

The Effect of Cognitive Variables on Lexical Acquisition

R.L. Banigan & H.N. Seymour

Child language theorists regard the dyadic interaction between caregivers and their infants an important factor in the acquisition of language. Research on the relationship between caregiver input and the language acquisition process in children has identified and described what has come to be called "motherese" and the "baby-talk register" (Cross, 1977; Newport, Gleitman and Gleitman, 1977; Snow, 1984). Motherese and baby-talk register alter the adult communicative dyad in various verbal and nonverbal ways. There are the adult's insertions of pauses or pitch variations (Garnica, 1977); attention to novelty (Greenfield, 1982); exaggeration of stress patterns and slower rate of input (Bowerman, 1977; Clark, 1973); production of content words in isolation (Brown, 1973; Chapman, 1981); and timing of labeling an object.

These various kinds of modification in the adult conversational dyad may facilitate language acquisition by young children — a conclusion based on the obvious fact that children exposed to simplified and altered adult models of speech acquire language quite successfully. Such an assertion is more intuitive than empirical and without complete understanding as to how motherese contributes to language acquisition. Indeed, much is known about the constituent forms of caregiver input, but the problem for those concerned about language intervention and facilitation is in knowing what elements of motherese are important. Also, little is known about the interactive effect of those constituents. The particular interest of this study is the examination of adult verbal and nonverbal input behaviours that affect a child's development of lexicon.

At an early stage in acquiring a lexicon, a major cognitive task of children is filtering out the salient features within a continuous stream of communication. This perceptual task may be facilitated by making various verbal and nonverbal experiences more salient through motherese. The result of perceptual saliency within a communicative dyad is greater attention to labels for referential objects and to the figurative and functional attributes of those objects. Consequently, increased attention to words aids in the mapping of linguistic labels as part of one's conceptualization about particular experiences.

Thus, ability to map linguistic input may be facilitated by expending and directing a child's experiences through verbal and nonverbal means. And one's referential conceptualization may be expended by increasing experiences with particular referents. Wells (1974)

reported that the meaning a child constructs for a referent will be influenced by selectively directing the child's attention. Moreover, young children's strategy is to take new words as labels for whole objects rather than for physical or relational properties of objects (McNamara, 1972; Ninio & Bruner, 1978). Seemingly, a child draws inferences about referent objects based on experiences and implements a strategy to organize those inferences that often result in overgeneralizations from the perspective of adult categories.

The enhancement of input through the direction of attention to salient features of a referent may increase the efficiency of the child's referent mapping process. Mervis (1984) reported that children rely on adult labeling for understanding ambiguous referent categories. Ambiguity arises when a referent object equally approximates the representation of two categories (an example would be a *ball* and a "round" *candle*). An extension of Mervis' premise would include objects that are ambiguous because of children's inexperience with referents, making category assignment difficult for objects whose featural or cluster attributes are not prototypical for "child category" representation. In such instances, language input can eliminate ambiguities in processing experience. The value of cognitive processing variables that direct, enhance and expend on a child's experience with a referent is supported in the literature (Newport, Gleitman and Gleitman, 1977; Carey, 1978; Barnes, Gutfreund, Satterly and Wells, 1983; Belsky, Good, Most and Farel, 1980).

Although research documents the importance of cognitive processing variables in lexical development, there is a paucity of information about the comparative effects of these variables on lexical development. Does one set of variables contribute more to the acquisition process than another, and does the relative contribution vary according to different aspects of lexical learning? Hence, the purpose of this study was to investigate the effect of two aspects of cognitive processing — attention-getting devices and direct-interaction devices — on three dimensions of lexical acquisition: (1) demonstration — appropriateness of play, as representing conceptualization of the function of a referent; (2) comprehension — understanding of verbal label for an object/referent; and (3) labeling — verbal naming of an object.

The research question posed in this study was whether there existed a difference between attention-getting devices and direct-interaction devices in affecting acquisition of lexicon for specific objects as measured by demonstration, comprehension and labeling behaviours. A single-subject-alternative-treatment design was used

Rael L. Banigan & Harry N. Seymour
University of Massachusetts
Amherst, Massachusetts

to address the research question. Observation of a single subject's progression toward the acquisition of lexical items over several training sessions may reveal useful information about the process of acquisition that would not be possible in traditional group experimental designs.

