Phonological Categories and their Manifestation in Child Phonology[*]

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Abstract: The nature of phonological representations and of their acquisition by language learners has been a subject of debate since at least the 1970s. Vihman & Croft (2007) recently proposed the 'Radical' Templatic approach to phonology, which formally rejects segmental features as independent units of phonological representation, in spite of their central relevance within mainstream theories of phonology since at least the 1940s. In this chapter, I emphasize that abstract categories are in fact central to our characterization of phonological systems and their acquisition by language learners. I discuss longitudinal data on the development of consonants and consonant clusters in the productions of Catootje, a Dutch-learning child. I highlight several categorical effects that are readily captured in models of phonological development which embrace abstract units such as features and syllable constituents.

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Introduction

One of the fundamental debates in phonology and phonological development concerns the nature and origin of the units represented within the speaker's lexicon. While models of phonology within structural and/or generative traditions posit units such as segmental features and syllable structure constituents, that is, abstract building blocks that capture generalizations about sounds and sound combinations (e.g. all 'labial' or 'fricative' segments; syllable 'onsets' or 'codas'), other models limit formalism to readily identifiable units such as words, syllables and phones. These latter, more holistic approaches to phonology generally

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consider sub-segmental units (features) and sub-syllabic constituents (e.g. onsets, codas) to be irrelevant to the functioning of human languages.

This position, however, contradicts the bulk of the literature on phonetics and phonology. Phonological features have been fundamental to models of phonology since (at least) the seminal work of Nikolai Trubetzkoy and Roman Jakobson within the Prague Circle of Structural Linguistics and later developments within Generative Phonology (e.g. Jakobson 1941; Jakobson, Fant & Halle 1952; Chomsky & Halle 1968; Trubetzkoy 1969). Likewise, robust theories of syllable structure (and other levels of prosodic constituency) make crucial reference to constituents such as syllables onsets and codas to capture distributional and prosodic aspects of speech (e.g. Fudge 1969, 1987; Kahn 1976; Goldsmith 1976; Selkirk 1980a,b, 1982). In spite of this, features and syllable structure constituents remain at the heart of a number of controversies, for example concerning their psychological reality (e.g. Bybee 2001; Vihman & Croft 2007) or how they may shape natural language speech perception and production behaviours (e.g. Mielke 2011 for a recent summary).

In this chapter, I support the view that abstract categories are fundamental to phonological systems. Formally, I embrace the emergentist position that abstract categories are not innately available to the child but gradually emerge within his/her lexicon through learning. This proposal builds on earlier analyses by, e.g. Goad & Rose (2004), Fikkert & Freitas (2004, 2006), and Fikkert & Levelt (2008), each of which highlight the central importance of the learner's analysis for acquisition. I argue that human beings acquire the phonology of their first (and subsequent) languages as they make perceptual and articulatory generalizations about the segmental, distributional, and prosodic properties of these languages. In the spirit of Pierrehumbert (2003), these generalizations form the basis of abstract categories, which the child stores as part of his/her lexical representations. As these representations gain categorical abstractions, they offer as many shortcuts in all tasks related to speech perception and production. This emergentist approach to formal phonology predicts limited systematicity during early stages of word production, due in part to the incomplete development of the child's phonological system at early stages. As the learner acquires phonological categories, for example new phonological features or constituents within prosodic representations, we may observe abrupt and systematic shifts in phonological productions.

I illustrate these predictions through patterns of phonological development observed in the productions of Catootje, a child learning Dutch as her first language. I conclude with a discussion about the relevance of both holistic and finer-grained models of phonological representation, as the former is better suited to descriptions of early phonological productions, while the latter enables accounts of later phases in the acquisition process and, ultimately, of the functioning of adult phonological systems.

Background

Abstract phonological models

Models of phonology build on abstract categories to capture robust observations about phonological systems, for example the fact that natural classes of sounds, i.e. groups of phones that share one or many phonetic attributes, tend to pattern together in adult languages. Likewise, segmental distributions can be formally encoded in terms of rules and/or constraints making reference to structural positions within syllable, word or larger domains. Natural classes of sounds can be defined in terms phonological features, that is, sub-segmental units which represent their common phonetic properties, the functional relevance of which must be determined on a language-specific basis (e.g. Mielke 2011). Taking an example from acquisition, we can see in (1) that child code-named W, a learner of English, seemingly ‘moves’ word-initial fricatives in target word forms to the word-final position (data from Leonard & McGregor 1991, as reported by Velleman 1996). This generalization, which transcends individual word forms, can be descriptively captured as a rule or mapping process that reorders initial fricatives in perceived forms into the word-final position of produced forms.

