Revue Traduction et Langues Vol 7 N°1/2008, pp. 47-54

Phonological Awareness

Sebbane Zoubida
University of Oran-Algeria
zsebane@yahoo.fr

To cite this article:
Sebbane, Z. (2008). Phonological Awareness. *Revue Traduction et Langues 7(1)*, 47-54.

Abstract: *This study aims at getting a better understanding of human speech processing, and explores specifically the task that infants face while learning their native language. Indeed, this work sheds light on 30 years of research that have questioned the developments in early infancy that allow word learning to proceed rapidly before two years of age. Infants are born with Perceptual biases that facilitate attention to speech and the encoding of its properties over the first several months of life, infants' perceptual biases increasingly conform to native language patterns. By the end of this study, it is suggested that word learning is another bootstrapping phenomenon in developmental research. It does not mean it can be reduced to perceptual and learning. Instead, we argue that perceptual learning provides a foundation upon which abstract linguistic units can be built. Just as phonological patterns act as cues to morphological and syntactic structure, and just as naive concepts allow infants to learn more complex ones, perceptual learning allows segmentation and representation of word forms that, once mapped to concepts, bootstrap the process of word learning and lead to a qualitative improvement in its efficiency.*

Keywords: *Phonological awareness, infant language acquisition barriers, word segmentation, perception,* sound *patterns.*

Résumé : *Cette étude vise à mieux comprendre le traitement de la parole humaine et explore spécifiquement la tâche à laquelle les enfants sont confrontés lors de l'apprentissage de leur langue maternelle. En effet, ce travail met en lumière 30 années de recherche qui ont questionné les évolutions de l'enfance permettant un apprentissage rapide des mots avant l'âge de deux ans. Les enfants naissent avec des biais perceptuels qui facilitent l'attention à la parole et l'encodage de ses propriétés au cours des premiers mois de la vie, les biais perceptuels chez les enfants se conforment de plus en plus aux modèles de langue maternelle. À la fin de cette étude, il est suggéré que l'apprentissage des mots est un autre phénomène d'amorçage dans la recherche sur le développement. Cela ne signifie pas qu'il puisse être réduit à la perception et à l'apprentissage. Au lieu de cela, nous soutenons que l'apprentissage perceptif fournit une base sur laquelle des unités linguistiques abstraites peuvent être construites. Tout comme les modèles phonologiques agissent comme des indices de la structure morphologique et syntaxique, et tout comme les concepts naïfs permettent aux enfants d'en apprendre des plus complexes, l'apprentissage perceptif permet la segmentation et la représentation des formes de mots qui, une fois mappées aux concepts, amorcent le processus d'apprentissage des mots et conduisent à une amélioration qualitative de son efficacité.*

Mots clés : *Conscience phonologique, barrières à l'acquisition du langage chez l'enfant, segmentation des mots, perception, modèles sonores.*

Corresponding author : Sebbane Zoubida

By their first birthday, infants can understand many spoken words. Research on cognitive development has long focused on the conceptual changes that accompany word learning that also entails perceptual sophistication. Several developmental steps are required as infants learn to segment, identify and represent the phonetic forms and spoken words, and map those word forms to different concepts. This work reviews recent research on how infants' perceptual systems unfold in the service of word learning, from initial sensitivity for speech to the learning of language specific sound patterns. Building on recent theoretical framework and emerging new methodologies, we attempt to show how speech perception is crucial for word learning, and suggests that it bootstraps the development of a separate but parallel phonological system that links sound to meaning.

The difficulty of the task of segmenting a speech signal into its words is immediately clear when listening to a foreign language. It is much harder to segment the signal into its words, since the words of the language are unknown. Infants are faced with the same task when learning their first language.

One master thesis examined the aspect of language and communication in early school education, targeting especially infants aged 3-5 months old. It was hypothesized that those children could communicate and interact with the caregivers using Standard Arabic. A six-month-study showed that at the end of the experiment infants failed doing to speak. This failure was fundamentally due to the fact that standard Arabic was a foreign language for the children, as they ignored all the rules that build the language. Although they were familiar with some phonetic sound patterns, the infants found it hard if not impossible to use the words in fluent speech, the caregivers ignoring the hard task of learning the words of a language which is foreign to the children.

Learning a language is not an easy task, even if it is a native language. Beyond the conceptual barriers that children have to overcome, they also need exposure to perceive all the phonetic, phonological, syntactic details for a good production.

This study provides a better understanding of the task that infants face while learning their native language. It is then worth looking into the process of language acquisition to attempt shedding light on the problem raised earlier. The following hypotheses will help unfold part of the complexity that wraps human language acquisition.

