THE DERIVATION OF A SONORITY HIERARCHY FROM THE SYLLABLE CONTACT LAW (SCL) AND THE PRODUCTIVITY OF THE SCL IN AMERICAN ENGLISH[1]

Nikoleta Dineen and Daiva Miller

"Why do we say *razzle-dazzle* instead of *dazzle-razzle*?" Steven Pinker asks on p. 170 of his best selling book, ***The Language Instinct*** (1994). "Why *super-duper, helter-skelter, harum-scarum, hocus-pocus, willy-nilly, hully-gully, roly-poly, holy moly, herky-jerky, walkie-talkie, namby-pamby, mumbo-jumbo, loosey-goosey, wing-ding, wham-bam, hobnob, razzamatazz,* and *rub-a-dub-dub*? I thought you'd never ask. Consonants differ in 'obstruency'—
the degree to which they impede the flow of air, ranging from merely making it resonate, to forcing it noisily past an obstruction, to stopping it up altogether. The word beginning with the less obstruent consonant always comes before the word beginning with the more obstruent consonant. Why ask why?"

INTRODUCTION

As we try to answer Pinker's question, we arrive at an alternative approach to a phonological analysis of *razzle-dazzle* and other similar compounds. Pinker suggests that in these compounds, the word with the less obstruent initial consonant is followed by a word with a more obstruent initial consonant. However, there seem to be degrees of obstruency—and of sonority, its opposite as we understand it,—which operate in a place not addressed by Pinker, namely, the syllable contact between adjacent constituents of these compounds. (We will henceforth refer to words such as *razzle-dazzle* as *razzle-dazzle-isms*.[2] In order to maintain consistency with our sources, we will also adopt the antonymous term sonority in place of obstruency.)

Independent of Pinker, we propose that the order of the constituents within the razzle-dazzle-ism depends on the well-formedness of the syllable contact based on the Syllable Contact Law (Hooper 1976) which we will explain after a discussion of sonority in the next section. We will argue that adopting an accurate sonority hierarchy enables one to predict the preferred order of the components of any razzle-dazzle-ism. Conversely, analysis of the preferred order of words in razzle-dazzle-isms is a useful tool in deriving a sonority hierarchy ranking for phonological segments.

To demonstrate our claim, we conducted a study with newly formed razzle-dazzle-isms. The study will be explained in the body of our paper which is divided into four sections. In section one, we will give some theoretical background. We will provide a brief overview of sonority, define the Syllable Contact Law (SCL), and list several versions of the Sonority Sequencing Hierarchy (SSH). Then we will explain our hypothesis and propose a sonority

[1] Thanks to Kerry Manion for welcoming us into her kindergarten class at St. James Elementary School, Falls Church Virginia, and to all the "kids" for telling us what razzle-dazzle-isms they liked best. We are indebted to all our subjects who took time from their busy schedules to be our "guinea pigs." We are grateful also to our friends and colleagues far and near who provided and/or helped us to transcribe and translate foreign language razzle-dazzle-ism examples: Majeed Abu Nimer, Mohanad Al Shaikh, Arash Afshar, Kanae Aoki, MaryJo Archibold, Balazs Barborik, Giedra M. Campbell, Csaba, Luz Echeverri, David Fisher, Carlos Gancedo, Miwako Hisagi, Carl Jacobsen, Jin Mann Joo, Heike Kurtz, SooJung Lee, Teresa Bandrowska Maloney, Leena Maattanen, Asuman Mutlu, Qi Pan, Irena and Vytautas Paulauskas, Yihuan Peng, Louis Remillard, Beate Riemer, Antonina Rodgers, Serge A. Shpilkin, Marija and Jonas Simonis, Terry Stryer, Kaoru Suzuki, Jeanne Trott, Lynn Crawford Trott, Yeon Sun Woo, John Woodgate, Santiago and Elena Valente Zegarra.

[2] Some authors may suggest alternative terms, e.g. Crystal (1987) calls ". . . a type of compund in which both elements are the same or only slightly different, eg. goody-goody, wishy washy, teeny weeny. . . " *reduplication*. We feel that the term *reduplication* is too general and refers to many linguistic phenomena. We prefer to coin a new term, *razzle-dazzle-ism*, which refers to a type of compOund in which the first component is reduplicated several times with a different onset and in which the components alone are meaningless.

hierarchy for American English (AE)[3] . In section two we will describe our subjects and explain our methodology. In section three we will discuss our results. Finally, in section four we will summarize our findings.

THEORETICAL BACKGROUND

The term "sonority" has been explained many ways. Trask's *Dictionary of Phonetics and Phonology* (1996) gives this definition:

> A particular sort of prominence associated with a segment by virtue of the way that segment is articulated. Sonority is an elusive notion. One approach holds that it is the output of periodic acoustic energy associated with the production of a particular segment, and hence of its intrinsic loudness: the greater such output, the greater the sonority of the sound. Others would associate sonority chiefly with the degree of aperture of the vocal tract.(p327).

Ladefoged (1975) defines sonority in his discussion of a sonority principle: The sonority of a segment is " its loudness relative to that of other sounds with the same length, stress and pitch." Christman and Depaolis (1996) write:

... sonority has been characterized as an abstract aspect of language knowledge which, like the phoneme and syllable, has provided descriptive utility as a language construct, but for which a set of invariant physical parameters has not been found.

Crystal (1987) implies in his *Cambridge Encyclopedia of Language*[4] that sonority is tied to acoustical properties. The following table (1), which Crystal attributes to D.B. Frye, suggests the relative decibel values of English segments.

(1)

ɔ: 29	e23	l 20	ʒ 13	ð 10
ɒ 28	i: 22	ʃ 19	z 12	b 8
ɑ: 26	u: 22	ŋ 18	s 12	d 8
ʌ 26	ɪ 22	m 17	t 11	p 7
ɜ: 25	w 21	tʃ 16	g 11	f 7
a 24	r 20	n 15	k 11	θ 0
ʊ 24	j 20	dʒ 13	v 10	

For us, the notion of sonority is tied to the concept of *syllable*. The more sonorous the segment, the more vowel-like it is, and the more likely it is to be a syllable peak. Keeping in mind the varied definitions of sonority, note that its existence is generally accepted and called upon in one way or another to justify a number of "principles" and "laws" relating to the well-formedness of syllables, to syllabification, and to other phonological phenomena. One of these is the Syllable Contact Law (SCL).
Vennemann, (1988) defined the SCL in this way:

---

[3] Although we accept the possibility that all human language segments can be ranked by sonority, we lack the means to test on such a grand scale. Hence, our domain: American English.
[4] See p.134 for discussion on amplitude and intensity and p. 164 for syllables.

