Delay Versus Deviance in the Language Acquisition of Language-Impaired Children

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To investigate the issue of delay versus deviance in the language acquisition of language-impaired (LI) children, the order of acquisition of a set of linguistic structures and the relationship obtaining between one structure and another were examined in comprehension and production over a 6-year period in a group of LI and language-matched normal children. The results demonstrated a method similarity between groups, both in the point at which mastery of individual structures was achieved and in the overall patterns of acquisition demonstrated. These data suggest that LI children are constructing grammars based on the same rules and principles as those of linguistically normal control subjects, and that their linguistic impairments may be principally processing, not representational, in nature.

KEY WORDS: language acquisition, language-impaired children, delay, deviance, grammar

The mechanism of first language acquisition are poorly understood. Theories of language acquisition seek to explain how children master a first language within a given time frame, a relatively uniform manner; why children make only certain types of errors; how they come to know more than they are ever exposed to; and how and why they move from stage to stage. Explanations have been based largely upon data from normal children. However, important insights into the nature of acquisition have also been obtained from studying children with known sensory and cognitive impairments, for example, blind children (Anderson, Durkin, & Kachola, 1984; Mattman, 1981; Landau & Gleitman, 1986); deaf children (Jackson, 1989; Lillo-Martin, 1989; Newport & Meier, 1985; Petitto, 1983); and children with Down's syndrome and other mental retardation (Curtis, 1982; 1988; Fowler, 1984, 1986).

Examining language acquisition in children with known learning difficulties may help to make particular promise for elucidating both the principles and processes underlying language acquisition and the developmental relationship between these and other mental processes. This interaction between these and other mental processes has intimate interactions with language and its performance. Toward this end, a number of researchers have examined the cognitive language acquisition and the developmental relationship between these and other mental processes. These studies have included, for example, studies of LI children (Chiat & Hinson, 1978; Clahsen, 1989; Frumkin & Rapin, 1980; Johnstone & Karmen, 1984; Leonard, 1982; 1987; Leonard, Sab addar, Voelter, & Leonard, 1988; Rom & Leonardi, 1990; Tallal & Pepper, 1973, 1974; Tallal, Stark, Kallman, & Meliss, 1981; Tallal, Stark, & Meliss, 1985). This population is of special interest because it is a group that has been reported to have language learning problems in the face of normal nonverbal intelligence (Benton, 1984).

One of the key questions regarding LI children is whether these children evidence significantly delayed normal patterns of acquisition, or whether they evidence deviant acquisition patterns. From a theoretical standpoint, this question is critical, because a finding of deviance in LI children's language acquisition may provide important insights.
into language acquisition by illuminating the consequences of altered and implicated conditions of grammar-building mechanisms, or of specific nonlinguistic mechanisms that support or are intimately involved in the processes of encoding and representation. Actual question clearly has important implications for the clinical remediation of childhood language disorders.

What evidence do we have that language acquisition in a young child? The process of mastering a first language involves both constructing a grammar, or, perhaps, selecting the correct grammar by testing and selecting parameters (Hyams, 1986; Roeder & Williams, 1980), as well as applying algorithms for pulling that linguistic knowledge to use. Constructing the grammar involves establishing a knowledge base in the form of abstract structural linguistic representations and increasing the knowledge base or changing it in principled ways (i.e., moving from "stage 1" to "stage 2"). The second aspect of grammar acquisition is one of mapping linguistic knowledge onto processing procedures. These then constitute distinct areas in which language development can be conceptualized in the representational level, deviations might be predicted to result in structure-specific difficulties, that is, limitations on grammatical structures that embody particular formal properties in rules and representations undetected in the grammars of linguistically normal children or in clear deviations from the normal relationship obtaining between one aspect of grammar and another. At this processing level, deviance might constitute atypical algorithms for parsing or mapping representations onto input or output procedures, such as scanning strategy, maze-like maps, or otherwise incorrect mapping of representational information.

Despite the fact that there are numerous notions regarding different stages of language acquisition and representation, actual differentiating representation from processing deviance on the basis of linguistic performance is extremely difficult. Nonetheless, deviations from what is considered normal in terms of the acquisition of the language for each child exhibit deviance at the representational level, that is, in their acquisition of linguistic form. Specifically, our study was focused on deviations exhibited by children who construct grammars in the same way as normal children. A number of studies have addressed this question, directly or indirectly, yet the issue is by no means resolved.