- The same sound is perceived differently in the two languages, if so. It is fundamental to investigate in the infant's language acquisition background to explain the process of language acquisition.
- There a relation between language acquisition and speech perception
- The child is provided with information about his sound system. 4-Cognitive development related to language acquisition.

ISSN : 1112 – 3974

- There is a period in the language acquisition process favored for the child to be attuned to the sounds of his native language and to discriminate the nonnative sound patterns.
- Word segmentation and prosody is acquired quite early in the development.

Linguists and psychologists have always acknowledged the complexity of human language. It is a system made of tens of thousands of units that all generate from a set of material. It is possible to organize an infinite number of different combinations, some of which being correct can be used for communication. The accepted correct combinations respond to rules that underlie the language. It is far from being a mere exercise and it seems therefore quite improbable for infants to show eagerness and ease during the first few years of their life as they have to jingle to converge on the structure and the organization of the system to use it for the purpose of communication.

Language researchers have been trying to examine the foundations of language and to come to the genesis of language learning and language comprehension by infants. The studies show the main paths infants take before they are able to extract, to manipulate and finally to create the most complex structures that exist within natural languages.

Before they are able to break into the system of their language, infants are first exposed to an acoustic stream that serves as input to the learning of a language, and then very rapidly before the first year of age, infants develop the capacity of combining units and naturally relate them to each other. Later, depending on how quick or slow the infants' cognitive development is done and what factors determine it, the child perceives syntactic forms from his language input and is even able to produce his owns, even though some may be unavailable in the language.

There is a long way before infants in the world can put names on objects... Adults' speech is formed of continuous chains of sounds, very often, without perceivable boundaries marks. The task for the child is first to extract combinations of units from the language input. This process is called segmentation. A great number of researches on infant speech segmentation have demonstrated the capability of the child to realize this task at the age of 7 months. The process is grossly quite simple. Once the infant gets familiarized with units of speech, he discovers other units as he is constantly exposed to language input. The child's rearing environment is a prerequisite for his linguistic development.

For the learner, the first step toward language acquisition is to discover the words and to comprehend their meaning. Then gradually he includes the grammatical units that give form to his language. The use of function words such as articles, prepositions of time and place are implicitly learned as the child acquires language through his ears and his eyes. Observation of very young infants has shown that at that age, they are able to associate actions with names of objects. The

ISSN : 1112 – 3974

infant learns by the ear, he relates an object or anything with a combination of sounds and not with a picture of a written word in his brain

This process enables them to structure their language without Any specific guidance Many theories explain that the language input the child is exposed to include units of innate biases; therefore, it is presently still not easy to assert that any particular element observed in the child language is innate or acquired. Chomsky (1968) introduced the notion of LAD (Language Acquisition Device) to explain that all children are born with a natural capacity to speech. There are basic layers in the child's brain at birth that develop through time and allow the infant not only to reproduce what he hears from the language input but also help him generate an infinite set of units with only a finite sample.

Many other theories about infants' language acquisition have confirmed or conversely infirmed through time and through experiments other theories, however, there is a general agreement between all the theories on language acquisition, that before he reaches linguistic maturity the child, form birth goes through a long learning processing. During this period, he discovers the sounds patterns of his language, then he learns how these sounds are significant when they are combined into longer strings that convey meaning. These processes that sound extremely complex to the Foreign learner is naturally experienced by the child so that he bridal<s into the systems that compose his language. Integrates them and cracks the code of communication of his environment.

A speech signal does not contain many obvious marks, like space between words in written texts to indicate word boundaries. A person listening to the speech signal is thus faced with the task of segmenting the speech signal into words in order to obtain the message of the speech signal. The difficulty of the speech segmentation task is immediately clear when listening to a foreign language. Whereas the speech signal in one's own mother tongue is easily segmented into words, the segmentation of the speech signal of a foreign language is much harder, if not impossible, since the words that constitute the language are unknown.

The latter situation explains exactly the circumstances under which infants have to learn to speak and understand their native language. Psychologists Have found that young infants can discriminate among virtually all sounds used in all languages, whereas adults cannot (Juicy; 1995). This capability is however lost very soon. In language acquisition, infants first learn which phonetic contrasts are important in the language they are learning. In a subsequent step, infants learn to group together sounds that may sound distinct, for instance due to co articulation or to speaker differences in gender, age speaking, style or rate, but nevertheless belong to the same phonemic unit, (this is called categorization).

This study aims at getting a better understanding of human speech processing. To penetrate this field, various experiments have been attempted, most of which by building a computational model of speech recognition, using techniques from the field of automatic speech recognition, which is gaining land by giving reliable and

ISSN : 1112 – 3974

measurable results. These techniques are able to model all parts of the human speech recognition process, including the acquisition of new phonemes, and subsequently, words.

