompatible with the rules of the grammar – when the task is ungrammatical? What are the implications of ungrammaticalness for task attitude? It is proposed that ungrammaticalness is threatening to the self and leads to a negative attitude.

A familiar example of ungrammaticalness is when tasks are interrupted before an outcome is reached (thus violating the rule that a task include an INTENDED OUTCOME). When this occurs, tasks often are

A worthwhile first step, before trying to identify a structural basis for these self-relations, would be to clarify similarities and differences in their meaning. No doubt some of these self-relations are more primitive than others (e.g., internal causation). No doubt others are synonymous or nearly so (e.g., competence and self-efficacy). A parsimonious model of the semantic domain of tasks requires that terms such as these be clearly defined and distinguished.

perceived negatively and participants feel frustrated (see Greenwald, 1982, for a review of the interrupted task literature). Although many reasons can be given for this, an important one could be that such tasks violate the perceiver's basic understanding of task.

Other examples of ungrammaticalness are where structural categories (SETTING, EVENT-STATE SEQUENCE, INTENDED OUTCOME) are related in anomalous ways. Consider what happens in a game when one individual or team develops an insurmountable lead before the game is completed. Here, the INTENDED OUTCOME occurs before completion of the EVENT-STATE SEQUENCE (thus violating the rule that the latter come before the former). As opposed to a "good game, where the outcome is determined at or near the end, such a game probably would be labeled "bad" and would be viewed with a certain anomaly. Indeed, it is not unusual, in such games, to observe attempts by individuals and groups to deny the particular structural anomaly. One is reminded here of the now familiar apothegm attributed to Yogi Berra (former player and sometime manager of the New York Yankees): "It ain't over till it's over. No doubt part of what he and everybody else mean by this is that nobody likes playing a game when the conclusion is foregone.

Although other examples of ungrammaticalness could be given, suffice it to note that such examples are difficult to explain without a prior understanding of the rules of grammar. By defining only certain structures as grammatical, these rules supply critical information about the existence of structural anomalies that may be related to attitude.

SUMMARY AND DISCUSSION

The purpose of this paper was to begin to describe the ability of perceivers to form impressions of tasks as part of the process of forming a task attitude. To this end, a grammar of task syntax was proposed that describes how critical elements of tasks are identified and organized in perception. This grammar was shown to generate representations of task structure that are associated with attitude.

To be sure, the work presented here is preliminary and does not deliver fully on the promises of an articulate theory of task grammar. Indeed, its value is more in the direction it points than the distance it covers. Its primary virtue is that it gives compass to the basic question of how perceivers are able to form impressions of tasks as part of the process of forming an attitude. Its further virtue is that, by its clumsiness, it communicates something of the difficulty of investigating this question. To ask how perceivers are able to form impressions of tasks (e.g., to recognize that a crossword puzzle

is “challenging”) is to ask a deep question of enormous complexity and subtlety⁸

Beyond pointing to the difficulty of studying task grammar however this work suggests several directions for further study. At the theoretical level, a number of nettlesome conceptual problems remain. Is the accounting of task elements (i.e., STATES, EVENTS, and types of relations) complete? Are all of the elements thus far proposed necessary? Is it possible, for example, that tasks are organized not by so many as five kinds of relations (i.e., NULL, AND, THEN, BEFORE, and CHOOSES) but instead by only two or three (e.g., weak, strong, probabilistic)? Also, how are task elements themselves perceived? Although task elements were stipulated as irreducibles for the purpose of this paper there is a competence associated with their perception yet to be described.

In regard to the rules of syntactic grammar, it remains to clarify precisely how perceivers’ intentions function in task perceptions. How, for example, are STATES and EVENTS “known” to be related or unrelated to an INTENDED OUTCOME? And on what basis? What accommodation need be made for the fact that tasks often have multiple intended outcomes? Do perceivers switch between them, or do they somehow incorporate multiple outcomes into a single overarching interpretation of the task? Similarly it remains to clarify how task elements are categorized into the groups of SETTING, EVENT-STATE SEQUENCE, and INTENDED OUTCOME. Are these groupings natural, basic-level categories of perception (see Rosch, 1978)? What is the nature of the boundaries between these categories? If, as has been suggested, these categories are fuzzy sets with boundaries, how do perceivers deal with problems of ambiguous classification?

Finally of further theoretical concern are questions about how tasks are judged to be grammatical or ungrammatical. Rules 3, 4, and 5 of the proposed grammar suggest that only certain relations are permitted among the basic structure categories of SETTING, EVENT-STATE SEQUENCE, and INTENDED OUTCOME. What other structures are imposed on these relations? What limitations are imposed on the content and organization of STATES and EVENTS *within* basic structural categories? These are basic questions about what constitutes a proper “task.” They are neither idle nor easy.