> A syllable contact A$B is the more preferred, the less the Consonantal Strength of the offset A and the greater the Consonantal Strength of the onset B; more precisely—the greater the characteristic difference CS(B)—CS(A) between the Consonantal Strength of B and that of A.

More simply explained by Hooper (1976) and reported by Clements (1990), the SCL may be stated as in (2), where C = segment and $ = the contact between syllables.

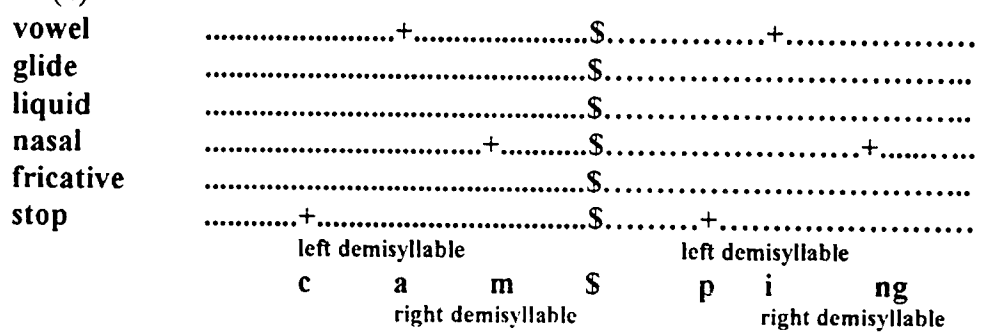
(2) **In any sequence C_a $ C_b there is a preference for C_a to exceed C_b in sonority.**

To illustrate with the word *carpet* ([kaːɹ] $ [pɛt]), [ɹ] is more sonorous than [p]. This falls out from the Dispersion Principle (3) identified and named by Clements (1992).

(3) **The Dispersion Principle:**
a. the preferred initial demisyllable[5] maximizes sonority dispersion
b. the preferred final demisyllable minimizes sonority dispersion.

Illustrating with a monosyllabic word, *bean* [b i n], the initial demisyllable is [bi] the final demisyllable is [in]. The initial demisyllable rises from a stop to a vowel (a maximal dispersion or difference); the final demisyllable falls from a vowel to a nasal (a lesser dispersion). When we apply the Dispersion Principle to the Syllable Contact Law, we see that the rise in the demisyllable (onset and nucleus) on the right should be steeper than the fall of the demisyllable (nucleus and coda) on the left (Weinberger 1998). An illustration of the word *camping* gives us the following chart.

(4)



In order to determine what the optimal syllable contact is, we must agree upon the relative sonority of individual segments. There are numerous theories pertaining to the ranking of segments in the order of their perceived sonority. A term for this order, widely accepted in the literature, is *sonority hierarchy*. Trask (1996) says: " [sonority hierarchy is] a putative ranking

[5] The term demisyllable was first introduced as a phonetic unit in the work of Fujimura et al. (1977). Clements (1992) explains demisyllables as "syllable halves—overlapping portions of a syllable sharing the [syllable] peak."

of segment types in order of their intrinsic sonority. Views differ, but a common ranking is (from least to most sonorous) **oral stops < fricatives < nasals < liquids < glides < vowels.** Some would add further elaborations, such as voiceless plosives< voiced plosives and high vowels< low vowels."

Clements (1990), proposes a simpler hierarchy:

(5) **obstruents<nasals<liquids<glides<vowels.**

He further argues that this was the only ranking likely to hold for Universal Grammar, but allows that individual languages which are more complex might subdivide into narrower categories or invert the rank of certain segments. In describing how he arrived at his preferred hierarchy, Clements notes that as early as 1865, W.D. Whitney suggested a notion of sonority ranking. Clements also recounts that Sievers (1881), Jespersen (1904), Saussure (1916), and Grammont (1933) attempted to use such rankings to explain recurrent patterns of syllable structure. Sievers assigned liquids a sonority ranking above that of nasals based on the fact that syllables such as *mla, mra, alm, arm* were relatively frequent in languages while *lma, rma, aml, amr* were not. Sievers, as cited by Trask (1996) also stated that a consonant's proximity to the "sonant"[6] determined its sonority ranking. Jespersen (in Clements 1990) restated Sievers' claim in a way that is familiar to phonology students today: "In every group of sounds there are as many syllables as there are relative peaks of sonority." Clements[7] tells us that Jespersen (1904) presented the following sonority scale (from least to most sonorous):

(6)
1.(a) voiceless stops, (b) voiceless fricatives
2.voiced stops
3. voiced fricatives
4. (a) voiced nasals, (b) voiced laterals
5. voiced r-sounds
6. voiced high vowels
7. voiced mid vowels
8. voiced low vowels

In spite of such alternative proposals, Clements claims that his simpler hierarchy should hold and proposes the following :

(7) **Sonority Sequencing Principle:**
Between any member of a syllable and the syllable peak, only sounds of higher sonority rank are permitted.

Bell and Hooper (1978) argue that in sonority ranking, one "cannot operate successfully with general categories such as obstruent, nasal, liquid and glide without knowing more of the details of the phonetic realization and phonological properties of the particular segment in the particular language. For instance, all *r*-like sounds cannot be placed at the same point on the scale since there are so many varieties of r . . . "[8]

---

[6] A sonant is any voiced sound capable of acting as a syllabic nucleus: a vowel, liquid, or nasal.
[7] 1990: p. 285, figure1.
[8] p. 12.

sonority is concerned, but rather something which is more sonorous than [n]. To test this we created *Hukk-Nukk*. *Hillung-Nillung* was added to test not only whether [h] is more sonorous than [n], but also to determine how strong the sonority constraint is against the Obligatory Contour Principle (OCP)[13] which is believed to discourage or disfavor the occurrence of consecutive identical segments and even, in many cases, consecutive segments which share certain features, (Trask 1996). Under the OCP the contact [ʊŋ-nɪ] of *Hillung-Nillung* may be treated as a violation because of the two consecutive nasals. If the OCP proves stronger than sonority, subjects should choose the reverse razzle-dazzle-ism, *Nillung-Hillung* with a non-optimal contact, but in conformity with the OCP. Finally, we claim that there is no difference or only marginal difference in sonority within the class of nasals. Therefore, we constructed the razzle-dazzle-ism *Nillus-Millus* and its reversal *Millus- Nillus* which, if our claim is correct, should be chosen randomly by our subjects. In other words, there is an equal probability for choosing either of these two razzle-dazzle-isms.

