Psychological Linguistics: A Natural Science Approach to the Study of Language Interactions

Sidney W. Bijou, John Umbreit, Patrick M. Ghezzi,
and Chia-Chen Chao
The University of Arizona

Kantor's theoretical analysis of "psychological linguistics" offers a natural science approach to the study of linguistic behavior and interactions. This paper includes brief descriptions of (a) some of the basic assumptions of the approach, (b) Kantor's conception of linguistic behavior and interactions, (c) a compatible research method and sample research data, and (d) some areas of research and application.

In the years between 1975 and 1981, Kantor (1975, 1977, 1981) described a natural science approach for the study of linguistic behavior and interactions which he called *psychological linguistics*. In fact, his analysis of linguistic behavior appeared initially in the 1920s in journal articles (Kantor, 1921, 1928, 1929), and in a chapter for a book on principles of psychology (1926), and in the 1930s in book form (Kantor, 1936). These publications stimulated a number of studies on the postulates of the approach (e.g., Brions, 1937; Bucklew, 1943; Herman, 1951a, 1951b; Pronko, 1945; Ratner, Gawronski, & Rice, 1964; Ratner & Rice, 1963; Rosenberg & Cohen, 1966; Wolf, 1958a, 1958b), a comprehensive review of the literature (Pronko, 1946), and an approach to the study of language (Ratner, 1957; Rice & Ratner, 1967).

In the present paper, we present an overview of our work on psychological linguistics. We shall describe (a) some of the basic assumptions of Kantor's approach, (b) his conception of linguistic behavior and interactions, (c) a research method to study psychological linguistics and sample research data, and (d) areas of research and application. It is hoped that this brief account will orient the readers of *The Analysis of Verbal Behavior* to a natural science approach, one completely free of mentalistic

variables, to the study of language behavior in natural and laboratory situations.

Basic Assumptions

The conceptual background for the analysis of linguistic interactions presented requires a comprehensive review of at least two books: *The Science of Psychology* (Kantor & Smith, 1975) and *Psychological Linguistics* (Kantor, 1977). Such a review is neither appropriate nor feasible here. We shall therefore limit ourselves to a description of five of the basic assumptions of Kantor's approach.

1. The subject matter of psychology as a natural science is the adjustments of human and nonhuman organisms to persons, objects, and events that constitute the environment. Adjustments are categorized as effective (manipulative), affective (feeling), cognitive (knowing), and linguistic (language) (see Bijou, 1984).

2. An analysis of adjustments involves the reciprocal interrelationships among (a) responses of an organism in its symbiotic relationship to interacting stimuli, (b) media that enable interactions to take place (light for visual contacts, sound for auditory contacts, and the like), and (c) setting conditions that foster or hinder the order, regularity, and completeness of an interaction (e.g., satiation or deprivation of appetitive stimuli). Responses *and* stimuli are defined in terms of their function, which evolve in the individual's history of interactions, (i.e., a clear distinction is made between response function and response topography and between stimulation from a source and the physical description of the source).

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Requests for reprints should be sent to Sidney W. Bijou, College of Education, The University of Arizona, Tucson, Arizona 85721.

3. In some situations, adjustments center on changes in the organism (e.g., heart rate acceleration in an affective reaction); in other situations, they center on changes in the stimulus objects (e.g., opening a box, thereby making it possible to get a cracker); in still other situations, they result in a change of orienting or knowing behavior (e.g., understanding a speaker's referential behavior). Explicit or implicit linguistic reactions may be the dominant or the subordinate part of any adjustment.

4. Adjustments may be momentary reactions (e.g., moving out of the path of a flying object) or they may be cumulative, well-established reactions (e.g., responding aggressively to practically all remarks), in which case they are generally referred to as a personality trait.

5. Biological conditions of the individual influence momentary and cumulative reactions, but do not determine psychological events. Biological conditions are components in the total interactional situation, conceptualized as a field of reciprocally related variables. Thus an organism's species characteristics limit its performance to certain classes of behavior, but among the members of a species, all behavioral reactions and traits develop from the individual's interaction with his or her inorganic, organic, and cultural environment.