(1) Manner-conditioned metathesis (Leonard & McGregor 1991)[1]

|zu|	[uz]	‘zoo’	|snupi|	[nupis]	‘Snoopy’
|faɪn|	[aɪnf]	‘fine’	|stɑp|	[taps]	‘stop’
|sop|	[ops]	‘soap’			

As mentioned above, natural class effects and feature-based descriptions of these effects pervade the literature on adult phonology. However, how these systems come to be acquired raises questions about the origins of features. Indeed, while the literature on child phonology highlights systematic patterns such as that in (1), it also reveals significant patterns of variability. This variability poses challenges to formal models of phonology and acquisition, especially in approaches based on categorical representations or rules. This topic has been taken up as a central area of

1 Target forms are represented between vertical bars; actual forms between brackets.

concern within competing, functionalist approaches to phonology, a strong version of which is discussed in the next section.

'Radical' Templatic Phonology

Templatic Phonology is rooted within the Firthian approach to phonology (e.g. Firth 1957). This approach rejects the phonemic principle as foundational to phonological systems. Within Templatic Phonology, the smallest segmental unit of speech is the phone; features and the natural classes they describe are seen as merely epiphenomenal. Phonological patterns are encoded in terms of prosodies, viewed as independent units positioned on an otherwise flat word 'template'. Prosodies describe phonological patterns in a *wysiwyg* (*what-you-see-is-what-you-get*) fashion: they indistinctly encode phonetic properties (e.g. vowel duration), segmental units (e.g. epenthetic vowels), and phonological processes (e.g. vowel harmony). Various versions of this general approach are expressed throughout the literature on phonological development (e.g. Menn 1971; Menn 1983; Waterson 1971; Waterson 1987; Macken 1979; Macken 1996; Vihman & Velleman 2000; Vihman & Croft 2007; Menn & Vihman 2011; Vihman 2014). In this section, I focus on the recently proposed 'Radical' version of Templatic Phonology, proposed by Vihman & Croft (2007; henceforth, V&C) as it offers one of the clearest contemporary definitions of the theory.

Consistent with the original model, V&C reject the feature as an independent category within phonological representations:

> In adult phonology segment categories — natural classes, or features — are best defined in terms of their occurrence in positions in the templates in individual languages, not as independent universal categories. (V&C:683)

V&C base their argument against the feature and, more generally, the natural classes of phones it defines, on a number of observations about the shapes of words generally observed in early child language productions. I summarize these observations in (2) (see, also, Waterson 1971; Ferguson & Farwell 1975; Macken 1979; Macken 1992; Vihman 2014).

(2) Properties of early word productions (adapted from V&C:689–690)
   a. Variability in children's productions of words, between pronunciations of the same target sounds and/or words
   b. Limited correspondences between sounds attempted/produced:
      i. Homophony between different target forms attempted by the child (i.e. 'preferred word patterns')
      ii. Limited relationships between child and adult forms

Drawing heavily on Bybee (2001), V&C favour an approach to phonology which excludes any formal separation between phonological representations and their phonetic reality. Under this view, variable production patterns suggest "that the child has knowledge of particular words but has not yet developed abstract categories of sounds for production" (V&C:689, after Ferguson & Farwell 1975).

Template-based analyses of phonological development have been primarily used to describe child production data ranging from the babbling stage to early word forms (e.g. MacNeilage & Davis 1990, 2000; Vihman 2014). While often associated with functional approaches to phonology, templates have also been used as descriptive devices within generative phonology (e.g. Levelt 1994; Fikkert 1994; Demuth 1995; Rose 1997; Wauquier-Gravelines & Yamaguchi 2013). From the perspective of development, and crucial assumptions about innateness taken aside, these competing approaches share the view that children's phonological representations are initially impoverished, and gain in representational detail through learning (contra Hale & Reiss 1998ff). Among other debates, for example about the types of learning mechanisms involved, is the question as to what units must be posited within the model in order to encode the relevant type and amount of representational detail. On this topic, V&C explicitly contradict the often elaborate systems of categories developed within the generative tradition, as they restrict the number of categories to the following few:[2]

> […] the only phonological categories posited by a templatic approach to phonology are (i) words; (ii) word templates of varying degrees of schematicity, and (iii) syllable and segment categories as subparts of those phonological templates, defined in terms of their occurrence in particular template positions. (V&C:717)

2 In a more recent paper, Menn & Vihman (2011) offer a less 'radical' stance, which in fact allows for the possibility of phonological features as categories emerging from learning. This is in essence the hypothesis I support throughout this chapter.

