ACQUISITION OF PHONOLOGY

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1. Introduction

Given the limited length of this article and the generative scope of this journal I will be primarily concerned with issues regarding the acquisition of phonology, although I shall also make extensive use of studies on child language. The latter term is often used to describe phonological phenomena found in child language, without consideration of theoretical linguistic issues of acquisition. Although good descriptions of phenomena and developmental patterns occur in child language, it is an absolute necessity for developmental patterns occur in child language, without consideration of theoretical issues regarding the acquisition of phonology, they are often ignored as such. Of course, one must look only at certain aspects, which is what kind of sounds could be articulated by three-year-old children. However, norms do not tell us much about how the individual child goes about acquiring the phonology of a language.

In reaction to this, new research started to look for the emergence of rules and to describe the developing grammar. The goal was to explain language acquisition and to investigate how learning is accomplished. Jakobson's theory of phonological features makes it possible to do this for linguists formulated by Chomsky. Related to this is the question of how much of grammar is innate and how much is learned. In the last decade several different theoretical frameworks have been used: natural phonology (Stampe 1973), Firthian prosodic phonology (Waterson 1971, 1987), while Smith's (1973) work used the framework developed in SPE (Chomsky & Halle 1968). With the shift in focus, the methodology also changed. Large sample studies were replaced by longitudinal language sampling, where a number of children are visited at regular intervals over a period of time, to gain representative samples of the language development of more than one child. Longitudinal language sampling studies focusing on phonological development are not available and partly because it is very time-consuming and partly because existing databases are not easily accessible. This will hopefully soon change: currently, discussions on how to make phonological databases accessible through CHILDES are taking place in the CHILDES (e-mail) network.

In addition to longitudinal studies, experiments can be conducted to find answers to specific questions. Although this is potentially a very fruitful method, it can only be used to investigate how lexical items are stored in the mind, the few experiments have been successfully carried out using young children as subjects: young children have been shown to know a word and are often not able to carry out the tasks set.

2. A Brief History

The first two steps make clear why papa and mama — the title of Jakobson's 1939/1962 article — are among the first words in every language. Jakobson further claimed that there is a relationship between the order of acquisition and the distribution of sounds in the languages of the world. Those features or contrasts that figure in all languages are acquired first. Furthermore, he claimed that there are laws of order and that diversity was made possible by Jakobson: (1) gives the first stages of acquisition, as predicted by Jakobson:

1. Contrast between consonants and vowels, resulting in a CV syllable. The optimal contrast is between minimal pairs: /p/ versus /b/.
2. Contrast between nasal and oral stops: /m/ versus /n/.
3. Contrast between labial and non-labial (dental) /p/ versus /t/.
4. Contrast between wide (low) and narrow (high) vowels: /a/ versus /i/.
5. Contrast between front and back vowels: /i/ versus /u/.

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An important feature of Jakobson’s theory is the clear relationship between children’s phonological systems and those of adults. A child’s system may be simpler (having fewer contrasts), but not fundamentally different. In other words, the child’s initial phonological structure is relatively impoverished. If positive evidence for a particular contrast has been encountered by the child, he or she is forced to add structure. This assumption is shared by most researchers, although not by all. Smith (1973), for example, views acquisition as the “unlearning” of rules, or the suppressing of natural rules. In their views the child’s system becomes simpler as the acquisition process goes along. On this view we might also assume that a child’s system is fundamentally different from that of adults with maturation being the key factor. On this assumption, however, the study of acquisition is however not particularly interesting or enlightening for linguists.

Jakobson’s work has been widely criticised, mainly because it predicts a universal order of development, whereas the study of acquisition data has revealed a great deal of both inter- and intralanguage variation. Even if the child’s system is based on the phonological system, he or she is only partially aware of the rules in the adult’s system. He or she might not be aware of the different kinds of variation in child language data. His work was based on phonological data, but there is no clear view of the relationship between linguistic universals and language acquisition. Even though there might be some variation, this variation is by no means random. Certain segmental inventories are

3. Acquisition of Segmental Phonology

In the area of segmental phonology two basic approaches have been developed: the optimality approach (Ross & Krifka 1989). The second investigates the acquisition of segmental rules or processes (3.2). Surprisingly, hardy any work has been done on the acquisition of the segmental rules that play a role in the adult’s phonology. The focus has largely been on rules typifying...
more likely than others, while others simply never occur.