Several investigators have reported an abnormally persistent use of early acquired linguistic forms either instead of expected advances or in first- and other-acquired forms. For example, in phonology, for example, the researchers noted that Chiat and Hirson (1987) and Ingram (1976) have described the continued use of forms whose surface phonetic realizations are the result of early simplification and subclassification rules alongside renditions of the same child's use of much more mature phonological rules. A parallel phenomenon has been reported in language morphology. Although Li children have shown similar rules of acquisition of standard grammatical morphemes, they are reported to show atypical patterns with respect to the grammatical control of these forms in production. Johnson and Schley (1976) and Stickel (1976), for example, studied the acquisition of 

subjects

The subjects were 28 Li children who met the following criteria:

1. A nonverbal IQ of 6 or better on the Arthur Adaptation of the Leiter International Performance Scale.
2. A "language age" at least 1 year below chronological age and performance mental age. Language age was computed by averaging the scores achieved on the following standardized expressive and receptive language tests: the Sequenced Inventory of Communicative Development (SICD) (Hodgik, Prather, & Tobin, 1979); The Token Test (Disslmer, 1976); the Northwestern Syntax Screening Test (Lee, 1971); the Circle Altered Language Inventory (Celi, 1974); and the Arizona Articulation Proficiency Scale (AAPs; Fidada, 1980). All tests were equally weighted in the computation; thus the resulting index of language age represented an average of a child's comprehension and production performance.

3. Normal hearing acuity* and no oral structural or motor impairments affecting nonspontaneous movements of the articulators.

4. A nonverbal intellectual deficiency, with significant developmental differences from Standard American English in the home environment.

5. No notable history of autism or emotional pathology as determined by DSM III diagnostic criteria.

6. No frank neurological deficit (e.g., hemiparesis or seizure disorder).

In addition, the Li children comprised three defined clinical subtypes: (a) those exhibiting greater receptive than expressive language skills; (b) those exhibiting greater expressive than receptive language skills; and (c) those exhibiting comparable receptive and expressive language skills.

*"Receptive language age" (the mean age of scores on the receptive language tests and "expressive language age" (mean age of scores on the expressive language tests) were also computed. Those scores were used to determine specific subgroups that were not further included in the study reported herein.

The standard auditory procedures of the Speech, Hearing and Communication Center at Children's Hospital in Citi, New York, were used to assess the hearing acuity of the children. No child had normal hearing at 20 dB or better, and normal hearing (i.e., 0 dB or better) for children who exhibited hearing thresholds for pure tones at 500, 1000, 2000, 4000, and 6000 Hz. This procedure was performed by a certified audiologist who administered hearing threshold and speech reception thresholds to the children. In the present study, the children selected for inclusion in the study were those whose speech reception thresholds were greater than 20 dB, or the present study were included.

An oral motor exam was given by a certified speech pathologist. Gross determinations of oral structure, flexibility, and coordination were performed and noted as to right vs. left, or to raise the tongue tip and keep the lip closed, protrude, and project the tip of the tongue. These tests were performed by a certified speech pathologist who administered them.

The research reported in this paper involves only oneaspect of the larger study of which this was a part. A separate aspect of the study addressed the
Conclusión referente a la evaluación de la eficacia del abordaje cognitivo en pacientes con enfermedad de Parkinson.
Deviation from Linear Sequence

To examine the general developmental order in which children achieved the structures tested, scores were first sorted by CYCLE level. For the CYCLE subtests used in this study, there were seven levels, ranging from 2-0 to 2-8. The levels of each subset are indicated in Table 1. For each subset, means were computed, by level, of the data points at which the subsets were passed. For example, the data points means at which Subject 1 passed the seven test levels were 2.3, 3.5, 3.7, 4.5, 5.6, 5.5. Recall that in the present study there were six data points, with data point 1 indicating the structure was "not attained" within any of the data collection points.

With the data sorted in this fashion, the extent to which scores showed consistent developmental increase (higher level attained as chronological age increased) was then inspected. As in the example cited, it was expected that the mean data points for the seven test levels would increase sequentially. That is, the actual data points at which subjects passed these tests were predicted to increase along with increasing test level.