Under this view, *schematicity* remains more or less undefined, but can be taken as the level of representational definition that syllables and phones afford, which are assumed emerge from frequent or otherwise salient phonetic properties of the ambient language (in line with Bybee 2001). V&C further claim that individual word templates represent the child's 'preferred' productive abilities, which emerge during the babbling period, as the child begins to reproduce speech units relevant to the target language (see, also, MacNeilage & Davis 1990; Beckman & Edwards 2000). Templates can thus impose certain segmental or prosodic properties to word forms attempted by the child. A striking example of this comes from Priestly (1977), who documents the productions of an English-learning boy aged 1;10-2;2. As we can see in (3), the child substitutes the phone [j] for word-medial consonant across different CVjVC words, the remainder of which display some level of identity with the target forms.

(3) Word-level adaptation to a 'CVjVC' word template (Priestly 1977)

basket	[bajak]	*turkey*	[tajak]
blanket	[bajak]	*fountain*	[fajan]
tiger	[tajak]	*flannel*	[fajan]

Given that templates are virtually free of constraints as to what they may encode, they can in theory be used to describe every imaginable idiosyncratic pattern in children's productions. This is fitting in that most of the arguments brought in favour of templates come from studies documenting the earliest (and most idiosyncratic) period of phonological productions, based on babbles and early words from children with vocabulary sizes often restricted to 25 or 50 words (e.g. Vihman 2014).

However, beyond this early phase in phonological development, templatic approaches have been criticized for their failure to capture aspects of phonological development which transcend individual word forms (e.g. Rose & Inkelas 2011 for a general discussion). As we will see next, this problem also arises in the context of Catootje's phonological productions, which reveal segmental and syllable-level patterns of development that transcend word- or syllable-size units of representation. These data instead support models that incorporate features and syllable constituents within phonological representations.

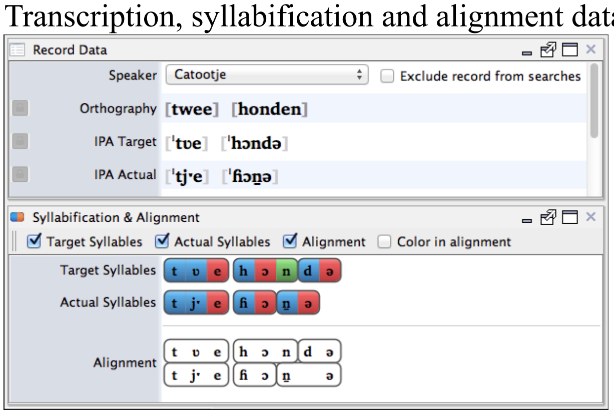
Case study

The corpus

Catootje's data constitute a subset of the Dutch-CLPF corpus, which documents the phonological development of 12 Dutch-learning children and is available through the CHILDES/PhonBank online database (http://childes.talkbank.org/phon/). Catootje's patterns of segmental and prosodic development have been at the centre of several debates on phonological acquisition since (at least) the original publications by Fikkert (1994) and Levelt (1994). The description below, based on 4987 word forms recorded over a little less than nine months, between the child's ages of 1;10.10 and 2;7.4, adds a new angle to this body of work, as it highlights previously under-documented parallels between the development of segmental categories and that of onset clusters in Catootje's phonology.

These further descriptions of Catootje's data were performed with the Phon software program for phonological analysis (e.g. Rose et al. 2006; Rose & MacWhinney 2014). Within this relational database system, data records document utterances produced by the child, which were gathered during naturalistic recording sessions. Sets of phonetic transcriptions represent both the adult 'model' pronunciations of these utterances, the targets, and the child's actual renditions of these words. Target and actual transcriptions are labelled for syllable-level information and aligned against one another on a segment-by-segment basis for systematic comparisons. The screenshot below illustrates how this information is represented within the Phon graphical user interface:

(4) Transcription, syllabification and alignment data within Phon



This alignment provides the necessary grounds for data assessment, as the targets provide a baseline for evaluating the child's actual performance in her renditions of these word forms.