In Task II, subjects were asked to provide onsets of their own choosing to complete a number of razzle-dazzle-isms with missing onsets (11). We expected that subjects would select onsets in agreement with the SCL.

(11)	heff-__eff	[hɛf-__ef]
	__idge-didge	[__ɪdʒ-dɪdʒ]
	__esh-nesh	[__ɛʃ-nɛʃ]
	__ubb-fubb	[__ʌb-fʌb]
	lom-__om	[lɑm-__ɑm]
	masp-__asp	[mæsp-__æsp]
	__ult-vult	[__ʌlt-vʌlt]
	shevvin-__evvin	[ʃɛvɪn-ɛvɪn]

In each case we tried to create words which sounded plausibly English but which did not immediately suggest real words. We also placed the segments in question next to lax vowels[14] so as not to complicate the perception problem. In order to get a base, non-analytical response from our subjects, we complicated the the task by including not only one-syllabic razzle-dazzle-isms, but also a few two-syllabic examples. Finally, because we included children in our study, we decided that pictures might be helpful in focusing their attention while we conducted the study, so we selected eight pleasant pictures to accompany the razzle-dazzle-isms in Task I (see Appendix C.) The test instrument is included in Appendix B.

Our hypothesis was that subjects would overwhelmingly choose the form which was better-formed when analyzed at the contact between the component words. In other words, if they found fricatives to be more sonorous than stops they would choose e.g. *Fapp-Dapp* ahead of *Dapp-Fapp*, since, according to the SCL, the contact [æp-dæ] is preferred over the contact [æp-fæ] because there is a steeper rise in [dæ] than in [fæ].

[13] For more information on the OCP see Trask (1996.)
[14] Based on Fowler, Treiman, and Gross (1993).

(12)

vowel	.....+.....	$	.....+.....		
glide	.....	$	.....		
liquid	.....	$	.....		
nasal	.....	$	.....		
fricative	.....	$	.....+.....		
stop	.....+.....	$	.....		
	right demisyllable			**left demisyllable**	
	æ	p	$	f	æ

Every pair of razzle-dazzle-isms (and every razzle-dazzle-ism of Task II) was analyzed according to this model.

Data collected from both groups, children and adults, were independently transcribed by two transcribers, the authors of the study. In fact, since the target pronunciations were introduced earlier in our study, we have transcribed only the deviant pronunciations, e.g. *ka[və]-da[və]* for *Kaddub-Daddub*. (See Appendix A.)

RESULTS

All the data are divided into two major sections: adult data and child data. Adult data are further subdivided into *perception data*, *phonetic output data*, *total phonetic output data*, and *production data*. Child data consist of only *phonetic output data* and *total phonetic output data.*

The adult data for Task I, where subjects circled the razzle-dazzle-isms they liked better after hearing a tape with the razzle-dazzle-isms read by a model speaker, are called *perception data.* They are shown in tables 1.1 and 1.2 in Appendix A. There is no such table for children because the children did not circle their own selections; instead, we circled the choices we perceived them to be making based on their phonetic output.

The *phonetic output* of the subjects (some subjects repeated the razzle-dazzle-isms differently from the input offered by the model speaker) is represented in tables 2.1a, 2.2a, 2.1b, and 2.2b in Appendix A. This type of data was recorded for both children and adults.

In Task II on the adult test instrument, subjects were asked to supply a consonant onset that was missing in one of the component words of each razzle-dazzle-ism. This task was designed to give subjects an opportunity to respond actively to a further test of our proposed sonority hierarchy and the productivity of the SCL. This *production data* is presented in table 3 in Appendix A. We did not collect similar data from the children for practical and methodological reasons. Child subjects were not expected to understand the concept of consonant sounds, nor to identify sounds with graphemes.

Total phonetic output—every form that our subjects produced can be found in tables 4a (adults) and 4b (children) of Appendix A.

Children. 1. Fricatives proved to be slightly more sonorous than stops (55%).

2. 63% of the children perceived glides to be more sonorous than vowels. They also found glides more sonorous than liquids. This suggests that glides not only outrank the liquids as expected, but may even outrank some vowels (not expected.)

3. Children found voiceless fricatives more sonorous than voiced fricatives by 94%. This difference suggests that at least for the two particular consonants [f] and [v], the sonority ranking is reversed from our proposed hierarchy. However, when we considered the output of four of our child subjects, we found (based on their output) that they did not differentiate between voiced and voiceless fricatives. This may simply show that they have not yet mastered the voicing contrast.[15] We are not prepared to argue this strongly, but think it might be a productive area for further research.

4. Children treat voiceless stops as more sonorous than voiced stops, at least where [d] and [k] are concerned. Only 28% of children chose *Daddub-Kaddub* over *Kaddub-Daddub*.

5. Children seem to find [h] more sonorous than [n] (57%) in our combined analysis of all the subjects' versions of *Hukk-Nukk* and *Hillung-Nillung*. This suggests that the sonority holds even against the OCP.

6. Finally, children's treatment of [m] and [n] appears to be that [m] (21%) is noticeably less sonorous than [n] (79%).

Based on these results, we have modified our sonority hierarchy as follows:

(13)

vowels
glides
liquids
[h]
nasal [n]
nasal [m]
fricatives
stops

The overall success rate of children, which we identify with the rate for productivity of the SCL, turned out to be 54%.

Adults. 1. Adults treated fricatives as more sonorous than stops 56% of the time, which somewhat strengthens our argument that fricatives and stops should be ranked separately on the sonority scale.