Only humans acquire language; perhaps this is why the first words learned by infants seem so special. Word learning is a milestone on the path towards developing a uniquely human ability, but the task of word learning, beginning with recognizing spoken words, is not trivial. It requires a complex mapping among a concept, a word, and the word's corresponding acoustic signal across different speakers and phonetic contexts. Although a long tradition in infancy research investigates how conceptual systems develop and then Change as words are learned; it is only recently that researchers have begun to understand the vital role infants' developing perceptual systems play in word learning.

Previously, it had been assumed that the perceptual units required for lexical acquisition were available as representations that could simply be mapped onto their corresponding concepts. It is now known that the emergence of perceptual units for lexical acquisition has a developmental history, and that the same processes that shape these units simultaneously enable the acquisition of other grammatical properties of the language. This work highlights these recent empirical findings, many using emerging technologies, which reveal how perceptual systems for speech are, firstly, initially structured, secondly, change with language specific exposure, and thirdly, contribute to, and are changed further by the process of word learning.

Infants are faced to many barriers mainly conceptual, however they amazingly overcome them before they learn to use words appropriately, infants face perceptual challenges: they must also learn to recognize and represent contrasting acoustic forms of words.

Although standard theories of language acquisition began with the assumption that words are perceptually available from the beginning, word boundaries are not acoustically demarcated in continuous speech. More than ten years of research has looked at how infants segment words from the speech stream without a priori knowledge of word forms. Jasczyk and Aslin first demonstrated that infants begin to segment words by 7 to 8 months of age. At 7 months, English learning infants pull out words that conform to the common English strong/ weak stress pattern, like Doctor, but do not segment weak/ strong words like guitar. By 10 months, English-learning infants, can also segment, weak/strong words, perhaps because they can also use language-specific phonetic and phonotactic cues to word boundaries. All of these cues improve performance in computational models of word segmentation. Once learned. Frequent word forms, like the infants' name facilitates segmentation of new words.

Another statistical regularity that infants are sensitive to is 'Transitional probabilities, learning that syllables from within one word are likely to co-occur than syllables from separate words. An emerging debate is whether infants first

ISSN : 1112 – 3974

begin to segment words by Using transitional probabilities, or by using word-level, native- language phonological properties, such as weak-strong forms, length, stress patterns, learned initially from words presented in isolation.

By 9-10 months of age, infants show an increasing preference for word forms that conform to the phonological characteristics of the native language. Infants of 9-10 months old prefer to listen to words obeying language phone tactics and to words with native language stress patterns.

In addition to language specific constraints on word forms, infants also encode phonetic details and indexical details such as speaker identity and emotional affect. They fail to recognize repetitions of a word, particularly after some delay, if the indexical properties are changed. By 10-11 month old, infants are able to recognize the word form across these indexical changes, as well as when syllabic stress changes, but recognition of these words is still faster when indexical information remains constant.

Although these results suggest that infants learn to give more weight to phonetic detail in word forms by 10-11 months, access is still very fragile. Infants of this age treat mispronounced words like real words, although only when theses mispronunciations are perceptually confusable. In fact, infants listening to pseudo words like 'dodder' tend to treat them like as real words like 'dinner' because they differ on unstressed syllables. However, infants show inconsistent treatment on pseudo words that differ on stressed syllables that are not in word-initial position and that differ in syllable-final position. 'Pug', similar to 'dog' are treated like unknown words, perhaps because these words differ in syllable-initial position on perceptually prominent stressed syllables.

Infants begin with simple associations between words and objects. By 6 months of age, infants learn to associate highly frequent words, such as 'mommy' and their referents. Over the next 8 months, infants develop cognitive and perceptual abilities that allow learning new associations more quickly, and in increasingly unconstrained situations. Infants as young as 8 months are able to link novel words to novel objects after only a few repetitions of the pairing, but require cross-model synchrony between the presentation of the word and movement of the object.

Learning associative links at 12 months still relies heavily on perceptual and social cues like visual salience and eye-gaze. The ability to form word-object links on the basis of co-occurrence alone,

Without facilitating social or temporal cues has been made evident by 12-15 months in laboratory tasks. At 14 months, infants 'ability to associate new words with new objects is still dependent on the contrastive salience of the words themselves.

Why do infants at 14 months confuse phonetically similar words when they are linked to objects, yet discriminate those same words when not paired with objects? The perceptual sensitivity needed to make fine distinctions exist, but

ISSN : 1112 – 3974

access may be inhibited by the computational demands of having to link word forms and objects. Both changes to the testing conditions and the use of familiar words ease the processing load, enabling access to phonetic detail at 14 months look longer to a target picture, such as a baby, when the target word is pronounced correctly 'baby, then when it is mispronounced 'vary'. By 17 months, infants regain access to phonetic sensitivity when learning new pairs, mapping forms on two different objects.

