

# Decay of Early Phonetic Discrimination

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## 1. Introduction

The decay of phonetic discrimination in babies during their first twelve months will be the subject of this paper. We will begin mentioning some confusion which has obscured the debate, first of all, supposing that the scientific notation mirrors exactly the way phonetic or phonological units are represented in our minds, for example, the linear succession of binary phonetic features belonging to a phoneme, according to some phonologic theories or to an arboreal representation in others.

Another confusion is the one between discrimination and perception, namely between discrimination and perceptual categorization. As Mandler (1999:303) pointed out, categorical perception groups the stimuli alongside a perceptual dimension, according to sensitivity of the perceptual system, while perceptual categorization abstracts the main components, organizing perceptual schemata or prototypes, after internalizing the patterns where the phonetic pertinent parameters belonging to a specific sociolinguistic variety are distributed.

## 2. Speech perception data

We will examine how the child moves from her/his categorical perception into the perceptual categorization, no matter how the represented forms in her/his linguistic memory may be. Indeed, the main question is how people identify the speech chain as an specimen of their own language, how they process it, how they recognize their constituent units, giving them meaning? If they do not possess some kind of internalized knowledge, how can they process their sociolinguistic variety?

Although we are far away from attesting the form of the mental representation of those units, being them phonetic features, phonemes, syllables, morphemes or words, we must admit that it exists. Denying it would mean the absence of a permanent linguistic memory which registers the person's knowledge about her/his own sociolinguistic variety, necessary for comprehending and producing messages.

## 3. Loss of sensitivity to some phonetic features

Empirical evidence obtained from experiments proves that the child innately guided (Gould & Marler, 1987) loses her/his sensitivity to some phonetic features, realigns categories and sharpens or broadens categories (Jusczyk, 1997:73-74), confirming Aslin and Pisoni's (1980) proposal about the role of experience on the development of the perceptual abilities for speech, in such a way that the cortex cells tune with such categories.

Enhancement occurs when stimuli in the vicinity of a perceptual category boundary become more discriminable.

Attenuation describes the reverse situation, when the stimuli in the category boundary region become less discriminable, such as is the case for the [r]-[l] distinction for Japanese speakers (Jusczyk, 1997:74).

Those innate abilities allow the children's sensitivity to the input acoustic patterns and help them to progressively detect the inherent regularities of the sociolinguistic variety they are acquiring. Innately guided learning means that "organisms are preprogrammed to learn particular things and to learn them in a particular way... infants' initial perceptual capacities put them in a position to pick up the kind of information that is needed to further develop these capacities" (Jusczyk, 1997:76).

Consequently, the sensitivity to contrasts that do not exist in a particular sociolinguistic variety begins to decay and not only to those contrasts but also to the phonotactic structures and the rhythmic and intonation patterns. Those aspects of the internalized knowledge will be crucial for recognizing and dismembering the lexical items of the speech chain and their subsequent storage in the lexical memory.

The young child demonstrates sensitivity to categorical perception independently of being exposed to any language, as it was shown through experiments using the HAS (high-amplitude sucking) paradigm. Eimas *et al.* (1971) proved that babies at 1 month and 4 months discriminated the English contrast voiced/unvoiced in the pair [ba]/[pa]. Further research tried to find out which categories are discriminated and when the abilities decay in favor of the parameters of the language being acquired. Results demonstrated that babies have a general linguistic ability to discriminate the phonetic contrasts of any language, which gradually decays in favor of the ones belonging to the sociolinguistic variety which is being internalized.

After acquiring a given language, people do not perceive contrasts which are not pertinent to their sociolinguistic variety. For example, Spanish native hearers/speakers do not perceive the contrast between the vowels [-post, -high, -low] and [-post, +low] and between [+round, -high, -low] and [+round, +low], belonging to the Portuguese system. Since they cannot perceive the contrast, consequently, they cannot produce it.

Native hearers/speakers of different languages also differ in the way they perceive the boundaries between segments (Lisker & Abramson, 1967).