2. Contrary to the children, adults showed very strong preference (76%) for the razzle-dazzle-ism *Anzy-Wanzy* , which supports our view that glides are less sonorous than vowels.

[15] Ingram (1978) treats the need to distinguish between phonetic and phonological development, stating that some children do not acquire certain fricatives phonetically even by age six.

3. Adults were almost as strong as children in their treatment of glides as more sonorous than liquids (71%).This, and their treatment of glides versus vowels, strongly confirms our proposal that vowels are charted at the top of the sonority hierarchy, followed by glides which are followed by liquids.

4. Surprisingly, 77% of the adults treated [v] as less sonorous than [f], which again suggests a need to adjust our proposed sonority hierarchy so, at least, in the case of [v] and [f], the voiceless segment is higher on. the scale.

5. The combined analyses for all the variations of *Kaddub-Daddub* and *Daddub-Kaddub* show that only 39% of adults treated the voiced stop [d] as more sonorous that [k], similar to the fricative situation. Perhaps, more research in differentiating individual segments needs to be done before this issue can be resolved. At present, we simply suggest that voicing contrast not be included in ranking most obstruents on the sonority scale.

6. The results for [h] versus [n] are even stronger with adults (73%) than with children in showing that [h] ranks higher on the sonority scale than [n], although this study does not show exactly how much higher.

7. Finally, adults found significantly less sonority difference between various nasals than children (56% for [m] and 44% for [n]), which suggests that all nasals may share the same degree in sonority (at least in American English).

Based on these results, we have further modified our sonority hierarchy as follows:

(14)

vowels
glides
liquids
[h]
nasals
fricatives
stops

The overall productivity of the SCL for adults based on Task I phonetic output data turned out to be 61%.

Regarding the production table, i.e, Task II, an analysis shows subjects' performance to be in strong (69%) conformity with our sonority hypothesis. Perhaps subjects made selections conforming to the SCL because they had the entire AE inventory of segments from which to choose. For the same reason, fine distinctions, such as we built into Task I of our test instrument (distinctions like voicing, closely ranking segments, etc.) only rarely came into play in Task II. These results convince us, nevertheless, that the SCL is productive in today's speakers of AE.

Table 1.1

PERCEPTION DATA—ADULTS
(only hypothesis-conforming reduplications charted)

word/subject	1 F/14	2 F/45	3 M/46	4 F/44	5 F/83	6 F/57	7 F/56	8 F/52	9 M/52	10 F/52	11 F/45	12 M/41	13 M/34	14 F/35	15 M/30	16 F/41	17 F/28	18 M/34	%
Fapp-Dapp	+	+	+	-	+	+	-	-	+	+	+	-	-	+	+	-	-	-	10/18 56
Anzy-Wanzy	+	-	+	-	-	+	+	-	+	+	+	+	+	+	-	+	+	+	13/18 72
Yeao-Laeo	+	-	+	+	+	+	+	+	+	-	+	+	-	-	-	-	+	-	11/18 61
V'luzz-F'luzz	-	-	-	+	-	-	-	+	-	-	-	+	-	-	-	-	-	-	3/18 17
Daddub-Kaddub	+	+	-	+	-	-	-	-	+	+	-	-	+	+	-	-	-	-	7/18 39
Hukk-Nukk	+	+	-	+	+	+	+	+	+	-	+	+	+	+	-	+	+	+	15/18 83
Hillung-Nillung	+	-	+	-	-	+	-	-	-	+	+	+	-	-	+	+	+	+	10/18 56
%	6/7 86	3/7 43	4/7 57	4/7 57	3/7 43	5/7 71	3/7 43	3/7 43	5/7 71	4/7 57	5/7 71	5/7 71	3/7 43	4/7 57	2/7 29	3/7 43	4/7 57	3/7 43	55/55

Table 1.2

PERCEPTION DATA—ADULTS
(both reduplications equally well-formed)

word/subject	1 F/14	2 F/45	3 M/46	4 F/44	5 F/8	6 F/57	7 F/56	8 F/52	9 M/52	10 F/52	11 F/45	12 M/41	13 M/34	14 F/35	15 M/30	16 F/41	17 F/28	18 M/34	%
millus-nillus	-	+	+	-	-	+	+	-	-	-	-	+	+	+	+	+	-	+	10/18 56
nillus-millus	+	-	-	+	+	-	-	+	+	+	+	-	-	-	-	-	+	-	8/18 44
%	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	50/50

Legend: "+"—chosen
"-"—not chosen
"n/a"—did not occur

"F"—female
"M"—male
"F/45"—female; 45 years

Table 2.1a

PHONETIC OUTPUT—ADULTS
(only hypothesis-conforming words charted)

word/subject	1 F/18	2 F/45	3 M/46	4 F/44	5 F/83	6 F/57	7 F/56	8 F/52	9 M/52	10 F/52	11 F/45	12 M/41	13 M/34	14 F/31	15 M/30	16 F/41	17 F/28	18 M/34	%
Fapp-Dapp	+	+	+	-	+	+	-	-	+	+	+	-	-	+	+	-	-	-	10/18 56
Anzy-Wanzy	+	-	+	-	-	+	+	-	+	+	+	+	+	+	n/a	+	+	+	13/17 76
Yeao-Leeo	+	-	+	+	+	+	+	+	+	-	+	+	-	-	n/a	+	+	-	12/17 71
V'luzz-F'luzz	-	-	n/a	+	-	n/a	n/a	+	-	-	-	+	-	n/a	-	-	-	n/a	3/13 23
Daddub-Kaddub	+	+	-	+	n/a	n/a	-	n/a	n/a	+	-	-	+	n/a	-	-	-	-	5/13 39
Hukk-Nukk	+	+	-	+	+	+	+	+	+	-	+	+	+	+	-	+	+	+	15/18 83
Hillung-Nillung	+	-	+	-	n/a	+	-	-	n/a	+	+	+	-	n/a	+	+	n/a	+	9/14 64
F'lu-[sf]uzz	n/a	n/a	-	n/a	n/a	-	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	0/4 0
Daddu[m]-Kaddu[m]	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0/1 0
Hillung-[m]illung	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0/1 0
Daddub-Kaddub	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0/1 0
Daddub-Kaddub	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0/1 0
Daddub-Kaddu[m]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1/1 100