Procedures

Subject

One female subject, aged 1 year, 8 months, with an MLU of 2.36, was selected for this study. The subject exhibited no speech-language, emotional, intellectual, hearing or neurological deficits.

Objects

Seven objects were used in the study. Baseline procedures including play, comprehension and production probes were utilized to select objects unknown to the child. To determine how well the objects represented their categories, 30 undergraduate students at a large university rated the objects in accordance with procedures described by Rosch (1975). A goodness of example rating was determined for each object. The 30 undergraduate students rated the objects on a seven-point scale with level "1" indicating that an object matched the subject's idea or image of the category very well; a level "7" was a poor match and level "4" was a moderate match. Based on the goodness of example ratings, the objects used in the study were considered good representation of their object categories as reflected in the scores. The relative distribution of ratings are presented in Table 1.

Table 1: Goodness of Example Rating of Objects Selected for Study

Jumprope	1.31
Yoyo	1.10
Megaphone	3.17
Padlock	1.28
Harmonica	2.90
Curler	1.59
Viewmaster	1.14

Functional Criteria Validation

A second preliminary procedure was employed to validate the criteria used in determining the extent to which a demonstration of objects' function represented the objects' concept. For example, lifting a cup to one's mouth, as in the act of drinking, may be considered a good functional example for the item cup. Hence, 10 undergraduate students from a large university participated in the validation procedure. Each student was queried individually about an object's function in terms

of what they would do with the objects. They were instructed to respond only nonverbally with gestures or movements in demonstrating that they knew the objects' functions. Also, they were instructed to use the fewest number of gestures possible. The student responses were analysed into two categories of gestures. Those gestures that were demonstrated by all 10 students were assigned to a "first level," and those demonstrated by at least 8 students were assigned to a "second level" of representatives. The first and second level criteria were applied in determining the extent to which subjects understood an object's function. Gestures classified as first level depicted maximal understanding. Second-level gestures were appropriate, but were considered supplementary to the demonstration and not necessary to indicate understanding of an object's function.

Primary Experiment

There were three experimental conditions, which exposed the subject to different investigator input stimuli. In condition 1, investigator input focused on the subject's attending behaviour — attention-getting devices. Condition 2 engaged the subjects in a specific cognitive learning experience involving labeling and functional interaction with objects — direct-intervention devices. And, in condition 3, the format combined elements of both conditions 1 and 2, wherein attention and direct interaction were emphasized simultaneously. The conditions were presented in numerical order, 1, 2 and then 3.

Play was the situational and interactive mode between the investigator and subjects in all experimental conditions. Objects were placed on the floor in front of the subject in a randomized order. The subject chose the objects and the duration of time in which to interact with each object. If a subject failed to play with a particular object, it was placed directly in front of the subject in an attempt to focus the subject's attention on that object. Also, during each session, the subject was asked a comprehension probe (Where is the _____?) and a production probe (What is this?) for each object in a random order. All sessions were audiotaped; written notations and audio comments were made about specific actions.

As noted above, the subject's attending behaviour was the focus. In condition 1, the investigator's input stimuli was determined by and in direct response to the subject's focus of attention. The response mode of the investigator took the form of looking at the subject and object in response to the subject's initiatives. Verbal input included labeling the object of the child's attention or verbalizing a single sentence descriptive of the child's action. Also, the investigator utilized an exaggerated stress pattern characterized by a slight pause preceding and following object label and slightly increasing the loudness of the verbal label.

Investigator input in condition 2 was directed toward cognitive processing by providing the subject with gestural and verbal stimulation. Deictic sentence

structure such as "This is a _____", as well as extensions of the subject's responses provided the interactive component for this condition. Also, the investigator initiated a demonstration of object function by describing actions that would typically take place with objects.

Condition 3 included input variables from conditions 1 and 2. Each of the investigator's verbal and non-verbal input used in conditions 1 and 2 were repeated at least once in each session during condition 3. The number of specific input behaviours was equivalent to the number in each of conditions 1 and 2, but included fewer examples of each specific type of behaviour. For example, the investigator may have used deictic sentence structure (This is a _____) five times in condition 2 but only once in condition 3. Hence, four other input variables would be added to the deictic exemplar, making the number of overall stimuli equivalent among the three conditions.

