

A preliminary typology of initial clusters in acquisition

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Introduction

Acquisition research, whether from normal or disordered development, has shown there is not a true order of acquisition of specific initial consonant clusters in English. Children differ in terms of which individual cluster is acquired first, and which is acquired last. This is not surprising, since the same has been found to be true with the development of singletons. However, one wants to make general claims about the classes of sounds or clusters that are acquired earlier and those acquired later. Unfortunately, even such general claims are not easily made.

Consider the acquisition of /s/-clusters relative to other clusters of English. According to some studies, they are acquired relatively early (e.g. Stoel-Gammon and Dunn, 1985), but according to others they are acquired relatively late (e.g. Smith, 1973; Smit, 1993). In Smith's (1973) diary study of normal phonological development, Amahl acquired the /s/-clusters later than most other clusters. From case studies of disordered development, some children acquired all the /s/-clusters before other clusters (e.g. Barlow, 1997; Gierut, 1999). However, Chin (1996) reported on one child who acquired non-/s/-clusters first, while another child acquired both types of clusters at the same time.

Order of acquisition is one factor that determines relative markedness of sounds and clusters in language. Specifically, children are expected to acquire unmarked properties of language first. Because of this unusual behaviour of /s/-clusters, it is difficult to determine if they are marked or not. If /s/-clusters are acquired early, then it would be reasonable to assume that they are unmarked relative to other clusters. However, if they are acquired later, one would assume that they are marked relative to other clusters.

Gierut (1999) addressed this puzzle with a treatment study. She determined that treatment on /s/+ stop clusters resulted in within-class learning only, such that generalization was limited. This type of generalization is characteristic of learning patterns associated with treatment on unmarked aspects of sound systems. This has

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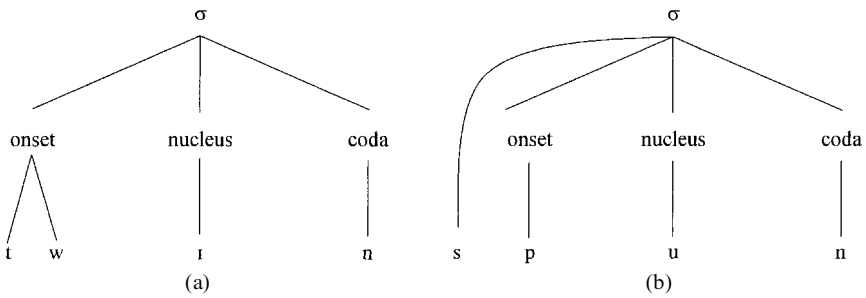


Figure 2. *Structural differences among consonant clusters of English. (a) Cluster with a branching onset in the word 'twin'; and (b) /s/-cluster as an adjunct in the word 'spoon'.*

accounted for by appealing to, for example, a modified version of the sonority hierarchy and language-specific constraints related to sonority distance between segments in a cluster. Interestingly, some developing grammars are better explained by appealing to this adjunct status in figure 2(b), whereas others are better accounted for by assuming that all clusters are complex onsets, as in figure 2(a). Perhaps different grammars produce different types of clusters.

A typology of grammars

Assuming such differing grammars exist, one may also assume that there may be no markedness relationship between complex onsets and adjunct clusters. This would explain the reported differences in acquisition. This is further considered with a possible typology listed in table 1. Accordingly, a grammar could exclude all types of clusters, as in grammar I. A different grammar could allow for adjunct clusters only, as in IIa. Yet another grammar could allow for complex onsets only, as in IIb. Finally, a different grammar could allow for both complex onsets and adjuncts, as in grammar III.

For a possible constraint-based account of this typology, see Barlow (2000).

Discussion and conclusion

The typology in table 1 yielded four different possible grammars, allowing for some variety in the way that clusters may pattern within a given grammar. It is, therefore, possible that not all children will pass through all the stages in table 1. It is assumed that most will pass through a stage in which no clusters are produced, as in grammar I; and it is assumed that most will reach a stage where all clusters are produced

Table 1. *Typology of cluster production*

| Grammar | Reported examples in acquisition |
|---------|--|
| I. | No clusters Barlow (1997), Chin (1996) |
| IIa. | Adjuncts only Barlow (1997), Gierut (1999) |
| IIb. | Complex onsets only Chin (1996), Smith (1973) |
| III. | Complex onsets and adjuncts Barlow (1997) |

correctly. However, it is theoretically possible that a child could approximate the target system and represent all clusters as adjuncts, or all clusters as complex onsets.

As the typology is viewed as universal, one should see parallels between children's grammar and adult grammar. That is, if children's grammar reflect each individual stage of the typology in table 1, one should also have evidence of a fully developed grammar that exhibits each of these stages, and, indeed, one does. Fijian has no clusters of any kind, supporting grammar I (Schütz, 1989). Acoma has /s/-clusters but no complex onsets, supporting grammar IIa (Miller, 1965). Spanish has complex onsets but no adjunct /s/-clusters, supporting grammar IIb (Harris, 1969). Finally, Italian has both complex onsets and adjunct clusters, supporting grammar III (Davis, 1990).

Because one refers to abstract structure, the individual differences in representation will not likely have an impact on the understanding of speech. Clusters will always sound like clusters. Where one might find evidence of this differing structural representation is among error patterns of children, as in the present case, as well as speech errors and language games with both children and adults. One speaker might show patterns with clusters that another speaker might not. Appealing to such external evidence will allow one to better understand developing and fully-developed phonologies.

This paper considered phonological patterns in both normal and disordered development. The results of this research also have clinical implications for remediation of phonological disorders. Treatment on /s/-clusters *may or may not* result in a generalization to clusters other than /s/-clusters. Recall that Gierut (1999) found generalization following treatment on /s/+ stop clusters to be limited at best, but perhaps differing grammars would produce differing results, particularly with /s/+ sonorant clusters. Treatment on /s/-clusters is one common practised strategy for facilitating singleton /s/ production, as well as elimination of cluster reduction. In order to be able to determine whether treatment on /s/-clusters would be appropriate for widespread change on clusters, however, a characterization of the structural representation of /s/-clusters is necessary. This can be done by analysing those clusters (if any) produced by a given child, and looking at all of the clusters produced in error. By looking for differential error patterns, one gets a better understanding of how clusters are organized within an individual child's grammar, and this might allow us to determine if treatment on /s/-clusters should be expected to cause change across all clusters. An obvious next step would be to look further at individual learning patterns in normal development and following treatment on children with phonological disorders who exhibit differing cluster errors.

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