Several researchers have attempted to improve Jakobson's theory by taking variation and variability into account. To gain insight into the amount of inter- and intra-child variation in the development of segmental inventories (Ferguson & Farwell 1975, Shibamoto & Ohmeda 1978) and the use of phone classes and constructed phone trees: for each target phoneme a child's corresponding productions, forming a phone class, are noted; by comparing these phone classes of a longitudinal series of language samples a phone tree is constructed. This method emphasizes the range of variation rather than the uniformity. The child was seen as a little linguist, an active hypothesis layerer, each child can therefore in principle come up with different hypotheses. Acquisitions in this view is thus more probabilistic rather than deterministic (as in Jakobson's theory). This theory does not make any predictions about acquisition, moreover, it does not account for the large amount of uniformity that is found in children's developmental patterns. Ingram (1981, 1988) criticizes Jakobson's theory of acquisition, because it is not falsifiable, in that no criteria for acquisition are given. This criticism can hardly be taken seriously, especially since he proposes to amend this by merely stipulating that constrained assimilation-at-a-distance processes (Levelt 1994). He also criticizes Ferguson & Farwell's work because of its sensitivity to all kinds of variability, not only due to competence factors, but also to performance factors. Criticism of Jakobson's work was also implicit in Jakobson's work. What Ingram proposes is in fact only a method for analysing children's data, not a theory of acquisition, let alone an improvement of Jakobsonian theory.

Another model that takes both uniformity and variability into account is that of Rice & Avery (1995). They hypothesise that inventories expand gradually, but systematically. Structure is built up over time, by increasing the number of contrasts in the inventory. Furthermore, elaboration must follow a predetermined path within any particular organisational node, in the Jakobsonian sense, but no constraints imply the existence of others (i.e. the presence of fricatives presumes the presence of stops), thus accounting for the universality of certain features. However, there is a certain freedom as to which organisational nodes are elaborated on, accounting for inter-child and cross-linguistic variability. With respect to intra-child variability they argue that in the absence of contrast correspondence a feature can be found, while in the presence of contrast the amount of variation decreases.

All the works mentioned above have in common that they are focused on individual features and/or phonemes. Although they may take different positions in the word into consideration, they fail to explain why differences between different positions exist. Some recent work shows that it is useful to look at whole words (Macken 1979, Stoel-Gammon 1983, LeVelt 1994, Velleman 1995), and to consider a child's whole vocabulary as some point in time (LeVelt 1994). I will return to this in 3.3.

### 3.2. Segmental processes in child language

Many articles on child phonology provide lists of what processes are found in child language (cf. Ingram 1976, 1988, Stampe 1973, Smith 1975, Menn 1971, 1977, Iverson & Wheeler 1987). Processes or rules are often formulated in such a way that they are not only more or less relevant to the adult target form, and perform changes to this form so that they deliver an output, the child's production form. In other words, these processes describe the relationship between the adult and the child's forms. In some examples of such processes are given in (2), from Ingram (1976), which divides processes into three types: assimilation, substitution and syllable structure simplification processes. The latter are discussed in section 4.

### 3.2.1. Consonant harmony

Consonant harmony (CH) is the process by which consonants in the word become more similar. This usually only affects primary place of articulation features. The process is relatively often attested in child language, but is hardly found in adult languages, where it always involves secondary place of articulation features, never primary. CH is usually defined as an assimilation-at-a-distance process (Vihman 1978). Features from one consonant spread to a non-adjacent consonant. A well-known example is presented in Menn (1978): **gk** for **duck**.

