

A CRITICISM OF STAMPE'S NATURAL PHONOLOGY
IN LIGHT OF RECENT FINDINGS IN THE
STUDY OF PSYCHOLINGUISTICS

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ABSTRACT

While it is foreseeable that Stampe's theory of Natural Phonology will be getting more attention among phonologists, and will be very soon employed in the study of Chinese phonology, the author attempts to point out two problems of the basic assumptions of the theory. The paper will first start with a very brief outline of the theory. It will be followed by a criticism of the theory in light of recent findings in the study of Psycholinguistics.

史旦 (Stampe) 的自然語音理論 (Theory of Natural Phonology) 於最近十年來，大受語言學家的重視。此派理論，雖根源於生成語音理論 (Generative Phonology)，但在一些問題運用及語音程序上，却有不同看法。其理論據點，主要是由觀察幼兒學習語音的情形而來。其中最重要的論點有二：

一、幼兒在牙牙學語時，其語音有別於年長人，主要不在於聽覺能力 (perceptual ability)，而在於說話能力有困難 (articulation difficulties)。即是說，幼兒在年紀很少時，其語言聽覺能力，已如年長人的豐滿程序。

二、幼兒學習語音，是一 '有或無' 的二分現象。即是說，幼兒在學習語音過程中，如把 A 音位讀作 B 音位，但在幼兒學會了 A 音位後，則所有有 A 音位的字中，幼兒都會把它讀作 A，而不會讀作其它音位。

本文首先簡介此派理論，然後引用心理語言學中幼兒學語的研究文獻，加以反證上列兩個論點。

1. INTRODUCTION* †

A recent theory which has developed out of generative phonology is Stampe's theory of Natural Phonology. For the last few years, there has been an increasing

* I would like to thank Dr. Pat Shaw of the University of British Columbia for commenting on an earlier version of this paper.

† Some of the ideas involved in this paper came from discussions in the Child Language Seminars led by Dr. David Ingram. These seminars were held during 1978 at the University of B.C., Canada.

emphasis among phonologists in the study of this theory (Edwards, 73; Ingram, 74; Miller, 72; Rhodes, 73, 74 and others). Phonologists interested in child language find Natural Phonology attractive, because Stampe bases the main part of his theory on the results of observing the rule behavior of language of young children. Phonologists in general also find this theory attractive. Although the theory is based on many of the assumptions and concepts described by Chomsky and Halle in *The Sound Pattern of English* (1968), it gives a very different approach to the study of phonology. It also attempts to account for historical sound change and at the same time to explain facts of loan word phonology and second language learning.

This paper is an attempt to give a survey of Stampe's Natural Phonology. Problems regarding this theory in light of recent findings in Psycholinguistics will be discussed.

2. NATURAL PHONOLOGY

2.1. Survey

The theory of Natural Phonology is based on the assumption that the phonological system of a language is the residual of a universal system of processes reflecting all the language-innocent phonetic limitations of the infant, revised in certain ways by linguistic experience (Stampe, 69). According to Stampe, the child's pronunciation is derived from his mental representation of adult speech. This mental representation corresponds approximately to the adult surface pronunciation and is the child's underlying representation. An innate system of phonological processes operates on this representation (Edward, 73). The innate system expresses the full system of restrictions of the human speech capacity: a full set of phonological processes which are unlimited in number and entirely unordered. Thus in early stages when all of these processes are applying in unordered fashion, simple sequences like [dadada], [mamama] appear. These are the utterances produced by children in the post-babbling period, commonly characterized by well-articulated sequences of identical stressed syllables with lax stop or nasal plus low vowel, representing the fullest effect of the innate system.