The experimental design of the study was a single-subject-alternative-treatment design. As such, baseline measures were obtained before and after each of the three treatment conditions. Other than probes for comprehension (Where is the _____?) or production (What is this?), there was no direct interaction with the investigator during baseline sessions. Since all objects not involved in direct treatment appeared alternately in the session as baseline objects, and another object was included to remain in baseline throughout the duration of the study, specific intermediate baseline sessions were considered unnecessary. All sessions were 15 minutes long.

The number of sessions in each condition was determined by the consistency of the subject's responses. Seven sessions were necessary for conditions 1 and 2, but only five sessions for condition 3. In each session, five objects were included: the two primary objects for that condition; one alternative object from each of the other two conditions; and one baseline object. The investigator input for a condition was applied to the two primary objects assigned to that condition, and all other objects were treated as if in baseline, with no interaction from the investigator except for comprehension and production probes. Within each condition, objects designated as alternatives were alternated among sessions in order to limit their exposure. The same object (viewmaster) remained in baseline throughout the study.

A binary coding system was used for data analysis and classification for investigator input, subject responses to production and comprehension probes, and for subject demonstrations of object functions. Investigator input variables were coded to identify that target input was applied at least once during the session. A plus (+) indicated the presence of an appropriate investigator input variable and a minus (-) reflected the absence of input variables. In addition to investigator input, subject's responses to comprehension and production probes were also coded. In order to achieve a plus (+), a

definitive spontaneous response was required. An inconsistent or unclear response was coded as minus (-).

In coding the demonstration of objects' functions, the data from the audio tape, audio comments and written notations were coded immediately following each session. If an appropriate gesture/movement was observed it was positively coded. Both of the first-level gestures had to be demonstrated to receive a positive demonstration code. For example, the first-level gestures for viewmaster included raising the viewmaster to eye level, then pushing down the lever on the side. However, if the child only places the viewmaster to her eyes, such action reflects the form-function attributes of the glass section or shape, but would not clearly support category knowledge. Pressing the button and looking at the pictures would represent the appropriate form-function correlation for the category of viewmaster. In the case of this object, the subject consistently raised the viewmaster to her forehead and said "camera." Reliability for coding input, comprehension and production probes, and subject demonstration was assessed once during each condition and resulted in 97.8%, 93% and 91.3%, respectively.

In order to gauge the importance of a possible influence of outside experiences during the period of the study, the subject's daily activities were monitored by discussion with parents, teachers and daycare staff. Based on these discussions, outside experiences were not considered to be a factor in the subject's performance during the study.

Results and Discussion

Figure 1 depicts the subject's learning curves for comprehension, labeling and demonstration for all three conditions. Also, an overall learning curve of averaged scores (expressed in percentages) for comprehension, labeling and demonstration is shown. A treatment effect was demonstrated for all conditions. This treatment effect was strongest for condition 3.

Clearly, the most rapid and consistent overall performance including comprehension, labeling and demonstration was evident in condition 3, the combination of attention-getting devices and direct-interactive devices. Fewer sessions were required to achieve criterion of

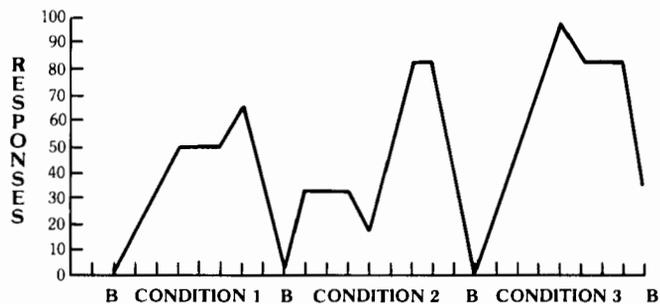


Figure 1: Student's responses to attention and cognition in experimental conditions (1, 2 and 3) and baseline (B).

consistent performance in condition 3. The subject appeared to prefer the interactive nature of condition 3 and demonstrated more focused play and experimentation with objects.