The Domain of Psychological Linguistics

The field of language is broad indeed, subsuming phonology, morphology, lexicology, syntactics, semantics, semiotics, and pragmatics. It also embraces special areas generally studied in anthropology, linguistics, sociology, philosophy, physics, physiology, and psychology. In Kantor's perspective, the study of language from the point of view of psychology as a natural science means that the study of language deals in *actual* language interactions in specific settings. These interactions are specialized types of adjustments, namely, communicative, indicative, or symbolic. To paraphrase Kantor (1977), language interactions are the acts of persons as they adjust to people, objects, and events, either through referential interactions involving verbalizations and/or gestures, or through symbolic interactions. Language related phenomena such as transcriptions, verbal formulae (e.g., greetings), dialectical and

communal language practices, cultural language systems such as French and German, and speech descriptions such as syntax, are clearly recognized as being intimately related to psychological linguistics but are excluded and should be treated either as *parapsychological language* or as *things in context*. In other words, psychological linguistics is concerned only with the description, analysis, and study of interactions of individuals in specific situations, and not with the products or style of such interactions. How linguistic products and style evolve is the concern of other linguistic disciplines, such as general linguistics, grammar, and semiotics.

Symbolic Interactions

Symbolic interactions refer to a person's reactions to a stimulus that has been made to *substitute* for something else, either by that person or by someone else. A reaction to a symbol may be (a) simply an orientational (knowing or knowledge) reaction with respect to a substitute stimulus (e.g., noticing an exit sign as you enter a theater and take your seat) or (b) an orientational reaction followed by contact with the object or event symbolized (e.g., noticing an exit sign and then leaving the theater through the door marked EXIT).

Referential Interactions

Referential interactions refer to a person's *simultaneous* reactions to a listener and a referent, under a specific set of circumstances (setting condition). Referential interactions may be narrative, mediative, or both. In narrative interactions, a speaker's referential behavior is coordinated with a listener's referential behavior, as in casual conversation. In mediative interactions, a speaker's referential behavior is coordinated with a listener's nonreferential behavior (e.g., the listener closes the door when the speaker requests it). The listener may be a person, a surrogate person, or the speaker himself or herself (i.e., when a person is both speaker and listener). A referent may be present or absent, concrete or abstract, existent or nonexistent. A setting condition, which may be social, physical, organismic, or some combination of the three, affects the stimulus function or response function in an interaction, or it may affect the entire interaction. The linguistic behavior in an

interaction varies in style in accordance with dialectical, communal, and cultural style which includes grammatical structures (syntax). How an individual comes to speak in a given style is of great interest, but requires a separate study that takes into account the personal and cultural histories of individual speakers.

Methodology

The methodology we have developed to study linguistic behavior and interactions deals with referential interactions. We study the linguistic behavior of a speaker (hereafter referred to as *A*) as he or she communicates with a listener (hereafter referred to as *B*). Our research thus far has not dealt with a detailed analysis of *B*'s response to *A*'s linguistic behavior. Conversations between *A* and *B*, usually 10 minutes in duration, are videotaped so that raters can view entire interactions. Data on *A*'s initiations of referential behavior and *B*'s responses to them are derived from these videotapes.

A's linguistic interactions are analyzed in two phases. First, the number of *A*'s initiations in a 10-minute period are identified. Second, a selected number of interactions initiated by *A* are analyzed to determine: (a) the average duration of *A*'s initiations, (b) the mode of *A*'s initiations (i.e., whether they were verbal-vocal, gestural, or both), (c) whether *B*'s response was narrative, mediative, or both, (d) the category or categories of the referents in terms of the persons, objects, and activities spoken of, and any accompanying feeling reactions and (e) any categories of secondary linguistic adjustment (secondary to the communication adjustment) such as amusing, instructing, persuading, etc. Criteria for ratings, examples of acceptable and unacceptable responses, and explanations are presented in a manual¹ to guide the raters' performances.

Determining the Number of A's Initiations in a 10-Minute Period

The rater identifies all of *A*'s initiations on a data sheet arbitrarily divided into 10 segments, each representing successive one-

minute time intervals. Sessions can be shorter or longer than 10 minutes and the intervals can be divided differently, depending upon the research. Frequently, a rater will need to listen several times to what precedes and/or follows a possible linguistic interaction.