Successive revisions of this innate system occur with the learning of each phonetic opposition through linguistic experience with the standard (adult) language. The mechanisms hypothesized for this revision are suppression, limitation, and ordering of the given phonological processes. The mature phonological system is the residue of those aspects of the innate system that are left intact by the revisions achieved through mastery plus certain language specified conditions of *rules* that are

learned.*

2.2. Two basic assumptions

1) Stampe (73) believes that the child's perceptual abilities are fully developed at a very early age and that his modified versions of adult target words are the result of phonological processes operating on base forms. This would suggest the child is able to correctly perceive adult phonemes, but is incapable of articulating them because of production difficulties. Thus in a Stampean analysis of child language data it would be assumed that the child would correctly perceive all the adult words he is attempting and would recognise all the phonological opposition in the adult speech. The child would be incapable of replicating the exact forms because of certain processes at work.

2) In Stampe's view, a child's utterances are the result of his innate phonological system applying to the *underlying phonological representations* that the child postulates on the basis of adult linguistic output. Evidence for this is based on the observation that when a child learns to pronounce a new segment, he pronounces the newly acquired segment in precisely the appropriate morphemes without rehearsal and the old substitutions do not reappear. To cite an example, *Wai*, a Cantonese-speaking child at one-year-and-seven-month-old, pronounced all [l]'s as [n].

Adult Form	Meaning	Child Form
[lɔ]	'to get'	[nɔ]
[l εŋ]	'beautiful'	[n εŋ]
[luk]	'deer'	[nuk]

Stampe would assume that when *Wai* learned the nasal distinction, all [n]'s that occurred in lexical items in the child's vocabulary would be correctly pronounced and [l] would no longer be used as a substitute for [l].

3. CRITICISM

Stampe's entire theory is based on a developmental theory of phonology. However, he is not very well-informed on the subject of language acquisition. The

* For a more detailed outline of the theory, see Stampe, 69 and Donegan and Stampe, 79.

above two assumptions that he has claimed seem to be questionable in light of recent investigations in Psycholinguistics .

3.1. First Assumption: The Child's Perceptual Ability

The main problem with Stampe's theory concerns the issue of children's early perceptual abilities. Stampe assumes that the child's perceptual system is the same as that of the adult and that his modified versions of adult target words are the result of natural processes operating on base form. This would suggest that the child perceives speech as the adult does but his productions are limited by motor constraints of the speech mechanism.

In the domain of infant speech perception, one of the major findings in recent years has been that the young child develops excellent ability to perceive adult sounds and, indeed, seems to come especially prepared to do so. A variety of studies have demonstrated this point. Regarding anatomical development, Nakai (70) has reported that both middle and inner ear structure have attained adult size by the fifth fetal month. Grimwade et al. (71) have shown that changes in both heart rate and movement occurred in response to pure tones in 38 to 42 week old fetuses. Eisenberg (76), who has also indicated that the premature infant is responsive to sound, states that these findings furnish ' good reason to suppose that the full-term baby emerges from the womb with at least some of the mechanisms he will need to organize his auditory world' (p. 11).

Until recently, it has been difficult to obtain information on the receptive abilities of infants because of the general difficulty of experimentation with infants. Methodological advances in research on infant perception, however, have provided several discrimination paradigms which now permit the investigation of the young infant's receptive abilities. Two paradigms frequently employed in current research are measures of the child's heart rate and rate of sucking on a non-nutritive pacifier. Studies proceed by presenting the child with a sound, such as "pa", and then after several presentations of this sound, introducing a new sound, such as "ba". If the child notices that a new sound has been introduced, that is, if the child can perceive the difference, there will be an increased sucking response and heart rate. Studies like these have shown infants capable of perceiving the following differences: [ba] versus [ga] at 5 to 6 months, (Moffitt (68)); [va] versus [sa] (Eilers & Minifie (75)); and [a] versus [i] (Trehub (73)). Trehub (76) has even shown that infants from 5 to 17 weeks of age were able to discriminate the non-English sounds [pa] versus [pã] (oral versus nasal vowel) and [za] versus [řa] (Czech r).

