


Input Representations (Inside the Mind and Out)

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Young children’s productions of the words that they know often differ from adult productions of the same words in ways that are transcribed as substitutions or deletions of segments, as illustrated in the following table of forms produced by three children with phonological disorders who participated in a test of young children’s consistency of production or mis-production of different phonemes of English (Issermann, 2001):

“process”	target	adult form	child form	ID no.; sex, age
velar fronting	<i>cage</i>	/kedʒ/	[tedʒ]	p115, male, 4;10
	<i>cat</i>	/kæt/	[tæt]	
consonant cluster reduction	<i>sweater</i>	/swetɪ/	[setə]	p119, male, 4;11
final consonant deletion	<i>cat</i>	/kæt/	[kæ]	p119
stopping of fricatives	<i>cave</i>	/kev/	[keb]	p136, female, 5;5

Patterns such as the “phonological processes” listed in this table are typically observed in much younger children and have been described in older Generative Phonology frameworks in terms of “rules” that map underlying representations onto surface forms (e.g., Ingram, 1989). Within the Optimality Theory framework, such differences from the adult targets are often attributed instead to the child having a different ranking of constraints. For example, Gnanadesikan (1995) attributes the cluster simplifications that she observed in her two-year old daughter to ranking a markedness constraint against complex onsets above faithfulness constraints, as shown in the following tableau (see also Pater, 2003):

<i>please</i> /pliz/	*COMPLEX	FAITH
[pliz]	*!	
 [piz]		*

Despite the much-discussed differences between OT and older derivational frameworks, both types of account share a significant complex of assumptions about the relationship between the adult and child forms. First, both the derivational and constraint-based frameworks conceive of phonological competence as a system for mapping between input representations and output representations. Therefore, second, both frameworks posit that there are input representations that can differ from output forms. Third, both input representations and output representations are assumed to be the same general kind of thing, namely a string of segments (or other comparable units of contrasting specification) like the transcriptions in the table and the tableau above. Moreover, fourth, the input representations are assumed to be like these transcriptions for all types of phonological behavior, at all stages of phonological acquisition.

There is by now a large experimental literature supporting the first two assumptions. Much of adult phonological behavior and children’s acquisition patterns make better sense if we conceive of phonological competence as knowledge of the correspondence between disparate representations, which can be viewed as input and output to various

phonological tasks such as recognizing a word form in lexical access or imitating a novel form that conforms to the phonological patterns of the native language (see, inter alia, Pierrehumbert, 2001; Vitevich & Luce, 1999).

The third and fourth assumptions, by contrast, are not well supported. Input representations do not seem to be homogeneous across different types of phonological behavior or across different stages of acquisition. While performance on some tasks at some ages does support the existence of symbolic units such as the /w/ and /t/ that are purportedly deleted in the forms [setə] for *sweater* and [kæ] for *cat* or the /k/ that is purportedly replaced by /t/ in the form [tedʒ] for *cage*, there are also many systematic patterns that cannot be described in terms of such units for either the input or for the output. Moreover, there is strong evidence that symbolic categories such as the “deleted” /w/ and /t/ typically do not emerge until much later ages for typically developing children (e.g., Walley, 1988, Edwards, Beckman, & Munson, submitted).

In this paper, I will review the literature arguing for these claims about the multiplicity of types of input representation, and the lateness of symbolic segmental ones. The review will be chronological, beginning with some trivial observations about possible input representations at the earliest stages of acquisition, when the infant’s perceptual map first begins to reflect the influence of the to-be-native language (e.g., Kuhl et al., 1992), and ending with a preview of some work that I am now doing in collaboration with Jan Edwards and colleagues. In the context of this review, I will sketch an alternative view of what input representations are like for the different problems that the child must solve at different stages of phonological acquisition.

References:

- Edwards, J., Beckman, M. E., & Munson, B. (submitted). Correlation of nonword repetition accuracy with vocabulary size and other measures of linguistic development in children with phonological disorders.
- Gnanadesikan, A. E. (1995). *Markedness and faithfulness constraints in child phonology*. ROA-67.
- Ingram, D. (1989). *First language acquisition: method, description, explanation*. Cambridge University Press.
- Isermann, B. C. (2001). *Variability and consistency of articulation in children with phonological disorders*. M.A. thesis. Ohio State University.
- Kuhl, P. K., Williams, K. A., Lacerda, F., Stevens, K. N., & Lindblom, P. (1992). Linguistic experience alters phonetic perception in infants by 6 months of age. *Science*, 255, 606-608.
- Pater, J. (2003). Form and substance in phonological development. In L. Mikkelsen & C. Potts, eds., *Proceedings of the 21st West Coast Conference on Formal Linguistics*, pp. 348-372. Somerville, MA: Cascadilla Press.
- Pierrehumbert, J. (2001). Why phonological constraints are so coarse-grained. *Language and Cognitive Processes*, 16, 691-698.
- Vitevich, M. S., & Luce, P. A. (1999). Probabilistic phonotactics and neighborhood activation in spoken word recognition. *Journal of Memory and Language*, 40, 374-408.
- Walley, A. C. (1988). Spoken word recognition by young children and adults. *Cognitive development*, 3, 137-165.