As we will see, the data reveal a high degree of phonological systematicity, suggesting generalizations on the child's part which transcend individual word or syllable shapes. I begin this discussion with a summary of the relevant properties of the Dutch phonological system.

The target system

The description of the Dutch phonological system presented in this section essentially follows that of Booij (1999). As we can see in (5), Dutch displays a relatively rich inventory of both vowels and consonants.

(5) Dutch inventory of segments (adapted from Booij 1999, chapter 2)

a. Vowels (monophthongs):

i	y		u
ɪ	ʏ		
e	ø	ə	o
ɛ			ɔ
		a	ɑ

b. Diphthongs: [ɛi, œy, ɔu]

c. Consonants:

	Labial	**Alveolar**	**Palatal**	**Velar**	**Glottal**
Stop	p, b	t, d		k (g)[3]	
Fricative	f, v	s, z		x, ɣ	h
Nasal	m	n		ŋ	
Liquid		l, ʀ			
Glide	ʋ		j		

The discussion below primarily focuses on the lateral [l], uvular [ʀ], and palatal [j], and on onset clusters which contain these consonants. Except for [h], all obstruents may combine with [l] and [ʀ] in branching onsets, modulo restrictions on the combination of places and/or manners of articulation within these clusters.[4] Clusters with [j] are however more restricted. This yields the inventory of onset clusters in (6).

3 [g] is mostly peripheral to the Dutch system as it occurs only in loanwords (Booij 1999:7).

4 Formal considerations concerning the source of these distributional constraints transcend the scope of this chapter (for discussion, see, e.g. Rice 1992; Goad & Rose 2004; Goad 2012).

(6) C+approximant onsets, ignoring voicing contrasts (Booij 1999:36ff)

pʀ	pl	pj	
tʀ		(tj)[5]	(tʊ)
kʀ	kl	kj	(kʊ)
fʀ	fl	(fj)	
(xʀ)	(xl)		

I discuss the acquisition of these clusters in the next section, except for those enclosed between parentheses, which either involve additional complications (e.g. footnote 5) or were not attested in sufficient numbers in the corpus to warrant analysis.

Catootje's general development of singleton and branching onsets

At the beginning of the recording period, Catootje was already in command of her target stops (both obstruent and nasal) [p, b, t, d, k, m, n], in addition to the laryngeal [h].

In the table below, the symbol "✓" indicates the age at which Catootje mastered target phones and phone combinations, except in the last case, in which ✓ indicates the emergence of a substitution pattern. The grey cells indicate that the target structure was attested in the words attempted but not yet acquired by the child; the black cells indicate that the relevant unit was not attested in the child's attempted forms. These data collapse voiced and voiceless obstruents as well as word-initial versus medial onsets, as no notable difference involving voicing or word position was found, except concerning the coronal voiced stop [d], which displays a noticeable level of variability. I discuss this issue below, where I show that this variability in fact emerges from interacting factors.

(7) Parallels between Catootje's development of segments and clusters

	1;10.10	1;10.24	1;11.09	1;11.22	2;00.06	2;00.19	2;01.03	2;02.14	2;02.28	2;03.25	2;04.11	2;04.25	2;05.08	2;05.22	2;06.06	2;07.04
[l]								✓								
[ʀ]										✓						
[j]			✓													
[pl, bl, kl]								✓								
[pʀ, bʀ, tʀ, dʀ, kʀ]										✓						
[kj, pj]									✓							
[kn] (> [kj])			✓													

5 All coronal+[j] clusters undergo palatalization in pronounced forms (e.g. /tj/ > [ʧ]).

The most central observation highlighted in this table concerns the parallels between Catootje's acquisition approximant consonants and that of branching onsets containing these approximants. These onset clusters were all mastered within the same 6-week period (2;02.14 - 2;03.25), the development of which was also contingent on the mastery of [l] and [ʀ], itself evidenced in singleton onsets. Another parallel observed is the emergence of the [kn] > [kj] substitution pattern, which coincides to the mastery of [j] in singleton onsets. Similar to [kj] and [pj], [kn] was not attempted in the sessions prior to the mastery of [j]. Additional observations about the corpus which are left out of this table include the fact that Catootje mastered all target sC clusters within the same one-month period (2;04.11 to 2;05.08). Further, as Catootje did not master the production of fricative consonants [f, v, ʃ, ʒ, χ] in syllable onsets by the end of the observed period, she remained unable to produce target clusters containing these consonants (e.g. [fl, vl, sχ]).[6]