The rater uses the following four guidelines to identify the situations and responses that are counted as *A*'s linguistic initiations:

1. From a situation of silence (i.e., 5 seconds or more during which neither person speaks), *A* introduces a referent that occasions a relevant referential or nonreferential response by *B*.

2. In the course of conversation, *A* introduces a referent different from that introduced by *B* that occasions a relevant referential or nonreferential response by *B*. In other words, *A* changes the subject of conversation and *B* reacts to it.

3. In a series of linguistic interactions, following an initiation by *A*, all of *A*'s linguistic responses are identified as *A*'s initiations until (a) *B* changes the referent, and *A* responds to it, or (b) a 5-second period of silence elapses.

4. During a conversation, *A* and *B* may agree to adhere to the plans or rules of a particular activity such as playing a game, adhering to parliamentary rules, limiting discussion to a particular topic, taking turns telling jokes, role playing, etc. If *A* initiates the plans or rules and *B* agrees, the episode is *A*'s initiation. If *B* introduces the plans or rules and *A* agrees, it is not *A*'s initiation. Within the agreed-upon format, *regardless of who initiated it*, all of *A*'s initiations are identified according to guidelines 1-3.

There are eight additional guidelines to help the rater identify *A*'s responses that do not qualify as initiations, such as *A* makes a comment not followed by a relevant response by *B*, *A* responds to a referent initiated by *B*, *B* indicates he or she did not hear what *A* said, and the like.

Analyzing the Duration, Modality, and Content (Referents)

Using a second data sheet, the rater analyzes up to ten of the interactions identified in each 10-minute session, which is an arbitrary practice on our part. If there are ten or fewer interactions, the rater analyzes all of them; if there are more than ten interac-

¹The Manual for Instructions for Identifying and Analyzing Linguistic Interactions may be obtained on request from Sidney W. Bijou, College of Education, The University of Arizona, Tucson, AZ 85721.

tions, ten are randomly selected for analysis. A comparative study has shown that an analysis of ten interactions produces data similar to an analysis of all the interactions in a 10-minute session.

The duration of each of *A*'s initiations is recorded to the nearest whole second. Each initiation is then classified as to modality: (a) entirely verbal-vocal, (b) entirely gestural, or (c) a combination of verbal-vocal and gestural.

A's referent is analyzed in terms of time frame, actuality, content, and feeling reactions about persons, places, objects, and activities. First, the rater determines whether *A* clearly indicated a past, present, or future time frame, or did not clearly indicate any time frame at all. Next, the rater determines whether the people, places, objects, and activities that *A* referred to are actual (real) or fictional (imaginary). Next the rater classifies the particulars of what *A* said by indicating whether *A* talked about: himself or herself, or his or her family, friends, pets, etc.; the listener, or the listener's family, friends, or pets, etc.; other people (e.g., classmates); animals (e.g., snakes at the zoo); objects (inanimate things); entertainment (e.g., movies, music, show business personalities); sports/recreation (e.g., visits to the zoo, camping trips or family outings, etc., that are *not* school-related); academic activities (part of the instructional program, including PE, band, etc.); non-academic school-related activities (e.g., recess, lunch, clubs); or other activities *not* included above. Finally, the rater indicates whether *A* clearly expressed a liking, disliking, anger, or fear reaction with respect to any part of the referent.

Analyzing A's Secondary Linguistic Adjustments

Using a third data sheet, the rater reviews the interactions to determine *A*'s secondary linguistic adjustments. Although research on other kinds of linguistic problems might require a different set of categories, we have found useful for our purpose the following: *amusement*, *A* humors or amuses *B*; *instruction*, *A* clearly teaches or instructs *B*; *persuasion*, *A* clearly induces or persuades *B* to exchange goods or services; *support*, *A* clearly compliments, flatters, or otherwise supports *B*; *punishment*, *A* clearly admonishes, ridicules, or otherwise punishes *B*; *cooperation/sharing*, *A* clearly

induces *B* to share some item or to cooperate on some task; and an *esthetic appreciation*, *A* communicates with colorful figures of speech, poetic expressions, or literary quotations.

Analyzing B's Responses

B's responses to *A*'s initiations are rated as narrative (verbal-vocal, gestural, or a combination of both), mediative (a nonreferential action), or a combination of both. Interactions as a whole are classified as narrative, mediative, or both, depending on the category of *B*'s response.