As a first measure of deviance\(^1\) we chose to define as "deviant" those cases in which subjects attained more "dif- ficult" structures earlier than "easier" ones (e.g., subjects showing later points of attainment for Level 2 structures as compared with Level 2 structures). In order to quantify the degree of deviation from the linear sequence of acquisition expected from the CYCLE levels, the number of times the expected linear progression through levels was violated was computed for each subject. The data were scored such that an exception was registered each time a subject showed mastery on a higher test level before one on a lower test level. That is, a case in which a presumably more difficult structure was learned before an easier one (where "difficult" and "easy" are to be translated as "later acquired" and "earlier acquired", respectively)\(^1\). Thus, a pattern such as 2.3, 3.9, 4.2, 5.4, 4.9, 5.7 would be scored as having one violation of the canonical (expected) sequence. A deviant acquisition pattern would presumably show a greater number of sequence violations than the norm.

1. Deviant acquisition patterns include "reversals" in the difficulty of acquired structures was underlaned because it represents a strong case of exception from expected acquisition patterns and is readily quantified. It should be noted, however, that such exceptions do not necessarily indicate that children are progressing through the curriculum at an abnormally slow rate. For example, in the case of a child who has not mastered a particular structure until a later point in time, it may be that the child has not yet had the necessary experiences to master the structure. In contrast, a child who has mastered a structure at a younger age may have had more exposure to the concepts involved.

2. This term "deviant" and "non-deviant" are being used for convenience and are not to be taken at face value relative to relative difficulty along some unspecified dimension of language or learning ability. The issue of complexity of acquisition is a matter of linguistic or learning ability theory and is not being addressed here. See Parker (1984) and Hyams (1986) for interesting discussions of this issue.

### Survival Analysis

In order to analyze possible group differences in the rate of attainment of individual grammatical forms, we used the data survival prediction (Kaplan & Meier, 1958). Survival prediction affords a highly robust test of how groups may vary in their ability to survive specific criteria over time. In the current application, survival was defined as not passing a subject at a given data point; once a subject achieved mastery, she fell out of the study. For each of the 29 CYCLE subtests, separate survival curves were estimated for the two groups of children, using the program SMERSUS (Deacon & Brown, 1981). A representation of the results for CYCLE Subtest 5 (noun singular/plural) is presented in Figure 2, which displays the percent of children surviving (i.e., not achieving mastery) in each group.

The effects on survival were statistically based upon a Cox Proportional Hazard function (Cox, 1972), with significance assigned using a generalized Savage (Mantel-Cox) test. The results are shown in Table 2, which lists for each CYCLE subtest the Mantel-Cox statistic and significance for each group. As can be seen in the table, the group differences are significant for all groups except for Subject 1, where the difference was not statistically significant for either group. The percentage of children surviving in each group is given in Table 2, along with the significance level.

### Discussion

Our findings support the notion that LI children do not display deviant acquisition, because the acquisition patterns displayed by the LI and normal children were remarkably different.
similar. These findings are consistent with other data on this population (although not all of the findings cited below have been interpreted in this way).

In the area of phonology, where research has focused on the phonetic realization of segments and syllables in the speech of LI children and the processes reflected therein, LI children are reported to demonstrate nearly identical phonological processes as those used by younger, normal children (e.g., Campbell & Strich, 1962; Compton, 1970; Ingram, 1955; Leonard, 1977; Studdert-Kennedy & Tarski, 1966). Even in the face of serious motor production difficulties or when evidencing atypical phonetic realization, LI children are matched on the basis of much broader aspects of linguistic performance, including comprehension level. While this more extensive basis by matching L1 children on LI language acquisition in LI and normally developing children, it has not precluded the larger study of this was a part (see Leonard, 1977). Many interesting group differences (Curtiss & Taal, 1991).

Second, the deviance reported in other studies may pertain to control of the grammatical form and not to the nature of the grammatical representations embodied in the grammars of LI children. Thus, even the atypical production patterns reported (e.g., Johnson & Kemper, 1984) do not necessarily reflect abnormal patterns of grammatical construction or deviant linguistic representations of the relevant forms. Rather, these findings are consistent with a view of delayed but normal representational knowledge alongside potentially deviant output procedures (e.g., applying immature, inaudible, or incorrect algorithms for producing the relevant linguistic forms). As an example, in an interesting case study of an LI adolescent, Clark and Hirson (1987) propose a model of processing deficits that is quite consistent with the notion that the impairment of LI children may be at the level of processing rather than in structural representations, although it has recently been suggested that LI children do have representational deficits of morphological modules that may relate to some degree (Leonard et al., 1991, and above references).

