
LETTERS TO THE EDITOR

Comments on the Interaction of Syntactic and Phonological Disorders

Paul and Shriberg (1982) have contributed a valuable descriptive study of the syntactic, morphological, and phonological deficits of children with phonological disorders. The early correlation studies they mention (p. 536) were not grounded in linguistic description, and later studies of phonology excluded data on "higher" levels of linguistic development. Paul and Shriberg demonstrated the scope of the problem—Children with phonological disorders display global expressive language problems manifested at various levels of linguistic production and analysis (Panagos, 1982). This study was greatly needed, and generally we agree with the findings reported.

We do not agree, however, with some of the conclusions reached by the authors, particularly those which qualify the information processing theory proposed by Panagos, Quine, and Klich (1979). The chief concerns expressed in this letter are the following: (a) Given differences in the designs of the studies, the data reported are over-interpreted; (b) key assumptions about the information processing model are misconstrued; and (c) interesting indirect evidence of linguistic processing deficits in the authors' data are overlooked. These three points, developed in turn, are all pertinent to the question of how a theory of delayed speech is to be constructed.

The information processing theory proposed by Panagos et al. (1979) was based on an experiment in which a speech production task was used to induce complexity effects. Critical aims of the experiment were to (a) design a study to test for *cumulative* influences of syntactic and phonological complexity on phonological performance (i.e., causal effects); (b) adequately separate sources of syntactic and lexical phonological complexity; (c) tax subjects' processing capacities to the point of error production; (d) measure complexity effects systematically across selected production contexts; (e) maintain reasonable control of various sources of linguistic complexity; and (f) control discourse factors through the use of a speech production task. On balance, the information processing explanation fit the facts of the study.

In contrast, Paul and Shriberg based their qualifications about the processing explanation on the results of a descriptive study for which samples of spontaneous speech were collected. In all critical areas (a-f) the two studies were different, meaning that direct comparisons of results are misleading. We wish to amplify some points.

First, concerning research design, the quasi-linguistic analysis yielded classification data, and—as the title suggests—only "associations between phonology and syntax" can be discussed legitimately. Questions regarding direct influences of higher linguistic levels on lower ones cannot be addressed because of inherent limitations of association data in clinical research (for discussion, see Panagos, 1982). In particular, nothing can be said in this study about how sources of syntactic, morphological, and phonological complexity might have combined to increase the number of linguistic errors produced. That linguistic complexity accumulates to disrupt encoding performance is a major assumption of the processing explanation.

Second, who controls encoding complexity, the experimenter or the subject, is crucial. Prelock (1982) examined the comprehension, elicited production, and spontaneous production of language-disordered children under the effects of phonological complexity. Unlike elicited production, which yielded robust experimental effects, the effects for spontaneous speech were much smaller. The reason seems to be that when the child has free control of linguistic encoding, integrating pragmatic intent with sentence structure, he/she works safely within the bounds

of computational capacity to ensure the communication of essential meaning. However, when encoding is taxed sufficiently according to the demands of a stimulus sentence, response to various structural features is obligatory, and structural simplifications are necessary outcomes. Paul and Shriberg in their study had no means of taxing their subjects' processing capacities.

Third, differences in the classification of linguistic variables are troublesome. Syntax in the case of Panagos et al. (1979) subsumed morphology, whereas Paul and Shriberg gave the two components independent status. Brown's grammatical morphemes liberally encompass both lexical and inflectional morphology, making it confusing as to where syntax leaves off and morphology begins (compare their footnote 3). What is more, inflectional processes overlap phonological processes so that neither are these two components independent (Panagos, 1978). At the phonological level, the Paul and Shriberg analysis entailed all levels of structure, whereas in the Panagos et al. study, only consonant production was a dependent variable. The data of the two studies are difficult to compare.

Fourth, the fact that subjects were allowed to generate their own contexts meant that there was a substantial loss of data. For the four test morphemes of Table 3, 27% of the data are missing. We believe complexity effects are subtle and must be measured uniformly across all contexts investigated.

Turning to issues of theory application (Tables 2 & 3), reservations expressed about the processing explanation were based on subject classifications derived from developmental indices (SSS, OGM). A subject could be delayed in syntax or morphology or both. Yet, according to the processing explanation, a delay of a particular component of linguistic development is not critical to hypothesis testing. For example, a child could have normal syntax and delayed phonology and still show greater difficulty articulating words in sentences than in isolated production. One would predict that even children with relatively normal linguistic development (Pattern IV) would show processing problems and elevated error rates when cumulative complexity overly taxed their encoding capacities. In this connection Prelock (1982) found that young normal children displayed sentence processing problems similar to those of older delayed children when the linguistic load became sufficiently taxing to produce these effects.