Describing the Setting Conditions

The setting condition is the physical and social situation in which the subjects talk to each other. In our studies, it is a room in a public school building decorated as a lounge with bean bags, colorful pictures, and an end table. A setting condition may be implemented by the participants when they agree to behave in a certain way, as prescribed by a game, dramatic play, rules of order, etc.

Interrater Agreement

Interrater agreement is determined by point-by-point interscorer agreement between a principal rater and a second trained rater. Both raters independently analyze data from 25% to 33% of the videotaped sessions. Their ratings are compared using the formula $\text{agreements/agreements} + \text{disagreements} \times 100\%$. With five subjects, each of whom talked to three different listeners for three to nine sessions, yielding a total of 28 sessions, agreements for identifying *A*'s initiations ranged from 80-100% with a mean of 86% overall; agreements for analyzing interactions ranged from 92-100% with a mean of 94% overall.

An Example of Data

In developing the methodology, we studied the effect of the listener on the linguistic behavior of normal 11-year-old Caucasian children (four girls, one boy). Each subject interacted with same-sex listeners of three different ages: a young adult (25-30 year's old), an age peer, and a younger child (6 year's old) from 3 to 9 sessions. Figure 1 shows data on the average number and duration of initiations for one of the female subjects. Table 1 shows the results of the subject's initiated interactions (referents).

KATHY

Figure 1. Mean number (left side) and duration (right side) of initiations for Kathy while interacting with three different-aged listeners.

For this subject, who had eight conversations with each listener, the mean number of linguistic initiations was highest, and the mean response duration shortest, when she was talking to the six-year-old girl, and lowest and longest when talking to the young adult. This reciprocal relationship between number and duration of initiations was found with some of the other subjects, but not with all. This result is consistent with the literature on younger children (e.g., Shatz & Gelman, 1973).

Table 1 shows the characteristics of A's initiations.

1. *Modality.* Most of A's initiations were verbal-vocal (58% to 77%), but she made more mixed verbal-vocal and gestural responses in her conversations with the young adult (38%), compared to those with the child (26%) and with the peer (21%).

2. *Type of interactions.* Based on the listeners' responses most interactions were narrative, with the greatest percentage (100%) in the subject's conversations with the young adult.

3. *Content of A's initiations (referents).*

(a) *Time frame.* Most of A's referents with the child and peer had no time frame (96% and 90%, respectively). The percentage also was high (71%) in conversations with the young

adult, but with her, past time frames also were used (21%).

(b) *Actuality.* All of A's referents were about real people and events.

(c) *Subject-matter.* Much of A's referents with the child were about the child (42%); with the peer and young adult, the referents were about other people (44% and 29%, respectively).

4. *Secondary linguistic adjustments.* There were relatively few secondary linguistic adjustments. Most were in conversations with the child (29%) and took the form of amusing (18%), instructing (9%), punishing (5%), and cooperating/sharing (68%).

Applications

Our experience and the data collected thus far leads us to believe that our research methodology (a) is applicable to linguistic studies in natural, quasi-natural, and laboratory settings and (b) will yield meaningful information about linguistic interactions involving a variety of speakers, listeners, referents, and setting conditions. Research using this method can take various forms and serve various purposes. For example, it is applicable to studies on the linguistic interactions between mothers and children, handicapped and nonhandicapped children, therapists and patients, lawyers and clients, administrators and on-

Table 1
Summary of Analyzed Interactions: Kathy

<u>Speaker</u>	<u>Child</u>	<u>Peer</u>	<u>Adult</u>
Vocal (V)	74%	77%	58%
Gestural (G)	_____	2%	4%
V & G	26%	21%	38%
<u>Listener</u>			
Narrative (N)	79%	88%	100%
Mediative (M)	9%	2%	_____
N & M	12%	10%	_____
<u>Referent</u>			
Past	1%	6%	21%
Present	3%	4%	_____
Future	_____	_____	8%
No Time Frame	96%	90%	71%
Real	100%	100%	100%
Fictional	_____	_____	_____
Speaker	26%	23%	21%
Listener	42%	15%	8%
Other People	16%	44%	29%
Objects	28%	25%	17%
Activities	22%	35%	21%
Feeling	_____	_____	4%
Secondary Adjustments	29%	2%	8%

line workers, and peers in recreational and vocational settings. Studies of the linguistic behavior of babies and young normal children and their caretakers could focus on the nature of linguistic development; studies of retarded, autistic, and emotionally disturbed children could yield information about the conditions that produce deviant linguistic development; studies of training/treatment could reveal the actual and contrived situations that stimulate and facilitate fluent conventional speech; etc.