The attention variables of condition 1 seemed to play an important role in the production of referent labeling. The subject's apparent strategy was to encode a new label by attending to the sound sequence and immediately available perceptual and interactive environmental supports. Evidence for this conclusion was the subject's ability to label objects when presented but inability to respond to the comprehension probe — "Where is the _____?" for the same objects when they were on the floor and mixed among five other objects. Moreover, labeling preceded comprehension by one session in condition 1, which was not the pattern observed in either conditions 2 or 3.

The direct-interactive devices in condition 2 appeared to be most important to the categorization processes required of the comprehension and demonstration tasks. The demonstration and description of objects in condition 2 reduced ambiguity associated with objects so they could be more readily categorized. Indeed, there was ample evidence that the subject utilized available schema as well as perceptual and featural attributes of the objects in play. Yet, there was no self-discovery of the appropriate function and categorization for objects, which was reflected in "child-basic" categorizations and labeling of objects. For example, the viewmaster was held to the subject's forehead and labeled camera, indicating use of available schema for categorization but resulting in an inappropriate and an overgeneralized label.

The results of this study indicated differential effects as well as highlighted the importance of input on the process of lexical acquisition. From a clinical perspective the single-subject design can be implemented to assess a particular child's response to input and style in lexical acquisition. Information of this kind can be utilized in program implementation to facilitate learning by directing input to the child's individual learning style. Further research is needed to investigate the effects of input in special populations, such as the language impaired, as well as at different ages in development. However, the results of this preliminary investigation and the single-case design can provide guidelines for further investigation.

One limitation of single-subject design studies is the extent to which findings on a single subject is representative of a more generalizable pattern, and the current study is no exception. Hence, either a between-subject or across-subject experimental design comparing spe-

cific components of input (i.e., labeling, demonstration and description) with large numbers of children would be a logical follow-up study. Such a study might further clarify the differential effects of the specific components of the attention-getting devices and direct interaction devices, which were not possible to discern in the current study.

Conclusion

The results of this study indicated that the combination of attention and cognitive processing variables greatly facilitated the lexical acquisition process. Also, the single-subject design was useful in examining and contrasting lexical learning modes among aspects of lexical acquisition in isolation and in combination. The subject's learning curves support a combinatorial and interactive approach to lexical learning.

References

- Barnes, S., Gutfreund, M., Satterly, D., Wells, G. (1983). Characteristics of adult speech which predict children's language development. *Journal of Child Language*, 10, (1), 65-84.
- Belsky, J., Good, M., Most, R., Farel, A. (1980). Maternal stimulation and infant exploratory competence. *Child Development*, 51, 1168-1178.
- Bowerman, M. (1977). The acquisition of rules governing possible lexical items: Evidence from spontaneous speech errors. *Papers and Reports on Child Language*, 13, 148-156.
- Brown, R. (1973). *A First Language, the Early Stages*. Cambridge: Harvard University Press.
- Carey, S. (1978). The child as a word learner. In M. Halle, J. Bresnan, G.A. Miller (Eds.), *Linguistic Theory and Psychological Reality*. Cambridge: MIT Press.
- Chapman, R.S. (1981). Mother-child interaction in the second year of life. In R. Schiefelbusch, D. Bricker (Eds.), *Early Language Acquisition and Intervention*. Baltimore: University Park Press.
- Clark, E. (1973). Nonlinguistic strategies and the acquisition of word meaning. *Cognition*, 2, 161-182.
- Cross, T.G. (1977). Mother's speech adjustments: the contributions of selected child listener variables. In C.E. Snow, C.A. Ferguson (Eds.), *Talking to Children: Language Input and Acquisition*. London, Cambridge University Press.
- Garnica, O. (1977). Some prosodic and paralinguistic features of speech in young children. In C. Snow, C. Ferguson (Eds.), *Talking to Children*. Cambridge: University Press.
- Greenfield, P.M. (1982). The role of perceived variability in the transition to language. *Journal of Child Language*, 9, 1-12.

***The Atypical Stutterer:
Principles and Practices of Rehabilitation***

Editor: Kenneth O. St. Louis
Publisher: Academic Press, Inc.
Reviewer: Julianne Labreche,
Children's Hospital of Eastern Ontario

This book focuses upon seven subgroups of stutterers who do not fit the speech language pathologist's conception of "average". These include: the female stutterer, the exceptionally severe stutterer, the psychologically maladjusted stutterer, the mentally retarded stutterer, the clutterer, the adult neurogenic stutterer and the stutterer whose culture is not North American.