At the empirical level, the work reported in this paper underscores the importance of continued investigation of the perceptual reality of the proposed grammar. This need is pressing, not only to fix the scientific credibili-

⁸To ask this question is also to forsake the very customs of inquiry that have served psychological investigation so well in the past – namely, introspection and self-report. The rules for perceiving are beyond self-reflection (and indeed could not be otherwise). The present work appeals to theoretical structures and processes that function outside awareness.

ty of the grammar but also to illuminate its possibilities. As noted, previous research on perceptual organization processes, by Newton (1976) and Sandelands and Calder (1985), suggests the plausibility of a syntactic grammar that is based on the perceiver's goals and that is capable of representing different relations between the EVENT-STATE SEQUENCE and INTENDED OUTCOME. It remains, however to develop empirical procedures to test the proposed grammar more directly

Chief among the questions deserving immediate empirical attention are two. First, what evidence can be found to support the assertion of Rule 1 that task interpretations are predicated on a calculus of intention? Second, what evidence can be found to support the assertion of Rule 2 that task elements are categorized into groups corresponding to the SETTING, EVENT-STATE SEQUENCE, and INTENDED OUTCOME? Recently Bruner (1986) has written of the empirical support for the first assertion regarding the primacy of the concept of intentionality in task perception:

Fritz Heider and Marianne Simmel used a "bare" animated film to demonstrate the irresistibility of "perceived intention" in the form of a scenario involving a small moving triangle, a small moving circle, a large moving square and a box-like empty rectangle—whose movements are irresistibly seen as two lovers being pursued by a large bully who, upon being thwarted, breaks up the house in which he has tried to find them. Judith Ann Stewart, more recently, has shown that it is possible to arrange the space—time relationship of simple figures to produce apparent intention or "animacy. We plainly see "search, "goal seeking, "persistence in overcoming obstacles"—see them as intention-driven. (1986, p. 18)

Although the tendency to *see* intentionality in unmarked behavior is consistent with the idea that "intention" is important in task perception, it nevertheless remains to demonstrate the functioning of this concept in ongoing task perception. Similarly it remains to demonstrate the functioning of the categories of SETTING, EVENT-STATE SEQUENCE, and INTENDED OUTCOME in ongoing task perception.

Also deserving empirical study are the correspondences between structural representations of tasks generated by the syntactic grammar and the various impressions that are formed of their meaning. Here, the questions for investigation transcended mere syntax to include semantics. In this paper, task interpretations such as "flow " "rhythm, "obligation," "instrumentality "challenge, and "play were proposed to derive from three levels of syntactic structure: (1) the internal structure of the EVENT-STATE SEQUENCE (microstructure); (2) the configuration of relations among the categories of SETTING, EVENT-STATE SEQUENCE, and INTENDED OUTCOME (macrostructure); and (3) the grammaticalness of the structural representation. Certainly there are other task interpretations that have similarly definite associates in grammatical structure. Such associates may be found, for example, for interpretations of "internal causation, "competence, and "self-expression.

Finally at a most general level, the work presented in this paper raises questions of metatheory. Important among these is the question of the universality of task grammars. Are all tasks perceived the same way by all perceivers? What of suggestions that “work” tasks are perceived differently from “play” tasks, or that children see tasks differently from adults (see, e.g., Bateson, 1972; Bruner, 1972; Sandelands, *et al.*, 1983)? Related to this is the further question of origins. Whence does task grammar come? It seems likely that certain aspects of the grammar are innate—i.e., “hard wired” somehow into the cognitive apparatus. Perceptions of primitive elements of tasks like STATES and EVENTS could be of this kind. Other aspects, however might be learned, although perhaps very early in development. The grammatical rules that define which task structures are grammatical (e.g., Rules 3, 4, and 5)) could be of this kind. This suggests that important insights about task grammar could be gained by studies of its development in the individual perceiver.

CONCLUSION

This discussion concludes not with a reiteration of what was found, but with a voicing of hopes. It is hoped, first of all, that the paper has charted and made progress toward resolving the problem with which it started—namely to understand how people form impressions of tasks in the process of forming task attitudes. Secondly it is hoped that the paper has, in addition, raised the right questions and suggested promising directions for future research. Finally it is hoped that the paper draws criticism. Almost certainly the proposed grammar of task syntax is wrong in detail—either in regard to task elements proposed or the rules of structuring suggested. With criticism, there is continued study of task grammars and further insight into the theoretical foundations of task attitudes.