Hiltong-Nillung	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0/1 0
V'luzz-[v]'luzz	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	0/1 0
Dadd[ə]-Kadd[ə]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	1/1 100
Hill[ə]-Nill[ə]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	0/1 0
Wanzy-[?]anzy	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	1/1 100
Yeso-L[j]eso	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	0/1 0
Nillung-Hillung	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	0/1 0
%	6/7 86	3/7 43	4/7 57	4/7 57	3/7 43	5/7 71	3/7 43	3/7 43	5/7 71	4/7 57	5/7 71	5/7 71	3/7 43	4/7 57	3/7 43	4/7 57	3/7 43	3/7 43	56/–

Table 2.2a

PHONETIC OUTPUT—ADULTS
(both reduplications equally well-formed)

word/subject	1 F/14	2 F/45	3 M/46	4 F/44	5 F/83	6 F/57	7 F/56	8 F/52	9 M/52	10 F/52	11 F/45	12 M/41	13 M/24	14 F/35	15 M/30	16 F/41	17 F/28	18 M/34	%
Millus-Nillus	-	+	+	-	-	+	+	-	-	-	-	+	+	+	+	+	-	+	10/18 56
Nillus-Millus	+	-	-	+	+	-	-	+	+	+	+	-	-	-	-	-	+	-	8/18 44
%	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	50/50

Legend: "+"—chosen
"-"—not chosen
"n/a"—did not occur

"F"—female
"M"—male
"F/45"—female; 45 years

Table 2.1b

PHONETIC OUTPUT—CHILDREN
(only hypothesis-conforming reduplications charted)

word/subject	1 F/5,6	2 F/5,8	3 M/5,8	4 M/5,9	5 F/5,9	6 F/5,9	7 F/5,10	8 F/5,10	9 M/5,11	10 F/5,11	11 F/6,0	12 F/6,0	13 F/6,1	14 F/6,2	15 F/6,4	16 M/6,5	17 M/6,6	18 F/6,6	19 M/6,7	20 M/6,9	%
Fapp-Dapp	+	+	-	-	-	+	-	-	+	-	+	+	+	+	-	+	+	-	-	+	11/20 55
Anzy-Wanzy	+	-	-	+	n/a	-	-	-	-	-	+	-	+	+	-	+	-	-	+	-	7/19 37
Yeso-Laco	+	+	-	+	+	-	+	-	+	+	-	+	+	+	+	n/a	-	+	+	+	14/19 74
V'luzz-F'luzz	-	-	-	-	-	-	n/a	n/a	+	-	-	-	n/a	-	-	-	-	n/a	-	-	1/16 6
Daddub-Kaddub	+	+	-	-	+	+	-	-	-	-	+	-	-	-	-	n/a	n/a	-	-	-	5/18 28
Hukk-Nukk	-	+	-	-	+	-	-	-	-	-	+	-	-	+	+	-	+	+	+	-	8/20 40
Hillung-Nillung	+	+	+	+	-	+	+	+	+	+	-	n/a	-	+	+	+	+	+	-	-	14/19 74
wanzy-[ʔ]anzy	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1/1 100
da[vo]-[kavo]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0/1 0
hillu[m]-nillu[m]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1/1 100
kaddu[m]-daddub	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	0/1 0
daddu[m]-kaddu[m]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	0/1 0
%	5/7 71	5/7 71	1/7 14	3/7 43	4/7 57	3/7 43	2/6 33	1/6 17	4/7 57	2/8 25	4/7 57	3/7 43	3/6 50	5/7 71	3/7 43	3/6 50	3/7 43	3/6 50	3/7 43	2/7 29	46/43

Table 2.2b

PHONETIC OUTPUT—CHILDREN
(both reduplications equally well-formed)

word/subject	1 F/5;6	2 F/5;8	3 M/5;8	4 M/5;9	5 F/5;9	6 F/5;9	7 F/5;10	8 F/5;10	9 M/5;11	10 F/5;11	11 F/6;0	12 F/6;0	13 F/5;11	14 F/6;2	15 F/6;4	16 M/6;5	17 M/6;6	18 F/6;6	19 M/6;7	20 M/6;9	%
Millus-Nillus	-	-	-	+	+	-	-	n/a	+	-	-	+	-	-	-	-	-	-	-	-	4/19 21
Nillus-Millus	+	+	+	-	-	+	+	n/a	-	+	+	..	+	+	+	+	+	+	+	+	15/19 79
[f]'luzz-f'luzz	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	-	n/a	n/a	0/3 0
f'luzz-[f]'luzz	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	+	n/a	n/a	3/3 100
m|lu[θʰ]-n|lu[θʰ]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0/1 0
n|lu[θʰ]-m|lu[θʰ]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1/1 100
[f]'lu[ðʰ]-f'lu[ðʰ]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0/1 0
f'lu[ðʰ]-[f]'lu[ðʰ]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1/1 100
[w]eeo-yeeo	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	0/1 0
yeeo-[w]eeo	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	1/1 100
%	½ 50	½ 50	½ 50	½ 50	½ 50	½ 50	2/4 50	2/4 50	½ 50	½ 50	½ 50	½ 50	2/4 50	½ 50	½ 50	½ 50	½ 50	2/4 50	½ 50	½ 50	50/50

Legend: "+"—chosen
"-"—not chosen
"n/a"—did not occur
"F"—female
"M"—male
"F/5;6"—female; 5 years 6 months