Studies of syntax in LI children that have concentrated on detailed analysis of the structures used by LI children have found that they use NP, AUX, and VP structures attested in the speech of normal children and adults (e.g., Johnson & Kemper, 1984; Leonard, 1977; and Mynatt, 1946). Even considering specific difficulties with grammatical morphemes of "low phonetic distance" (Pinker, 1984b), the emergence of inflectional material and its relation to other properties of the syntax has been shown to be abnormal (Leonard, Sabaddini, Leonard, & Volland, 1987; Leonard et al., 1988).

In sum, there is considerable evidence to support a hypothesis of delay rather than deviance in the acquisition of linguistic form. Regardless of the grammatical component involved, no study has reported LI children to have hypothesized impossible rules of grammar, to have displayed patterns in the acquisition of the language-particular facts of English that are unrelated to other properties of the syntax (but shown to be abnormal). In our study, the LI and normal controls were matched on the basis of two structures, each approaching significance: (a) the Aux be + ing form in the singular, and (b) negation in an embedded clause. In both cases, the LI children showed later mastery of these forms than the normally developing children. Regarding acquisition of the be + ing, we did not find that the LI children showed relative difficulty with all discontinuous morphemes or with all forms that move from VP to VP, their pattern of acquisition with be + ing in the plural was not similarly affected, nor was their acquisition of the passive morphology be + an. Similarly, the phonetic substance of aux be singular is not arguably weaker than the noun plural marker, the possessive marker, or the personal pronominal vowel morpheme, none of which proved to be significantly different for the two groups. What is more, the statistics for the same singular possessive aux are not substantially different from either the plural possessive or the singular simple present, again, neither of which appear to have caused serious problems for LI children. A linguistically meaningful interpretation of this performance difference, therefore, remains elusive. Accounting for a similar delay and delay in the acquisition of negation within an ungrammatical clause, with comparable difficulty with affixation and agreement, is not possible without an assumption of comparable delays in the acquisition of simple negation forms. In LI children, we also find a delay in the acquisition of morphological modules that may relate to some degree (Curtiss & Taal, 1991).

Therefore, it is somewhat misleading to say that LI children language acquisition is "delayed" or "deviant." The acquisition of negation, for example, is a difficult problem for LI children, and it appears that LI children are not able to acquire the use of the auxiliary "be" in the same way that normal children do. However, the delay in the acquisition of negation is not as severe as the delay in the acquisition of other morphological modules, such as the future tense and the present perfect tense.

In conclusion, we should not interpret the findings of LI children in terms of a "delayed" or "deviant" acquisition of language. Rather, we should be more cautious in our conclusions and be more careful in our interpretation of the data. The delay in the acquisition of negation in LI children is not as severe as the delay in the acquisition of other morphological modules, and it is not as severe as the delay in the acquisition of the passive voice. Therefore, the delay in the acquisition of negation in LI children is not as severe as the delay in the acquisition of other morphological modules, and it is not as severe as the delay in the acquisition of the passive voice.

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APPENDIX

SAMPLE CYCLE ITEMS*

**CYCLE-F (Receptive)**

**SEMANITICS**

Locative prepositions: in, on, at

Subjunctive: Let this happen in the room.

**MORPHOLOGY**

AUX Be singular

Subjunctive: She is swimming.

Response picture choices: 1) she is swimming, 2) she is swimming

AUX be plural

Subjunctive: They are drinking

Response picture choices: 1) they are drinking water, 2) they are drinking

**SYNTAX**

Subject (S) relative clauses

Subjunctive: The rock which is big is chasing the girl.

Response picture choices: 1) big rock chasing girl, 2) girl chasing big rock

**CYCLE-E (Expressive)**

**SEMANITICS**

Prepositional with

Picture cues: 1) boy running and girl standing, 2) boy and girl running together

Subjunctive: Here the boy is running in the girl. But here he is running...

(with [hat, with the girl])**

**MORPHOLOGY**

Posessive morpheme

Picture cues: 1) boy holding ball, 2) girl holding ball

Subjunctive: This ball belongs to Michael and this ball belongs to Stacy. Whose ball is this?

(Stacey's ball, Stacy's)**

**SYNTAX**

Subject (S) relatives with related objects

Picture cues: 1) boy holding balloon

Subjunctive: A boy is holding the balloon. A boy is holding the other balloon. This is the other ball.

(That ball is the one [boy is holding], the banana has)**

* The cycle is 38 on the CYCLE-E and CYCLE F test of the CYCLE test by Susan Curtis and Jou Yamada. Full list of items is available from the authors.

**Possible target responses**