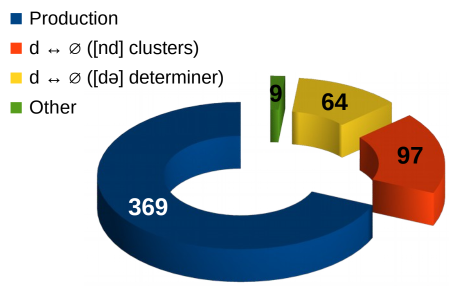
Taken together, these observations highlight systematic patterns of phonological development at both the segmental and sub-syllabic levels of representation. As we will see next, even the more variable aspects of Catootje's phonology can be predicted to occur, as the result of independent factors affecting the child's learning process.

Variability in the acquisition of [d] in onsets

Recall from above the claim that Catootje had already mastered target stops (and the laryngeal [h]) in syllable onsets at the beginning of the data recording period. This claim could be undermined by the apparently variable behaviour of [d] in onsets. Out of a total of 539 cases of onset [d] attested in the target forms, we find 170 (32%) cases of consonant deletion in Catootje's actual renditions, spanning virtually the entire observation period. This variation could be suggestive of a partially random system. However, it in fact derives from systematic interactions within the child's system. Of the 170 cases of [d] deletion, 97 arise from a single phonological context, that of onset [d] preceded by the coda consonant [n], while 64 arise from attempts at producing the definite article *de* |də| 'the', as schematized in (8).

(8) Overall production of [d] in onsets (*n*=539)

6 See Fikkert (1994) and Levelt (1994) on the development of fricatives in Dutch.



Starting with the [nd] context, we find 107 attempts at these coda-onset clusters in Catootje's attempted words. Of those, 97 (91%) undergo [d] deletion. I attribute this pattern to the acoustics of [nd] clusters, whose idiosyncratic patterning has also been documented in the acquisition of English (e.g. Smith 1973; Bernhardt & Stemberger 1998; Barlow 2003; see also Pater 1999 on nasal+C clusters in adult phonological systems). I argue that, in [nd] clusters, [n] casts a perceptual shadow over the following [d], a contexts which hinders the child's ability to represent a [d] in this position in her lexical representations. In a nutshell, if the child cannot properly perceive and, thus, cannot represent a phone within her lexical representations, she obviously cannot reproduce it in her speech productions. This analysis is reinforced by the additional observation that, out of the 49 attested attempts at [nt] clusters by Catootje, only a single occurrence of [t] deletion is found, within the very first recording session documented. This observation eliminates coronal homorganicity between the nasal and the stop as the leading explanation; Catootje's deletion pattern only affects voiced [d] in this context.

Turning now to the pattern of [d] deletion affecting the definite article *de* |də| 'the', of the 74 documented attempts at this function word in the corpus, Catootje fails to produce anything for [d] 64 times (86%). A plausible explanation for this observation relates to Catootje's development of the morpho-syntactic system of determiners in Dutch. Her production of phonologically indistinct [ə] for target |də| throughout the corpus is best characterized through the literature on 'filler' morphemes, in the tradition of Peters (1977, 1997, 2001) (see also Veneziano & Sinclair 2000), which reveals intricate interplays between morphological, syntactic, and semantic areas of knowledge involved in the acquisition of functional morphology (also, Peters & Menn 1993), which may also be hindered by the weak prosodic contexts in which these function words generally appear (e.g. Gerken 1996; Demuth 2001; Demuth et al. 2011).[7]

7 Whether morphology, prosody, or a conspiracy between the two is ultimately responsible for this phenomenon is left for further research, as it calls for the investigation of languages with

However, while a potential contributor, an explanation based on prosody alone would not account for the observation that onset [d] only rarely undergoes deletion in words other than the determiner *de* (and the [nd] context discussed above).

Finally, the factors affecting the child's production of target [nd] clusters and of the determiner *de* remain independent of any consideration about word shapes or input frequency. [nd] clusters yield identical behaviours across frequent and comparably rare words (e.g. *ander/e* 'other/different,' attested 58 times in the corpus versus *Indiaan* 'Indian,' attested only 4 times). Similarly, while *de* is arguably a frequently-occurring word in the language, other factors such as those mentioned above obviously got in the way of its acquisition by Catootje.

