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REVIEW

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OLLER D. K., *The emergence of the speech capacity*. Mahwah, NJ: Lawrence Erlbaum Associates, 2000. ISBN 0-8058-2629-7.

In *The emergence of the speech capacity* D. Kimbrough Oller, best known for his studies of prelinguistic vocal development, presents an infrastructural model for interpreting communication systems, and applies it to three different, but related domains: vocalizations produced by infants with typical and atypical vocal development, non-human primate communication, and the evolution of language. The infrastructural framework incorporates two basic sub-components, infraphonology and infrasemiotics, each of which specifies the principles responsible for generating potential well-formed operational units, and the properties of utilization and function of such units. Within the infraphonological component, principles and properties include recombinability and syllabification, while operational categories include segments and syllables. For infrasemiotics, principles and properties include propositionality based on designation, and operational categories include lexical meanings, syntactic and semantic functions, and illocutionary forces, among others. The infrastructural framework outlined in this book builds upon Oller's previous work, which focused more narrowly on characterizations of infant vocal development.

The book begins with a summary of the hierarchical infrastructural framework and an overview of the topics to be covered. The next few chapters are devoted primarily to a review of our current understanding of infant speech development. Oller argues strongly against the 'traditional' approach which used the International Phonetic Alphabet for describing infant vocalizations. He notes that application of a transcription system created for adult productions can be misleading when used with infant vocalizations, particularly for pre-canonical utterances in which the resonance and timing of the productions are not adult-like. Oller uses the term 'shoe-horning' to describe earlier efforts at transcribing infant speech with the standard alphabet or phonetic symbols, and he argues that descriptions in terms of 'protophones,' rather than standard phonetic symbols, are more appropriate. Application of the protophone classification reveals that all normally developing infants pass through the same stages of vocal development, beginning with quasivowels, moving to 'gooing', then to full vowels and marginal babbling, and finally to canonical babbling. It should be noted that Oller is not arguing against use of the IPA for transcribing all infant vocalizations; his remarks relate to pre-canonical utterances which lack essential timing features of adult syllables. Use of the IPA for transcribing infants' canonical

syllables has been very productive in allowing researchers to identify similarities between pre-speech and early speech patterns in infants and toddlers, and to examine the relationship between infant utterances and adult productions.

Chapters 4 and 5 provide a detailed discussion of the articulatory and acoustic parameters associated with the infraphonological framework. The essential features of canonical syllables (normal phonation, articulatedness, full resonance and rapid consonant–vowel (or vowel–consonant) transitions) are delineated through tables and figures illustrating key aspects of typical and atypical speech productions. Oller demonstrates how the infraphonological approach can serve as a mediator between the physical parameters associated with speech production and the operational-level units involved in describing and/or transcribing speech. He poses the question: 'Does infraphonolgy reside in the brain or some combination of the brain and the vocal tract, and if so, how did it get there?' (p. 105). Although a definitive answer to this question is beyond the scope of this book, Oller concludes that infraphonology is 'consistent with a long-standing tradition of interest in Universal Grammar,' a tradition which 'encourages inquiry into abstractions regarding the language capacity in its most general form, a form that must encompass information accessible to individuals but must transcend individuals in its focus on capabilities of the species' (pp. 106–107).

Chapters 6 to 8 provide a summary of vocal development in infants developing typically and atypically, with a large part of the research on atypical development coming from the work of Oller and his colleagues. Despite risk factors such as prematurity and low SES, the developmental sequence of vocal development remains unaffected in most cases. Even mental retardation is associated with a relatively mild delay in the onset of canonical babble. The one risk factor that has a clear effect on pre-speech vocal development is hearing status: deaf (and hard-of-hearing) babies fail to enter the canonical stage within the appropriate time frame and, in some cases, remain in the pre-canonical stages until they are two or three years of age.

Chapter 8 concludes with a discussion of the notion that late onset of canonical babbling may serve as an early indicator of atypical speech and language development. Summarizing his own work with at-risk babies, Oller states that 3% (or less) of infants begin canonical babbling after 10 months and that these infants may be at risk for language-related disorders, including SLI, phonological impairment, dyslexia, and autism. He also notes that parent interviews are reliable for detecting late onset and suggests that parental interview might be used as a screening tool for early identification of at-risk babies.

In chapters 9 and 10, the other side of the infrastructural model is highlighted with a discussion of the functions of early vocalizations. Babies are social beings, and their gestures, cries, and vocalizations typically elicit

responses in the adults around them. Proto-conversations, based on turn-taking behaviors, often occur in the 'gooing' stage when infants are 2–3 months old. A month later, as part of the 'expansion' stage, babies begin a period of active sound exploration during which they produce a wide range of vocal types with varying pitch levels (high squeals, low growls), phonation types (creaky voice, whispers) and intensity levels (yells, whispers, murmurs). Sometimes these vocalizations occur in interactions with adults; other times they are produced when the baby is alone, apparently for play or perhaps for practice. Adults tend to respond to these vocalizations in predictable ways, and pre-canonical utterances are often imitated, which, in turn, sometimes elicits an imitation from the baby. Canonical utterances, in contrast, tend to be interpreted as attempts at meaningful speech; a simple 'ba' from the baby will elicit the response of 'ball' or 'bottle' from the mother.

In terms of function, vocalizations that are part of the infraphonological framework differ from 'vocal signals' such as crying, moaning, and laughing, which have relatively fixed forms and communicative functions. Unlike protophones, fixed vocal signals are not precursors to speech. Fixed signals are present in a range of non-human species and have been studied widely by ethologists. Oller considers fixed signals to be good candidates for comparing communication systems across species and notes that these signal types presumably occurred in early hominid communication.

Chapters 11 to 15 present a discussion of the infrastructural model as it applies to vocal communication systems of human and non-human primates and to the evolution of spoken language. Oller begins with a comparison of the infrastructural properties of his model with the 'design features' for language proposed by Hockett (1960*a*, *b*). Both models strive to 'determine the basic and unchanging properties that are the prerequisites to the evolution of complex communicative systems' (p. 224). The two approaches differ in some important ways: Oller posits a hierarchical, multi-dimensional system of properties and principles; in contrast, Hockett's system is non-hierarchical, and each feature is binary (present or not present). Within the hierarchical approach, some properties are said to presuppose others, with simpler communication systems using the most basic levels and more complex systems adding levels to the hierarchy. Thus, in the evolution of speech, early hominids presumably incorporated the most basic elements of the hierarchy which served as the foundation for later developing systems.

Oller states that his approach is capable of offering 'a common ground for comparison among species' (p. 25), based in part on the claim 'that the posited properties are constant and deep across time and that they represent hidden units and relations underlying all possible vocal communication systems.' (p. 25) If indeed the proposed properties are constant and deep across time (at this point we cannot determine whether or not they are), that would be a partial explanation for similarities between ontogeny and

phylogeny. Oller's view is not that ontogeny necessarily recapitulates phylogeny, but rather that both ontogeny and phylogeny have the same underlying infrastructural properties, and thus share many features.

In sum, this book provides a comprehensive summary of vocal development in infants, with comparisons to non-human species and speculation about the evolution of language. It is a book with many intriguing ideas written by one of the foremost researchers in the field of infant speech development. The book should appeal to a wide audience in the fields of linguistics, psychology and ethology. Some of the ideas presented are well proven; others are speculative and require further research to be validated or refuted. Whether or not they prove true, the ideas and arguments are logical and coherent and merit serious consideration.

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