#### **4. Prototypical instances and perceptual magnets**

In relation to vowels, Kuhl's proposal about the existence of prototypical instances, the so called perceptual magnets, explains the decay in the discrimination of vocalic contrasts that are not pertinent to a given language, which begins earlier than the one found for the consonants contrasts. Those perceptual magnets shorten the distance between the edges and the categories center. Polka and Werker (1994) found this effect among six or eight months babies belonging to families who spoke only English. Those babies were tested on discriminating vowel contrasts that exist in German but not in English.

One of the possible explanations for the decay of the categorical perception in favor of the pertinent contrasts of a given language when the child is ten or twelve months is the fact that this is the period when the child calibrates her/his perceived categorical properties with her/his vocal gestures directed to the goal of comprehending and producing items with meaning that recur in the same context of use. These explanations are also sustained by the former Liberman and Mattingly's motor theory (1985) and by the acoustic articulatory theory (Albano, 2001): the last theory affirms that we cannot ignore the dynamic aspect of speech, combining categorical properties with quantitative weights determined by the different phonetic contexts. Bates and MacWhinney (1989, p. 31) also affirm: "Language acquisition is a perceptual-motor problem".

## **5. Internalization of other phonologic patterns**

In this section we will comment on the specific phonotactic principles belonging to a given language, which are necessary for recognizing and segmenting lexical items in the speech chain: how does the child recognize the possible or forbidden segments positions and/or combinations of her/his native language?

Data obtained from experiments show that children are not only sensitive to the sequential segments order but also that they codify such information very early (Mandel et al., 1996).

Experiments conducted by Jusczyk and his team (1997:88) demonstrate when babies begin to show their sensitivity to the phonotactics of the language they are acquiring. Considering that English and Dutch do not show large differences respecting prosody, they organized lists of unfamiliar words produced by a bilingual speaker: half the words belonged to the language practiced at home, while the other half belonged to the other language. So they could test if the child showed a preference towards one or the other half of the words, either due to the recognition of phonetic or phonotactic aspects, which are different in both languages. One example of those differences is that both [kn] and [zw] may appear in the beginning of words in Dutch but not in English.

Six months American children did not show preference neither to English words nor to the Dutch ones, but at nine months, they demonstrated preference towards words in English. Those findings were confirmed when children were tested with words that presented accepted words in both languages: the sole difference was in words that presented segments allowed in one language but not in the other. The results confirmed that nine months children are sensitive to the phonotactics of their respective language.

Languages with fixed stress, either in word initial or ending, or in the precedent one, give the infant a cue about where words begin or end. Jusczyk et al's (1993) experiments, where a bilingual Norwegian and English speaker produced half the words in one and half in the other language allowed testing this hypothesis, since Norwegian is a language where pitch is higher on unstressed syllables, contrary to English. As young as six months, children showed sensitivity to this parameter, like they did towards vowels.

## **6. Some consequences on the learning-teaching of second languages**

One of the first consequences of the mentioned findings on the learning-teaching of second languages is that students cannot naturally perceive the phonetic contrasts that are not functional in their native language, since this ability is blocked: only using a conscious procedure, namely metacognitive and metalinguistic strategies, may the teacher bring to light those contrasts, but it does not mean that doing so the student will master those contrasts. Consequently, as we have already mentioned, the student will not automatize the articulatory gesture to produce the respective sounds difference.

Fortunately, for understanding and producing messages people do not depend only upon decoding or encoding acoustic cues: a large amount of linguistic knowledge at different levels, such as the morphological, the lexical, the syntactic, the semantic and textual ones; the world, encyclopedic and shared knowledge, as well as the situational context are compensatory devices to overcome the barrier imposed by the decay of the sensitivity to some phonetic features,

## 7. Concluding remarks

In this paper I tried to bring some empirical evidence showing how children lose their sensitivity to certain contrastive phonetic features, realign categories and narrow or enlarge the distance between the edges and the categories center, and begin to show their sensitivity to the phonotactics in the process of acquiring their sociolinguistic variety. In consequence, children also lose the ability to automatize the respective articulatory gestures. This evidence has enormous repercussion on the 2<sup>nd</sup>. languages teachers' expectancies towards their students' possibilities and how to overcome those limitations.

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