Wisely, the editor points out in the introduction that all stutterers, being unique human beings, are, in a sense, atypical. Nevertheless, this book serves the useful purpose of identifying specific minority groups of stutterers requiring special consideration in conceptualization, diagnosis and therapy.

The authors argue against standardized treatments that can be applied uniformly to the stuttering population. According to St. Louis, the editor, the collective viewpoint is as follows: "Whenever possible, consistent, predictable, data-based treatments should be applied to all stutterers, but sensible variations should be applied to individual stutterers as needed, and, it is hoped, before they become the oft-ignored, small, but ever-present failure statistics."

The book provides many useful insights. Females, for instance, report a longer lag time than men in beginning speech therapy. A study by Silverman and Zimmer, 1982, showed that women reported entering treatment at 11.4 years. Men, in contrast, recalled entering treatment at 9.8 years. Another study, by Seider, Gladstien and Kidd, 1983, reported that female stutterers tend to recover earlier and to be younger at the onset of the problem.

Clinicians working with clients of another nationality may find their therapy attempts hampered by cultural differences. The male client may resent an assertive female clinician, coming from a culture where the female is subservient. A client may consistently arrive late for an appointment, being from a culture where arriving anywhere at the appointed time is considered an insult. A client may even storm out of a therapy session if a clinician's gesture, a positive one in this culture, is considered an obscenity in the client's culture.

Behaviourally oriented therapy programs are especially effective with the mentally retarded stuttering population. The psychologically maladjusted stutterer can benefit from a multidisciplinary approach, with concomitant psychotherapeutic intervention. For many neurogenic adult stutterers, pacing boards are recommended.

The book is an academic one, citing case studies, research results and published therapy material. Its approach is fresh and novel. Its lesson is clear: stutterers are not a collective entity. Individualized programming remains essential.

***Children on Medication: Epilepsy,
Emotional Disturbance and
Adolescent Disorders (Volume II)***

Author: Kenneth D. Gadow
Publisher: College Hill Press, 1986
Soft Cover \$17.95, 249 Pages
Reviewer: Lina Zatzman, M.A., Reg. O.S.H.A.
Speech-Language Pathologist
Durham and Northumberland
Community Support Program

This book seeks to inform primary caregivers and teachers of the behavioural and medical side effects of drugs used in the treatment of epilepsy and emotional disturbance in childhood and adolescence. It is a companion book to Volume I, which deals with hyperactivity, learning disabilities and mental retardation.

The first chapter gives a brief overview of pharmacotherapy. There are sections on the classifications of drugs, with examples of each type and easy-to-understand descriptions of how these drugs work.

The rest of the book is divided into three sections, each dealing with one of the disorders named in the title. Each section begins with a historical overview of drug therapy used to treat the disorder, incidence of occurrence, problems and methods of diagnosis and descriptions of the disorder and its subcategories.

The author consistently stresses the importance of weighing the risk to benefit in drug treatment. The child as a whole must be taken into consideration, and performance in all areas must be assessed. Dr. Gadow recognizes and emphasizes the importance of input from all those involved with a child on medication. He encourages teachers and caregivers to become active participants in the pharmacological treatment process and, more importantly, encourages the physician to seek and take this input into consideration when treating the child.

Charts with lists of generic and trade name drugs, average dosages and schedules of treatment are included in each section. There is only one chart, which indicates side effects of each drug; this would also be useful in the other sections or in an appendix so as to give a quick and easy reference to the readers.

Dr. Gadow is careful to avoid scare tactics. He recognizes that careful medical monitoring, frequent reviews and direct observation at home and in school are important when placing a child on medication. He also stresses that drugs do not always provide a magic solution and that behaviour management or counselling may need to be considered.

This book will assist primary caregivers and

teachers to become informed consumers. Its common-sense approach and easy-to-read style provides valuable information in a clear and concise manner, which will allow caregivers to ask the correct questions when treatment recommendations are being made. Overall, this book is recommended as an excellent resource for primary caregivers, teachers, clinicians and doctors.