Variability in the acquisition of onset clusters

As already showed in (7), Catootje's development of branching onsets also reveals a great deal of systematicity. Again here, however, we observe some variability in these data, to which I turn now, and discuss in light of Catootje's acquisition of the target liquids [l] and [ʀ].[8]

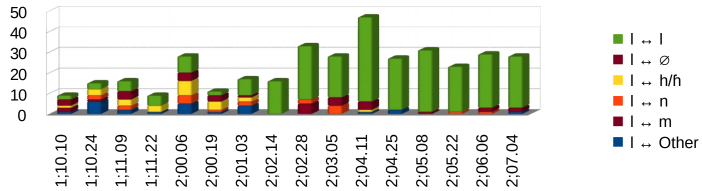
As we can see in (9a), variable patterns of production for target [l] in singleton onsets are attested between 1;10.10 and 2;01.03, when target-like productions never exceed 50%. We then observe an abrupt change in performance level: As of 2;02.14, Catootje began producing target [l] in singleton onsets at rates of 80% or above. It is also at this exact same recording session that she began to produce target C[l] onsets with accuracy. We can observe this qualitative change in her phonological grammar in (9b-d) through the contrast between the period before 2;02.14, during which Catootje fails to produce even a single target branching onset accurately, and the overall pattern of accurate productions observed from that age onward.

different rhythmic properties than English and Dutch.

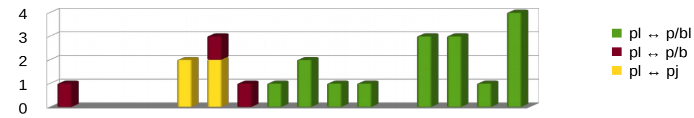
8 I briefly return to the development of C[j] onset clusters in the discussion below.

(9) Development of [l] in singleton onsets and onset clusters[9]

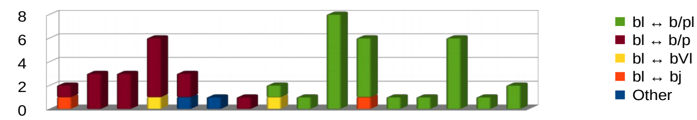
a. [l]



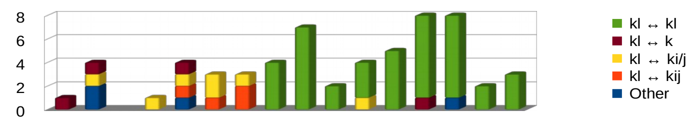
b. [pl]



c. [bl]



d. [kl]

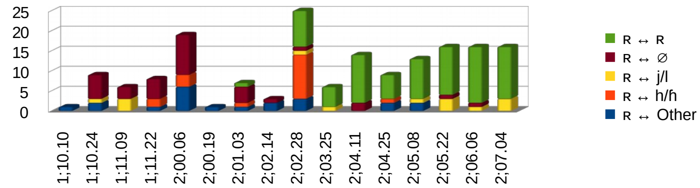


Similar transitions can be observed in the data on [ʀ] and stop+[ʀ] clusters in (10). As we can see in (10a), [ʀ] began to emerge in earnest at 2;02.28, and was mastered during the following session, at 2;03.25. Remarkably, and in spite of a few gaps in the data, both the emergence of the category in stop+[ʀ] clusters and its mastery can be observed at the same ages in the data in (10b-e).

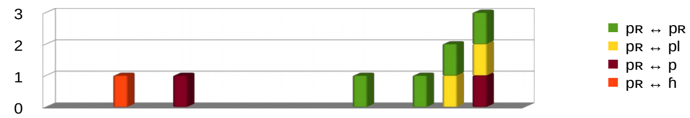
9 Here and below, the y-axis provides the number of attempts at the target consonant/cluster.