Table 3

PRODUCTION DATA—ADULTS
(responses to task II)

word/subject	1 F/14	2 F/45	3 M/46	4 F/44	5 F/83	6 F/57	7 F/56	8 F/52	9 M/53	10 F/52	11 F/45	12 M/41	13 M/34	14 F/55	15 M/30	16 F/41	17 F/28	18 M/34	No. occur.
heff-[z]eff	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
heff-[ʤ]eff	n/a	+	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	+	n/a	n/a	n/a	4
heff-[n]eff	n/a	n/a	+	n/a	n/a	+	n/a	+	+	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5
heff-[b]eff	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
heff-[i]eff	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
heff-[w]eff	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	+	2
heff-[l]eff	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	+	n/a	n/a	2
heff-[d]eff	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	+	n/a	2
lom-[tʰ]om	+	+	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	+	n/a	n/a	+	n/a	n/a	n/a	3
lom-[b]om	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	3
lom-[f]om	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	2
lom-[m]om	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	2
lom-[kʰ]om	n/a	n/a	n/a	n/a	n/a	+	n/a	+	n/a	+	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	4
lom-[pʰ]om	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2
lom-[d]om	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	1
lom-[l]om	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	1
[bɹ]idge-didge	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2
[ɹ]idge-didge	n/a	+	+	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	+	n/a	+	n/a	n/a	5
[m]idge-didge	n/a	n/a	n/a	+	n/a	n/a	n/a	+	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	+	4
[b]idge-didge	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[f]idge-didge	n/a	n/a	n/a	n/a	n/a	+	+	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3
[h]idge-didge	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	1
[j]idge-didge	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	1
[kʰ]idge-didge	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	1

sp-[tʰ]asp	+	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3
masp-[l]asp	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
masp-[ɹ]asp	n/a	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	4
masp-[gɹ]asp	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
masp-[kʰ]asp	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	+	n/a	n/a	3
masp-[pʰ]asp	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
masp-[kl]asp	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
masp-[g]asp	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	1
masp-[ŋ]asp	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	1
masp-[w]asp	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	-	2
[s]esh-nesh	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[m]esh-nesh	n/a	+	+	+	+	+	n/a	n/a	n/a	+	n/a	n/a	+	+	n/a	+	n/a	n/a	9
[ʃ]esh-nesh	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[l]esh-nesh	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	2
[fɹ]esh-nesh	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[kʰ]esh-nesh	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	-	n/a	1
[b]esh-nesh	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	1
[ŋ]esh-nesh	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	1
[kʰ]ult-vult	-	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	-	n/a	-	-	n/a	n/a	n/a	6
[dʒ]ult-vult	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[ʃ]ult-vult	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[d]ult-vult	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[m]ult-vult	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	+	n/a	3
[v]ult-vult	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[b]ult-vult	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	2
[p]ult-vult	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[g]ult-vult	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[ŋ]ult-vult	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	1
[tʰ]ubb-fubb	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2
[l]ubb-fubb	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	+	n/a	+	n/a	4
[d]ubb-fubb	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	-	3
[tʃ]ubb-fubb	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[b]ubb-fubb	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2
[kʰ]ubb-fubb	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[ʃ]ubb-fubb	n/a	n/a	n/a	n/a	n/a	n/a	+	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2

[ɹ]ubb-fubb	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	1
[pʰ]ubb-fubb	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	1
[ɬk.ɹ]ubb-fubb	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	1
shevvin-[l]evvin	-	n/a	-	-	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	1
shevvin-[n]evvin	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	1
shevvin-[g]evvin	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2
shevvin-[b]evvin	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
shevvin-[kʰ]evvin	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
shevvin-[d]evvin	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	+	+	n/a	n/a	4
shevvin-[m]evvin	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
shevvin-[bl]evvin	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	+	n/a	n/a	n/a	n/a	n/a	n/a	2
shevvin-[ʃm]evvin	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	1
%	3/8 38	5/8 63	4/8 50	6/8 75	7/8 88	6/8 75	7/8 88	6/8 75	4/8 50	6/8 75	5/8 63	5/8 63	6/8 75	6/8 75	6/8 75	7/8 88	5/8 63	4/8 50	65/--

Legend: "+"—hypothesis-conforming choice
"-"—non-hypothesis-conforming choice
"n/a"—did not occur

"F"—female
"M"—male
"F/45"—female; 45 years

Table 4a

TOTAL PHONETIC OUTPUT—ADULTS
(conforming and non-conforming reduplications; the reduplications in bold are hypothesis-conforming)

word/subject	1 F/14	2 F/45	3 M/46	4 F/44	5 F/83	6 F/57	7 F/56	8 F/52	9 M/53	10 F/52	11 F/45	12 M/41	13 M/34	14 F/35	15 M/30	16 F/41	17 F/28	18 M/34	No. conf.
Dapp-Fapp	-	-	-	+	-	-	+	+	-	-	-	+	+	-	-	+	+	+	8
Fapp-Dapp	+	+	+	-	+	+	-	-	+	+	+	-	-	+	+	-	-	-	10
Millus-Nillus	-	+	+	-	-	+	+	-	-	-	-	+	+	+	+	+	-	+	10
Nillus-Millus	+	-	-	+	+	-	-	+	+	+	+	-	-	-	-	-	+	-	8
Anzy-Wanzy	+	-	+	-	_	+	+	-	+	+	+	+	+	+	n/a	+	+	+	13
Wanzy-Anzy	-	+	-	+	+	-	-	+	-	-	-	-	-	-	n/a	-	-	-	4
Laco-Yeao	-	+	-	-	-	-	-	-	-	+	-	-	+	+	n/a	-	-	+	5
Yeao-Laco	+	-	+	+	+	+	+	+	+	-	+	+	-	-	n/a	+	+	-	12
V'luzz-F'luzz	-	-	n/a	+	-	n/a	n/a	+	-	-	-	+	-	n/a	-	-	-	n/a	3
F'luzz-V'luzz	+	+	n/a	-	+	n/a	n/a	-	+	+	+	-	+	n/a	+	+	+	n/a	10
Kaddub-Daddub	-	-	+	-	n/a	n/a	+	n/a	n/a	-	+	+	-	n/a	+	+	+	+	8
Daddub-Kaddub	+	+	-	+	n/a	n/a	-	n/a	n/a	+	-	-	+	n/.a	-	-	-	-	5
Hukk-Nukk	+	+	-	+	+	+	+	+	+	-	+	+	+	+	-	+	+	+	15
Nukk-Hukk	-	-	+	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	3
Nillung-Hillung	-	+	-	+	n/a	-	+	+	n/a	-	-	-	+	n/a	-	-	n/a	-	3
Hillung-Nillung	+	-	+	-	n/a	+	-	-	n/a	+	+	+	-	n/a	+	+	n/a	+	9
V'lu-[sf]uzz	n/a	n/a	+	n/a	n/a	+	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	4
F'lu-[zv]uzz	n/a	n/a	-	n/a	n/a	-	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	0
Kaddu[m]-Daddu[m]	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
Daddu[m]-Kaddu[m]	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
[m]illung-Hillung	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
Hillung-[m]illung	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Kaddu[m]-Daddu[m]	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
Daddub-Kaddub	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Kaddub-Da[bd]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1