So far, the results of the above studies seem to be consistent with Stampe's

claim that perception as being complete very early and production as the main focus of development. However, as pointed out by Ferguson (76) and Ingram (76), one important point to keep in mind in regard to these studies is that they do not deal with linguistic perception. They deal with phonetic rather than phonemic discrimination. All stimulus items in these studies are nonsense syllables. Proving that a child can discriminate between phonetic sounds does not prove that the child has linguistic perception. Linguistic perception, as defined by Ferguson (76), is the consistent use of sound differences to identify and store words so that they can be recognised later and eventually be called up for production.

Other studies focusing on phonemic perception in older children show that perceptual difficulties may still occur when meaning is attached to the test sounds, e.g. Schvachkin (48). Schvachkin, a Russian psychologist, developed an approach to investigate children's ability to discriminate between words, not just sounds. First, using five nonsense objects, he taught children a name for each of one, e.g. *bak*, *mak*, *zub*. Then, the child was asked to perform certain tasks which demonstrated his perception of the sounds in each name. Tasks included pointing to the object, giving an object to another child, and putting the object somewhere in the room or finding it. One could then vary the names of the objects based on the sounds to be examined. The most general finding was that the development of phonemic perception was gradual over this time, beginning with general contrasts such as those between vowels and consonants, absence of consonant to more elaborate ones such as voiced versus voiceless consonants, e.g. [p] and [b]. These results have been replicated in English (cf. Garnica (73) and Edwards (74), indicating that some children at age 3 still do not have complete perception of all the phonemes in English.

In short, although there are still conflicting ideas on children's linguistic perception, the most current findings seem to suggest that Stampe's position on this matter is also questionable.

3.2. Second Assumption: Acquisition of Sounds – All or Nothing Matter?

Another of Stampe's notions, namely that a child's acquisition of a given sound is an all-or-nothing event seems to be unfounded. Stampe claims that when a child masters a new phonological opposition: "From that moment he pronounces the new segment in precisely the appropriate morphemes, without rehearsing them, and the old substitute does not reappear again" (Stampe 69, p.446). However, the statement seems to be unsubstantiated in the light of recent investigations in Psycholinguistics. Children learn sounds gradually, over a period of time. Olmsted (71) studied 100

children ranging from 1;3 to 4;6 years of age, collecting spontaneous speech samples of various lengths from each child. He examined a variety of aspects of acquisition, including the frequency of individual sounds, the susceptibility of sounds to errors, substitutions, etc. Olmsted concluded that the success rate of individual children in producing attempted sounds varied considerably from day to day. Throughout his study, individual subjects continually varied in success and error with the sounds attempted. Therefore, children do not acquire individual sounds suddenly, but gradually over time, with extended periods where the sound is both correctly and incorrectly produced. It was also found that a child's ability to correctly pronounce a particular segment depended upon its position in a word and the nature of the surrounding segments.

Ferguson and Farwell (75), after analysing the first 50 words of three normal children, have given the following results:

First, they found that the acquisition of sound is often affected by specific lexical items. The child has certain "preferred sounds". Words containing the child's "preferred sounds" are adopted earlier by the child while some words are avoided because of the sounds they contain.

Second, the child's pronunciation of a word in some cases is better at first than it is later on. This point is illustrated by the frequently-cited example of Hildegard Leopold's production of the word "*pretty*", which changed from an 'accurate' repetition of the adult form to an 'inaccurate' form. These accurate productions which are more advanced than the child's phonological system have been termed "progressive idiom" (Moskowitz, 71, cited in Ferguson and Farwell, 75).

Edwards and Garnica (73) showed a phenomenon in language acquisition called "trade-off". It described how the acquisition of a new part of a word may distort the production of another part. For example, the acquisition of a final consonant may affect the occurrence of an initial one.

Based on the results of the above studies, it appears that Stampe's notion is erroneous in considering acquisition as an all-or-nothing matter. This leads to a rather serious flaw in the theory of Natural Phonology, since this is presented as evidence that will support the claim that a child has an internalized phonological representation of each adult word.

4. CONCLUSION

In conclusion, since Natural Phonology is based on a developmental theory of phonology, it seems that the two notions of the theory as we discussed above should

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clearly be revised in order to agree with current knowledge of how children acquire language.

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