(10) Development of [ʀ] in singleton onsets and onset clusters

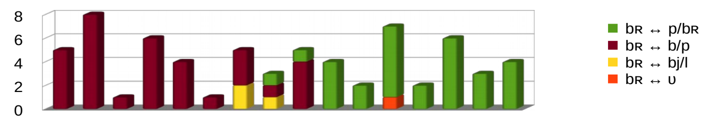
a. [ʀ]



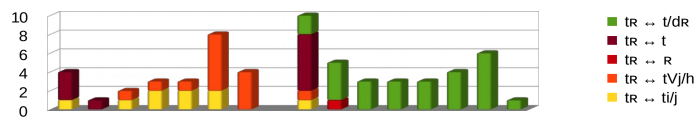
b. [pʀ]



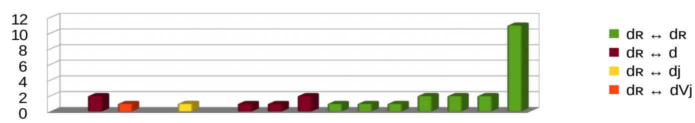
c. [bʀ]



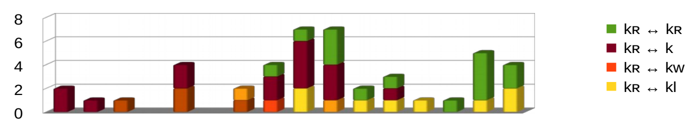
d. [tʀ]



e. [dʀ]



f. [kʀ]



Only [kʀ] clusters, in (10f), fail to display the overall parallel between the development of [ʀ] in singleton onsets and that of branching onsets containing this consonant. However, as was the case for the development of [d] in singleton onsets above, motivation for this apparent counter-example is readily available. Recall that the target [ʀ] of Catootje is articulated in the uvular area of the vocal tract, near the same point of articulation of the velar [k]. The combination of these two consonants within an onset sequence thus involves extremely subtle articulatory transitions and related acoustic cues. I argue that these phonetic factors likely contributed to the child's slower development of this phonological context. However, in the absence of perceptual data, it is difficult to state which of these acoustic or articulatory factors, or a combination of both, ultimately yielded the outcome observed in the data.

Finally, coming back to the general observations in (7), in spite of all the regularities observed above, we however did not find any parallel between the acquisition of [j] in singleton onsets and that of C[j] clusters. While this observation could be taken as contradicting the general view developed above in the context of liquids and C+liquid clusters, hastily jumping to this conclusion would elude another key observation, the fact that all of the child's stop+approximant onset clusters (i.e. with [l], [ʀ], and [j]) were in fact acquired within a single, five-week time window. In the spirit of the original analysis by Fikkert (1994), this observation can be captured within representational models that afford the necessary level of detail, here the onset constituent as the relevant domain of analysis.

Discussion

In sum, Catootje's developmental patterns reveal systematic patterns both segmentally and prosodically (within syllable onsets), as well as interrelations between these two areas of phonological development. Such are the hallmarks of adult phonological systems, as described by models of phonological theory that embrace segmental features and prosodic constituency as relevant units of representation. While the variable nature of Catootje's early productions can be described within holistic approaches to phonology, the systematicity observed around her mastery stages as well as in contexts where independent factors hinder acquisition, poses as many challenges for these models.

If taken from the perspective of frequency-based approaches to phonology and phonological development, the analysis above also raises questions about the types of units for which frequency information, if it is to be taken as a driving force in phonological development, may actually be compiled by the learner. For example, while individual onset clusters display a unique rate of occurrence in the signal, these clusters also can arguably be grouped within a more general category, formally the branching onset constituent which, if it is psychologically relevant, must be incorporated in statistical models. In sum, unless one adopts a completely structure-free model of representation and compiles statistics from raw phonetic forms only (e.g. Bybee 2001 for an exposition of this viewpoint), the integration of statistics with models of representation does raise a significant number of formal and empirical questions (e.g. Booij 2004; Rose 2009; see, also, Lieven 2010 and Ambridge & Lieven 2011 for similar considerations for other areas of grammatical organization).

In light of the general transitions we observed between relatively random patterns of liquid consonant productions, their categorical mastery, and related patterns in the child's productions of branching onsets, the overall picture appears to evolve from an initially impoverished system likely to produce the types of patterns summarized in (2) to a more systematic, category-rich system through which the child encodes learned generalizations about both segmental and prosodic properties of the target language. This transition in the child's phonological behaviours support holistic and finer-grained models of phonological representation as relevant to two different phases of phonological development. While the earlier phase can be characterized as relatively idiosyncratic behaviours, the subsequent phase offers evidence for the levels of abstraction that learners may attain, as they come to organize their phonological knowledge into phonological categories. Again, this raises central questions as to whether, or how, word templates and finer-grained phonological abstractions may co-exist within a unified framework.

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