Daddub-Kaddub	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Kaddub-Daddu[m]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Daddub-Kaddu[m]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
Nill[ŋ]-Hill[ŋ]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
Hillung-Nillung	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
V'luzz-[v]'luzz	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	0
F'luzz-V'luzz	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	1
Kadd[ə]-Dadd[ə]	n/a	n/a	n.a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	0
Dadd[ə]-Kadd[ə]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	1
Nill[ə]-Hill[ə]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	1
Hill[ə]-Nill[ə]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	0
[?]Anzy-Wanzy	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	0
Wanzy-[?]anzy	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	1
Laeo-Yeao	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	1
Yeao-L[j]aeo	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	0
Nillung-Hillung	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	0
Hillu[g]-Nillu[g]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	1

Legend: "+"—chosen
"-" —not chosen
"n/a"—did not occur

"F"—female
"M"—male
"F/45"—female; 45 years

Table 4b

TOTAL PHONETIC OUTPUT—CHILDREN

(ocurrences of conforming and non-conforming reduplications; the reduplications in bold are hypothesis-conforming)

words/subject	1 F/5;6	2 F/5;8	3 M/5;8	4 M/5;9	5 F/5;9	6 F/5;9	7 F/5;10	8 F/5;10	9 M/5;11	10 F/5;11	11 F/6;0	12 F/6;0	13 F/6;1	14 F/6;2	15 F/6;4	16 M/6;5	17 M/6;6	18 F/6;9	19 M/6;9	20 M/6;9	No. ocurr
Dapp-Fapp	-	-	+	+	+	-	+	+	-	+	-	-	-	-	+	-	-	+	+	-	9
Fapp-Dapp	+	+	-	-	-	+	-	-	+	-	+	+	+	+	-	+	+	-	-	+	11
Millus-Nillus	-	-	-	+	+	-	-	n/a	+	-	-	+	-	-	-	-	-	-	-	-	4
Nillus-Millus	+	+	+	-	-	+	+	n/a	-	+	+	-	+	+	+	+	+	+	+	+	15
Anzy-Wanzy	+	-	-	+	n/a	-	-	-	-	-	+	-	+	+	-	+	-	-	+	-	7
Wanzy-Anzy	-	+	+	-	n/a	+	+	+	+	+	-	+	-	-	+	-	+	+	-	+	12
Leco-Yeao	-	-	+	-	-	+	-	+	-	-	+	-	-	-	-	n/a	+	-	-	-	5
Yeao-Leco	+	+	-	+	+	-	+	-	+	+	-	+	+	+	+	n/a	-	+	+	+	14
V'luzz-F'luzz	-	-	-	-	-	-	n/a	n/a	+	-	-	-	n/a	-	-	-	-	n/a	-	-	1
F'luzz-V'luzz	+	+	+	+	+	+	n/a	n/a	-	+	+	+	n/a	+	+	+	+	n/a	+	+	13
Kaddub-Daddub	-	-	+	+	-	-	+	+	+	+	-	+	+	+	+	n/a	n/a	+	+	+	13
Daddub-Kaddub	+	+	-	-	+	+	-	-	-	-	+	-	-	-	-	n/a	n/a	-	-	-	5
Hukk-Nukk	-	+	-	-	+	-	-	-	-	-	+	-	-	+	+	-	+	+	+	-	8
Nukk-Hukk	+	-	+	+	-	+	+	+	+	+	-	+	+	-	-	+	-	-	-	+	12
Nillung-Hillung	-	-	-	-	+	-	-	-	-	-	+	n/a	+	-	-	-	-	-	+	+	5
Hillung-Nillung	+	+	+	+	-	+	+	+	+	+	-	n/a	-	+	+	+	+	+	-	-	14
[ʔ]anzy-wanzy	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
wanzy-[ʔ]anzy	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[f]'luzz-f'luzz	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	-	n/a	n/a	0
f'luzz-[f]'luzz	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	+	n/a	n/a	3
mi[θ]u[θ]- a[θ]u[θ]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
ni[θ]u[θ]- mi[θ]u[θ]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[f]'lu[ð]-f'lu[ð]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0

ɾlu[ðʰ]-[ʃ] 'lu[ðʰ]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
ka[və]-da[və]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
da[və]-[kavə]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
nillu[m]-hillung	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
hillu[m]-nillu[m]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1
[w]aeo-yeao	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	0
yeao-[w]aeo	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	1
kaddu[m]-daddub	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	0
daddub-kaddub	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	1
kaddu[m]-daddu[m]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	1
daddu[m]-kaddu[m]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	n/a	0

Legend: "+"—chosen
"-"—not chosen
"n/a"—did not occur
"F"—female
"M"—male
"F/5;6"—female; 5 years 6 months

Appendix B: TENTATIVE SONORITY AND SCL INSTRUMENT /Adults

Name:
Gender:
Age:
Number of years in D.C. area:
Native language:
Second, third, etc. language:

I.

1.	Dapp-Fapp	Fapp-Dapp
2.	Millus-Nillus	Nillus Millus
3.	Anzy-Wanzy	Wanzy Anzy
4.	Laeo-Yeao	Yeao-Laeo
5.	V'luzz-F'luzz	F'luzz-V'luzz
6.	Kaddub-Daddub	Daddub-Kaddub
7.	Hukk-Nukk	Nukk-Hukk
8.	Nillung-Hillung	Hillung-Nillung

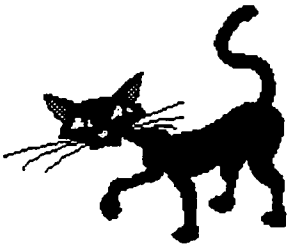
II.