Further, testing the processing model does not rest narrowly on the interaction of particular components or, indeed, on any two components. The mismanagement of complexity can arise from the interaction of morphology and phonology, for example (compare Pattern IVb). It can also arise from the interaction of levels of complexity within components, such as the disruption of syllable production (compare syllable deletion and cluster reduction in Table 2) influencing segment production (Panagos et al., 1979). Although the Panagos et al. study was concerned with directional influences, influences of syntax plus phonology on consonant accuracy, we were equally concerned with an initial test of the information processing hypothesis as it was germane to the problem of elucidating underlying language deficits (Panagos, 1982).

Moving to the third concern, within the descriptive framework set up by Paul and Shriberg there is some indirect evidence of directional influences of syntax on surface representations. On the one hand, added phonological complexity caused by postvocalic clustering affects the four phonetically complex morphemes approximately the same in the nominal (plural, possessive) and verbal (regular past, regular third-person singular) contexts. On the other hand, there was greater morphological simplification in the verbal context (\bar{x} percentage correct = 51%) than there was in the nominal context (\bar{x} percentage correct = 67%). Assembling structures for verb inflections involves more complication

of syntactic derivation than the processes of nominal derivation (Panagos, 1978). This is another way of saying that cumulative linguistic complexity within a sentence component yields greater linguistic simplification.

Likewise, inspection of the article data is instructive. The subjects of the four subgroups (Table 3) displayed quite similar degrees of article mismanagement (Patterns I-IV = 61%, 91%, 81%, 96%, respectively). Although *article* can be assigned to a grammatical morpheme inventory as Brown has done for descriptive purposes, it derives from syntactic processes while at the same time being sensitive to phonological constraints (Panagos, 1982; Panagos & Prelock 1982). Thus, the children might have been omitting articles either because they were having difficulty processing syntax or because an article like *the* was difficult to pronounce. Once again the effects of cumulative linguistic complexity are witnessed (Prelock, 1982). The reasoning here is consistent with the common sense notion of sources of linguistic complexity "ganging up" on the delayed child to impair language expression.

In the final analysis, we see the study under review as a complement to that of Panagos et al. (1979), not as one presenting competing data. Highlighted in this letter are some of the many problems remaining as to the construction of an adequate theory of delayed speech development. Clearly, many angles on theory construction are needed—descriptive and experimental, cross-sectional and longitudinal studies, to be specific. There is need for more precision when it comes to the use of information processing concepts and terminology, and issues regarding linguistic perception and cognition must be resolved. The appeal of an information processing account, however, is apparent. In the speech of the language-disordered child, according to decades of clinical experience, there is a systematic loss of structural information which is as characteristic of expression itself as it is of specific components of linguistic organization. A phonological disorder, therefore, is symptomatic of general problems of linguistic encoding.

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REFERENCES

- PANAGOS, J. M. (1978). Abstract phonology, grammatical reduction and delayed speech development. *Acta Symbolica*, 7-9, 1-12.
- PANAGOS, J. M. (1982). The case against the autonomy of phonological disorders in children. *Seminars in Speech, Language and Hearing*, 3, 172-181.
- PANAGOS, J. M., & PRELOCK, P. A. (1982). Phonological constraints on the sentence productions of language-disordered children. *Journal of Speech and Hearing Research*, 25, 171-177.
- PANAGOS, J. M., QUINE, M., KLICH, R. (1979). Syntactic and phonological influences on children's articulation. *Journal of Speech and Hearing Research*, 22, 841-848.
- PAUL, R., & SHRIBERG, L. D. (1982). Associations between phonology and syntax in speech-delayed children. *Journal of Speech and Hearing Research*, 25, 536-547.
- PRELOCK, P. A. (1982). *Cumulative effects of syntactic and phonological complexity on children's language production*. Unpublished doctoral dissertation, University of Pittsburgh, 1982.

Received May 24, 1983
Accepted July 15, 1983

Reply to Panagos and Prelock

We are grateful to Drs. Panagos and Prelock for the opportunity to clarify some of the points made in our paper in relation to their important work on phonology/syntax interactions. As we read their comments, the questions raised can be summarized as follows:

1. Can results between their studies and ours be meaningfully compared, given the differences in methodology?
2. Is the information-processing theory proposed by Panagos et al. (1979)^a properly applied to our data?
3. Does indirect evidence present in our data support the findings of Panagos and his colleagues in their elicited imitation studies?

With regard to the first question, we agree that the differences in method make comparison difficult. Children may not happen to use particular constructions within any sample, and one cannot know whether the child has not learned that construction or simply has not used it during the 10 min in which we happened to be listening. We do not, however, agree that for this reason "nothing can be said" about how sources of complexity interact to produce errors in spontaneous speech. We believe the type of inferential analysis used in our paper does allow some speculations to be made. For example, we can see that in some instances Pattern IVb children do not simplify articulation even in relatively complex morphological environments. We can conclude, therefore, that morphological complexity does not always result in phonological simplification.