REFERENCES

- Arnold, M. (1960). *Emotion and personality*. New York: Columbia University Press.
- Atkinson, J. W. (1956). Motivational determinants of risk-taking behavior. *Psychological Review*, *64*, 359-372.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review*, *84*, 191-215.
- Bateson, G. (1972). *Steps to an ecology of mind*. New York: Chandler.
- Bower, G. H., Black, J. B., & Turner, T. J. (1979). Scripts in memory for texts. *Cognitive Psychology*, *11*, 177-220.
- Bruner, J. S. (1972). Nature and the uses of immaturity. *American Psychologist*, *27*, 1-22.
- Bruner, J. S. (1986). *Actual minds, possible worlds*. Cambridge: Harvard University Press.
- Chomsky, N. (1972). *Language and mind*. New York: Harcourt Brace Jovanovich.
- Coombs, C. (1964). *A theory of data*. New York: Wiley.
- Csikszentmihalyi, M. (1974). *Flow: Studies of enjoyment*. Chicago: University of Chicago Press.

- Deci, E. L., & Ryan, R. M. (1981). The empirical exploration of intrinsic motivational processes. In L. Berkowitz (Ed.), *Advances in experimental social psychology*. New York: Academic Press.
- Fishbein, M. F., & Ajzen, I. (1975). *Belief, attitude, intention and behavior*. Reading, Massachusetts: Addison-Wesley.
- Greenwald, A. G. (1982). Ego-task analysis: An integration of research on ego-involvement and self-awareness. In A. Hastorf & A. Isen (Eds.), *Cognitive social psychology*. New York: Elsevier.
- Hackman, J. R., & Oldham, G. R. (1976). Motivation through the design of work: Test of a theory. *Organizational Behavior and Human Performance*, 16, 250-279.
- Heider, F. (1958). *The psychology of interpersonal relations*. New York: Wiley.
- Insko, C. A. (1967). *Theories of attitude change*. New York: Appleton-Century-Crofts.
- Lepper, M. R., & Greene, D. (1978). *The hidden costs of reward: New perspectives on the psychology of human motivation*. New York: Wiley.
- Mandler, J. M., & Johnson, N. J. (1977). Remembrance of things parsed: Story structure and recall. *Cognitive Psychology*, 9, 111-151.
- Miller, G. Galanter, E. H., & Pribram, K. (1960). *Plans, goals and the structure of behavior*. New York: Holt, Rinehart & Winston.
- Newtonson, D. (1973). Attribution and the unit of perception of ongoing behavior. *Journal of Personality and Social Psychology*, 28, 28-38.
- Newtonson, D. (1976). Foundations of attribution: The perception of ongoing behavior. In J. H. Harvey, W. Ickes & R. Kidd (Eds.), *New directions in attribution research* (Vol. 1). Hillsdale, New Jersey: Erlbaum.
- Newtonson, D., & Enquist, G. (1974). The perceptual organization of ongoing behavior. *Journal of Experimental Social Psychology*, 12, 436-450.
- Osgood, C. E., Suci, G. J., & Tannenbaum, P. H. (1957). *The measurement of meaning*. Urbana: University of Illinois Press.
- Pinder, C. C. (1976). Additivity versus non-additivity of intrinsic and extrinsic incentives: Implications for work motivation, performance and attitudes. *Journal of Applied Psychology*, 61, 693-700.
- Roberts, K., & Glick, W. (1981). The job characteristics approach to task design: A critical review. *Journal of Applied Psychology*, 66, 193-217.
- Rokeach, M. (1972). *Beliefs, attitudes and values*. San Francisco: Jossey-Bass.
- Rosenberg, M. J. (1956). Cognitive structure and attitudinal affect. *Journal of Abnormal and Social Psychology*, 53, 367-372.
- Rosch, E. (1978). Principle of categorization. In E. Rosch & B. Lloyd (Ed.), *Cognition and categorization*. Hillsdale, New Jersey: Erlbaum.
- Sandelands, L. E., Ashford, S. E., & Dutton, J. E. (1983). Reconceptualizing the overjustification effect: A template-matching approach. *Motivation and Emotion*, 7, 229-254.
- Sandelands, L. E., & Calder, B. J. (1985). *Perceptual organization in task performance*. Unpublished manuscript, Columbia University.
- Solomon, R. C. (1976). *The passions*. Garden City, New York: Doubleday.
- Staw, B. M. (1984). Organizational behavior. In M. R. Rosenzweig & L. W. Porter (Eds.), *Annual Review of Psychology*, 35, 627-666.
- Swann, W. B., & Pittman, T. S. (1977). Moderating influence of verbal cues on intrinsic motivation. *Child Development*, 48, 1128-1132.
- Weick, K. E. (1964). Reduction of cognitive dissonance through task enhancement and effort expenditure. *Journal of Abnormal and Social Psychology*, 68, 533-539.
- White, R. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, 66, 297-333.
- Zajonc, R. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, 35, 151-175.