A study is in progress involving mildly handicapped elementary school-age children. The goal is to develop a teaching/training technique (i.e., intervention package) that school personnel can use to improve a handicapped child's sociolinguistic skills in relation to nonhandicapped peers and vice versa. The ultimate goal is to enhance the mainstreaming process by enabling handicapped children to participate more fully in and enjoy social relationships with nonhandicapped and handicapped children and adults.

REFERENCES

- Bijou, S. W. (1984). Cross-sectional and longitudinal analysis of development: The interbehavioral perspective. *Psychological Record*, 34, 525-535.
- Brions, I. T. (1937). An experimental comparison of two forms of linguistic learning. *Psychological Record*, 1, 205-214.
- Bucklew, J. (1943). An exploratory study in the psychology of speech perception. *Journal of Experimental Psychology*, 32, 473-494.
- Herman, D. T. (1951a). Linguistic behavior: I. Some differentiations in hearer responses to verbal stimulation. *Journal of General Psychology*, 44, 199-213.
- Herman, D. T. (1951b). Linguistic behavior: II. The development of hearer interaction with holophrastic language stimuli. *Journal of General Psychology*, 44, 273-291.
- Kantor, J. R. (1921). An objective interpretation of meaning. *American Journal of Psychology*, 32, 231-248.
- Kantor, J. R. (1926). *Principles of psychology* (Vol. 2). New York: Alfred Knopf, Inc.
- Kantor, J. R. (1928). Can psychology contribute to the study of linguistics? *Monist*, 38, 630-648.
- Kantor, J. R. (1929). Language as behavior and as symbolism. *Journal of Philosophy*, 26, 150-159.
- Kantor, J. R. (1936). *An objective psychology of grammar*. Bloomington, IN: Indiana University Publications, Science Series.
- Kantor, J. R. (1975). Psychological linguistics. *Mexican Journal of Behavior Analysis*, 1, 249-268.
- Kantor, J. R. (1977). *Psychological linguistics*. Chicago: Principia Press.
- Kantor, J. R. (1981). Reflections upon speech and language. *Mexican Journal of Behavior Analysis*, 7, 91-105.
- Kantor, J. R., & Smith, N. W. (1975). *The science of psychology*. Chicago: Principia Press.
- Pronko, N. H. (1945). An exploratory investigation of language by means of oscillographic and reaction time techniques. *Journal of Experimental Psychology*, 35, 433-458.
- Pronko, N. H. (1946). Language and psycholinguistics: A review. *Psychological Bulletin*, 43, 189-239.
- Ratner, S. C. (1957). Toward a description of language behavior: I. The speaking action. *The Psychological Record*, 7, 61-64.
- Ratner, S. C., & Rice, F. E. (1963). The effect of the listener on the speaking interaction. *The Psychological Record*, 13, 265-268.
- Ratner, S. C., Gawronski, J. J., & Rice, F. E. (1964). The variable of concurrent actions in language of children: Effect of delayed speech feedback. *The Psychological Record*, 14, 47-56.
- Rice, F. E., & Ratner, S. C. (1967). Toward a description of language behavior: II. The listening action. *The Psychological Record*, 17, 493-502.
- Rosenberg, S., & Cohen, B. D. (1966). Referential processes of speakers and listeners. *The Psychological Record*, 73, 208-231.
- Shatz, M., & Gelman, R. (1973). The development of communication skills: Modification in the speech of young children as a function of listener. *Monographs of the Society of Research in Child Development*, 38, (5, Serial No. 152).
- Wolf, I. S. (1958a). Stimulus variables in aphasia: I. Setting conditions. *Journal of the Scientific Laboratories, Denison University*, 44, 203-217.
- Wolf, I. S. (1958b). Stimulus variables in aphasia: II. Stimulus objects. *Journal of the Scientific Laboratories, Denison University*, 44, 218-228.