In non-linear phonology CH is accounted for by the feature spreading of one consonant to a consonant not specified for place of articulation (Steinberman & Stoel-Gammon 1991). Coronal sounds are usually assumed to be unspecified for place and are therefore prone to adopt features spreading from other consonants. This feature-filling process can be represented as in (3a). A problem arises, however, when the vowel is also specified for place, since now the spreading results in crossing association lines, as shown in (3b). Of course, this problem does not arise if we assume that consonants and vowels have different sets of place features (e.g. Steinberman & Stoel-Gammon 1991). However, evidence from consonant-vowel interactions points towards a shared set of features for consonants and vowels (cf. Luriæ & Evers, 1991). McDonald & Myers (1991) propose how to solve the problem in (3b) by assuming that vowels and consonants are on different planes (planar segregation), a view shared by, for instance, Macken (1995, 1998), (1995), Stoel-Gammon (1995). In this view vowels are adjacent and there is no intervening vowel that causes association lines to cross. This account is schematised in (3c):

![Diagram of consonant harmony](image)

### 3.2.2. List of segmental processes in child phonology (Ingram 1976)

<table>
<thead>
<tr>
<th>Process Type</th>
<th>Description of Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assimilation processes (reduplication)</td>
<td></td>
</tr>
<tr>
<td>1.1. Total reduplication: a CV syllable is repeated in the child's word.</td>
<td><strong>Patrick</strong> → <strong>[ba][ba]</strong></td>
</tr>
<tr>
<td>1.2. Partial reduplication: either a consonant segment or a harmony vowel or a harmony vowel or a harmony vowel or a target syllable appears twice in the child's word.</td>
<td><strong>Peter</strong> → <strong>[b][ba]</strong>, <strong>Andres</strong> → <strong>[a][ae]</strong></td>
</tr>
<tr>
<td>2. Substitution processes</td>
<td></td>
</tr>
<tr>
<td>2.1. Stopping: the change of fricatives and affricates into stops</td>
<td><strong>[p][d][t]</strong> → <strong>[b][d][d]</strong></td>
</tr>
<tr>
<td>2.2. Prevoicing: the voicing of obstruents before sonorants</td>
<td><strong>[p][j]</strong> → <strong>[b][d]</strong></td>
</tr>
<tr>
<td>2.3. Final devoicing: the devoicing of final voiced obstruents</td>
<td><strong>[p][k]</strong> → <strong>[t][g]</strong></td>
</tr>
<tr>
<td>2.4. Promotional delinking: the fill of a slot in the target form.</td>
<td><strong>[x][r]</strong> → <strong>[r][x]</strong></td>
</tr>
<tr>
<td>2.5. Gliding: the changing of a liquid into a glide.</td>
<td><strong>[l][l]</strong> → <strong>[l][l]</strong></td>
</tr>
</tbody>
</table>

**Note:** This list is not exhaustive and more processes can be added as new data becomes available.
Although research on the acquisition of suprasegmental phonology is not abundant, its development has been similar to research on the acquisition of segmental phonology. In the seventies, a major goal was to explain main differences between adult forms and child forms, by formulating a set of rules or processes such as those given in (5):

(5) List of syllable structure processes (Ingram 1976)
1. Final consonant deletion out → (km)
2. Cluster reduction blanket → (lake)
3. Unanalyzed syllable deletion banana → (veneer)

Again, these processes or rules are at best a description of the relationship between adult target forms and children's production forms, and provide no insight into why children's forms differ from adult forms. With the emergence of non-linear phonology these rules were subsequently reanalysed in a non-linear framework. The relationship between input (adult) and output (child) forms was often described as the result of mapping the adult target onto the child's template (cf. Iverson & Wheeler 1987, Fee 1995, Fikkert 1994). If the child's template cannot contain the whole segmental pattern of the input target, this results in simplifications, as illustrated in (6):

(6) Mapping of adult target onto universal word template P = Wd

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An Acquisition of Phonology Bibliography