Ultimately, it is speech, and no other sounds, that is used as a medium for spoken language. Early appearing behavioral preference and unique cortical activation for speech might give words a Privileged status over nonlinguistic sounds for linguistic function at the onset of word-learning, word forms, but not tones, act as cues for 9 to12 month-old infants to individuate and categorize object.

Whereas conceptual systems are engaged by speech sounds early on, the meaningful application of infants' perceptual sensitivities to native language follows a somewhat different course of development. These sensitivities are not harnessed in word recognition until 17 months. What developmental changes allow 17- month-old infants to learn mappings for minimally contrastive words, a skill that coincides with the beginning of the vocabulary spurt around 18 months? One developmental change is learning which aspects of the acoustic signal are functionally, not just perceptually distinctive.

The word-object pairings highlight phonetic differences used to distinguish meaning, and to allow emergence of functionally contrastive phonological categories. Analogous to evidence showing that increased perceptual salience of objects makes it easier for those objects to be mapped in word tasks, phonological categories increase perceptual salience of certain phonetic contrasts, reducing processing load and enabling efficient formation of new word object links.

This work sheds light on 30 years of research that have asked what developments in early infancy allow word learning to proceed so rapidly in the few months before 2 years of age. Infants begin life with Perceptual biases that facilitate attention to speech and the encoding of its properties over the first several months of life, infants' perceptual biases increasingly conform to native language patterns.

Detection of statistical regularities in the input is one mechanism by which these sensitivities change, but further research in needed to determine if learning mechanisms change across development. Emerging native language perceptual sensitivity aids segmentation and memory of word forms, yet remains difficult to access in the initial stages of associative word learning resulting U-shaped performance through early development. With the mapping of word forms onto concepts, phonological categories are bootstrapped, yielding a substantive change in the efficiency' of word learning.

In summary, it is suggested that word learning is another bootstrapping phenomenon in developmental research. It does not mean it can be reduced to perceptual and statistical learning. Instead, we argue that perceptual learning

ISSN : 1112 – 3974

provides a foundation upon which abstract linguistic units can be built. Just as phonological patterns act as cues to morphological and syntactic structure, and just as naive concepts allow infants to learn more complex ones, perceptual learning allows segmentation and representation of word forms that, once mapped to concepts, bootstrap the process of word learning and lead to a qualitative improvement in its efficiency.

References

[1] Edwards, M. (1971). One Child's Acquisition of English Liquids. *Papers and Reports on Child Language Development.3.*101-9.

[2] -------- (1973). Speech lintellegibility and Children Verbal Behavior. Child Development 47, 452- 468.

[3] Ferguson, C.A. & Farewell, J. (1964). Baby talks in six Languages. *Special Publication of the American anthropologist.*

[4] Firth, J-R. (1948). Sounds and Prosodies. *Transactions of the Philological Society*, 127-152.

[5] Fromkin et al (1974). An Example of Linguistic Consciousness in the Child. In *Studies of Child Language Development*, pp 155-8.

[6] Jerkewitz E R (1980) «Development in early Play» Psychology Jacobson, R Font C G.M., & Harlem (1963)" The Distinctive Features and Their Correlates» Cambridge Mass.

[7] Jacobson, (1939). Observations sur le classement phonologique des consonnes. *Proceedings in the Third International Congress of Phonetic Sciences* (Ghent) 3 1-41. Reprinted in Jacobson 1962:272-9.

[8] Jansen, H.R. (1991). The Phone Unique System in Chosen, Clicks. *Journal of American Linguistics, vol2*.

[9] Juscozy P (1982). Developing Phonological Categories from the Speech Signal. In Ferguson, C-A &Stoel-Gammon (eds) *Phonological Development: Models Research implications*, Timonium MD York Press.17-64.

[10] Kohl, P.K. &Andrassy, J.E (1979). Early Phonetic Experience and Phonetic Perception. *Summer Institute of Linguistics*.p.14.

[11] Laser (1984). Vowel Systems Universals and Typology: Prologue to theory. Phonology yearbook, Vol. I.

[12] Macklin KS (1962). Assessing the Role of Experience on Infants' speech Discrimination» *Journal of Child Language9.*527-542.

[13] Markowitz G. (1978). Sound Acquisition and Contrast' Journal of Phonetics.Vol.3.

[14] Wood, S.A.J. (1979). One Child's Acquisition of English Liquids, *Papers and Reports on Child Language Development, 3.*101-109.

ISSN : 1112 – 3974