9.	heff-__eff	13.	__esh-nesh
10.	lom-__om	14.	__ult-vult
11.	shevvin-__evvin	15.	__ubb-fubb
12.	masp-__asp	16.	__idge-didge

Appendix C: Pictures

Dapp-Fapp
or
Fapp-Dapp

Millus-Nillus
or
Nillus-Millus



Anzy-Wanzy
or
Wanzy-Anzy

Laeo-Yeao
or
Yeao-Laeo

V'luzz-F'luzz
or
F'luzz-V'luzz

Kaddub-Daddub
or
Daddub-Kaddub

Hukk-Nukk
or
Nukk-Hukk

Nillung-Hillung
or
Hillung-Nillung

Appendix D: Non-English Razzle-dazzle-isms—a sampler[1]

Arabic	[hadi badi]	used in a counting game like "eeny meeny"
Chinese	[kádà]	a swelling in the skin
	[jáɔ kjàɔ]	(of a woman) gentle and graceful
	[tsʊ̃m lûm]	instigate

Since Chinese tones differ for each part of the razzle-dazzle-ism, perhaps they are not valid examples.

Dutch	[kri:s kra:s]	criss cross
	[hotɛl dɛ botɛl]	nuts, mad

Farsi/Persian
In spoken Persian, there is a tendency for speakers to "echo" nouns in order to express non-specificity, lack of importance. The echo occurs with the initial consonant [m].

	[tʃiz miz]	just any thing
	[pɛʰsar mɛʰsar]	any boy
	[batʃɛʰ matʃɛʰ]	any kid
Finnish	[hølynpøly]	nonsense
	[nurin kurin]	topsy turvy
French	[pɛl mɛl]	confusedly, messily
	[tɔhu bohu]	of Hebrew origin; "toroul boroul"in medieval French, "disorder, confusion"
German (Austria)	[hʊtʃ pfʊtʃ]	willy nilly
(nonspecific as to region)	[hɔkʊs pɔkʊs]	magic incantation
	[ruk tsuk]	immediately, suddenly
	[viʃi vaʃi]	description for pejorative evasive answers
Hebrew	[tɔxu wəbɔxu]	"chaos,"referring to the original state of Earth
Hungarian	[dutʃi futʃi]	chubby, e.g. Monika is *duci-fuci*
	[huʃi muʃi]	voluptuous, e.g. Marilyn Monroe was *husi musi*
	[tuṭi muṭi]	an effeminate man
Irish/Gaelic	[ɪʷuwəljʌ bʷəljʌ]	general confusion or mayhem
Japanese	[unome tɑkɑnome]	with a sharp eye for something
	[ɯjɛn kijɛn]	repeated accidental meetings
	[tɪmpʊn kɑmpʊn]	nonsense
	[ʔumiisɛŋ jɑməsɛŋ]	a rascal

[1] Many of the IPA transcriptions are broad because we received a number of razzle-dazzle-isms by mail and were unable to verify them with native speakers in every case.

Korean	[ɑri kɑri]	confusion
	[irakuŋ dʒɑrahuŋ]	a little bit of gossip
	[ɑlɔ tɑlɔ]	having bought clothes
	[ulkit pulkit]	colorful
Latin	[lokɔ fokɔ]	the main point
Lithuanian	[re:kt ɳɛbe:kɫ]	interjection: terrified
	[ʃɑ:lə bɑ:lə]	cold, in the emotional sense, like a wet blanket
	[mɛrgɔs tɛrbɔs]	"girly girls"
	[bɔbə ʈrʲɔbə]	old lady (pejorative)
	[ʃmɑ:ukʃt pəʃmɑ:ukʃt]	interjection: quick as a wink
	[lɑ:pe: snɑ:pe:]	fox, as in "foxy loxy"
	[kɪʃkɪs pɪʃkɪs]	hare or rabbit
	[trʲɔkʃt pokʃt kɛbɛrʲɔkʃt]	quickly—cf. "lickety-split"
	[ʃʲʊmpʊ pʊmpʊ]	a bear's noisy footsteps
Polish	[jɑkɔ tɑkɔ]	so-so
	[hɔtski klɔtski]	a mixture of things
	[fiki miki]	funny acrobatics
	[kɔʃɑl̪ki ɔpɑl̪ki]	tall tales
	[tʌp tsʌp]	grabbing someone quickly
	[wupʊ tsupʊ]	hitting someone
	[ʃmɪŋgʊs dɪŋgʊs]	sprinkling with water—Easter tradition
	[tɛrɛ fɛrɛ kuku]	hard to believe
	[ʃmihi xihi]	bad practical jokes
Russian	[gɔgəl mɔgəl]	a dessert made of raw eggs and sugar
	[ʃuri muri]	colloquial, disdainful,love affair
	[ʃəltai bəltai]	Humpty-Dumpty of the popular nursery rhyme
Slovak	[tsitsɑ mitsɑ]	familiar name for a cat
	[tsitsuʃkɑ mitsuʃkɑ]	diminutive (cat)
	[cuculi muculi]	a smarmy character
	[hɔ:kus pɔ:kus]	magic incantation
	[lɑ:ri fɑ:ri]	when a person doesn't wish to respond
	[tʃɑ:ri mɑ:ri]	similar to hocus pocus
	[hʌki bʌki]	illegible writing
Spanish		
(Peru & Ecuador)	[ɑβrə kɑðɑβrə]	magic incantation
	[ɔki ðɔki]	OK (maybe from English)
(Honduras)	[sumbə mʌɳ:mbə]	carelessness/tomfoolery
	[lɑ xɑnə ɔ lɑ hʷɑnə]	the next one to make the mistake
	[etʃɔ petʃɔ]	What's done is done.

(nonspecific as to region)	[tikis mikis]	fussy, fussing
	[siri miri]	drizzle (from Basque)
Thai	[gatuk g̥atak]	wavy motion
	[kɑo^{w} dʒɑo^{w}]	fresh rice
	[kɔn dʒɔn]	poor people
Turkish	[kɑrə pɑrə]	illegal money, used in drug trade
	[jɑmʊr tʒɑmʊr]	rainy,muddy mess

Yiddish-American

In Yiddish-American communities words are often echoed as a sign of negation.

[bɛrzbɔl ʃmɛrzbɔl]	baseball? who cares?
[dʒinjəs ʃminjəs]	genius? not really!