As Panagos and Prelock argue, whether complexity is controlled by the subject or by the investigator does make a critical difference in the results. In response to the elicited imitation tasks of Panagos and Prelock, structural simplifications are necessary outcomes. Our argument was that elicited imitation tasks do not reflect the conditions present when a child is engaged in conversation—that despite the task's internal validity, it is not ecologically valid. Therefore, test results cannot claim to explicate linguistic processes that occur in ordinary conversation. It is true that we have no direct means of taxing the subject's processing capacity in our design, but the children's own communicative intentions did provide some contexts that were syntactically and/or morphologically more taxing than others. Our intention was to examine what happened to phonological realization in those contexts in which children did, of their own accord, attempt a complex target.

It may well be that children do things other than phonological simplification in an attempt to control complexity in spontaneous speech. They may avoid phonetically complex words, reword sentences before their production, or simply talk as little as possible. These strategies would also result in reducing the encoding load, without articulatory simplification. We did not investigate these possibilities directly, and our findings do not rule them out. In interpreting our results, we merely attempted to point out that children sometimes do produce complex morphosyntactic contexts spontaneously and that when they do, this increased complexity does not invariably result in phonological simplification. Children may decrease their encoding load by a variety of avoidance strategies. But when they do attempt a complex target, some children are capable—perhaps for only a limited number of attempts in any discourse unit—of marshaling productive resources to express their linguistic competence.

In regard to the second question, there appears to be some confusion as to whether the information processing model presented by Panagos and Prelock is being treated as a hypothesis or an assumption. The model has two aspects: first, that linguistic complexity accumulates to stress a child's productive output, and

^aSee the References in the Panagos and Prelock letter preceding this letter.

second, that speech delay occurs in certain children who have a constraint in the normal complement of language encoding capacity. According to this model, both normal and disordered speech would be disrupted by some critical mass of linguistic complexity, and for speech-delayed children—because they have limited resources to begin with—this critical mass is simply smaller. This model seems, in general, intuitively reasonable.

Panagos and his colleagues have provided support for both aspects of this theory in a series of experimental studies. But, for reasons of ecological validity stated above, their findings do not seem to warrant unqualified acceptance of the basic notion of a general constraint on encoding resources as a sufficient explanation for all forms of speech delay. Although our descriptive study did not test the limited encoding hypothesis directly, it did present data that challenge one construction of the theory—that is, that because of constraints on encoding resources, syntactic complexity necessarily leads to phonological simplification.

As we stated in our paper, we believe the general syntactic delays seen in many children with delayed phonological development may, indeed, result from a limitation in encoding resources. We simply pointed out that it was not always possible to predict what aspects of the system—phonology or syntax—would be affected in uncontrolled conversation. If the information-processing model of Panagos and Prelock is not dependent on the ability to predict the point at which disruption will take place and only requires some decrement in complexity—expressed as either error or avoidance of some complex targets—we would have no quarrel with such a model as a working hypothesis. But we would continue to contend that some children in certain free speech contexts can “tune up” production to meet the complexity requirements of their own linguistic competence.

The third point raised in the letter concerns the use of indirect evidence of directional influence of syntax on speech production. The authors would like to claim, on one hand, that the

difference between the proportion of morphological simplification in verbal context—51%—and in nominal contexts—67%—is significant. At the same time, they propose that the proportion of errors in articles in the four groups, whose correct production ranges from 61% to 96%, is “quite similar.” We did not perform any statistical tests on these data because we felt the number of items in each category was too small for any meaningful comparison. The differences cited by Panagos and Prelock may be of interest, but we would not feel justified in making claims about the difference or similarity among these categories without collecting more data and performing statistical tests.

In summary, we would agree that the information-processing model of speech delay that Panagos and Prelock have presented has great appeal and—as we pointed out in our paper—accounts nicely for linguistic patterns seen in half of our subjects. Given the general form of the limited encoding capacity model as proposed here by Panagos and Prelock, we would accept the notion that phonological delay, as a working hypothesis, often can be thought of as a result of limitations in productive resources. However, we believe our data argue that some speech-delayed children are sometimes able to allocate these limited resources to realize targets on par with their linguistic knowledge in the environment of free speech, although they may at other times use avoidance strategies or other means of reducing encoding load.

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Received January 30, 1984
Accepted February 21, 1984

Reply to Panagos and Prelock

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J Speech Hear Res 1984;27;319-320

This information is current as of June 19, 2012

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