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# Gemination in English

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An account of consonantal ‘twinning’ in English and other languages

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## Introduction

THIS ESSAY<sup>1</sup> concerns itself with gemination in English, but more specifically, it asks whether English has consonantal gemination (CG), as has been reported by some in the literature. *Gemination* is usually defined as a phonetic doubling (cf. Latin *geminus* ‘twin’); however, phonetic length (as opposed to a single or nongeminated segment) is a more accurate designation (see Matthews 1997:141, who cites Italian *atto* [at:o] ‘act’, making reference only to ‘doubling’). It has long been known that English does not have contrastive CG as is recognized, say, from the phonemic difference between Classical and Modern Standard Arabic *kasara* (‘he broke’) and *kassara* (‘he smashed’) or *darasa* (‘he studied’) and *dar-rasa* (‘he taught’).

The aforementioned Arabic minimal pairs contrast a geminated consonant with its corresponding nongeminated one. CG is thus said to be lexical in Arabic, but such is not the case with English. It also plays a prominent role in the phonologies of languages as diverse as Japanese, Finnish, and Italian (cf. the minimal pairs in the latter *cane* ‘dog’ vs. *canne* ‘canes’). The cases of Arabic and Archi (a Caucasian language) involve what has been termed *true gemination*, whereas gemination across morpheme or word boundaries, such as occurs in English (as in *some more*), is known as *fake gemination*, according to Spencer (1996:25).

*Vocalic gemination* is known to be allophonic in most English dialects: Ladefoged puts it as follows (2001:232): ‘In most varieties of English, variations in length are completely allophonic.’ However, in Scottish English, there is a contrast between [wik] *week* and [wi:k] *weak*, ‘both having the same monophthongal vowel quality’ (*ibid.*). In Yorkshire, *ham* has a shorter

[a] than does *harm* [ha:m], according to O’Connor (1973:254). Moreover, experts agree that vowels before voiced segments are longer than before voiceless segments. Thus, the digraph [æ] in *cat* is shorter than in *cad*; *dock* has a shorter vowel than is present in *dog*, etc. This vocalic difference is also connected with a geminated [nn] in *send* versus a short [n] in *sent*; similarly, *felled* has [ll] versus [l] in *felt* (O’Connor 1973:197). Kenyon (1977:49) notes that the [l] of *build* is longer than that of *built*, the [m] longer in *dumb* than in *dump*, and the [n] longer in *hens* than in *hence*. It is also

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reported (O'Connor *op. cit.*) that the [z] in *rise* is shorter than the [s] in *rice*. The present work, however, deals only with CG<sup>2</sup> and does not consider vocalic gemination nor its possibilities of different phonological interpretations or analyses.

## The catalyst for the research

The catalyst for this essay was a transcription exercise in Ladefoged's phonetics textbook (2001), in which the student must correct one mistake per word written in IPA characters (2001:33). The word in question is transcribed as [rɒmmert] *roommate*. The alleged error is that the first vowel should be either [u] or [ʊ], depending on one's dialect; however, the geminated [mm] is never called into question as a possible error (since there can be only one per word). Gemination is present in Ladefoged's speech (personal communication), which suggests that this is so for other British English (BE) speakers, or perhaps for BE as a whole (since Ladefoged is an Englishman, albeit educated in and a long-time resident of Edinburgh and thereafter Los Angeles). My own formal and informal speech – I was born and raised in Los Angeles – does not, however, have a geminated /m/ in this word, viz., [rumert]. This word is transcribed in Kenyon and Knott (1953:367) as either ['rummet] or ['rumet] – my form with [u] is not mentioned by them. The latest version of *The American Heritage Dictionary* (4th edn, Boston: Houghton Mifflin, 2000:1512) records geminated and nongeminated [m] in this example.

## The scholarly literature

There does not appear to be much in the way of scholarly literature on the subject of gemination in English. Thus, the major purpose of this study is to resolve what has been said on this topic – to set the record straight, if you will, and to sum up the state of the art. Laver (1994) surprisingly does not have anything on the topic; neither does the new, most comprehensive grammar of English (Huddleston & Pullum 2002). Trask (1996:154) asserts that 'geminate consonants occur in English only at morpheme boundaries: *nighttime*, *bookcase*, *solely*, *non-null*.' In my view, what we appear to have in cases such as *nighttime* is orthographic and fake gemination, also present in *bookcase*, in which the <k> and <c> each represents the same voiceless velar

stop phoneme on the graphemic level.<sup>4</sup> If I produce [bʊkkeɪs] with a geminated [kk], this sounds unnatural to me – in both informal (or casual) and formal registers.<sup>5</sup>

In informal rapid speech, what I perceive is only a single consonant present in my pronunciation and that of many informants I have used to check this phenomenon (in all four of Trask's examples). Of course, in more formal, enunciated or careful speech, I can produce a clear and distinct geminate for some words which fit into the aforementioned category, as, e.g., *unknown*, the latter of which can have ultimate or penultimate stress, depending on the context. I do not think I usually do so, however. The question we wish to answer in this investigation is the following: Do geminated consonants occur in normal, everyday, informal speech for the majority of American English native speakers, and if so, how do they compare with their nongeminate counterparts?

Out of all the authors who have broached this topic, Malmberg (1963) has, I believe, offered a succinct, accurate account from the functional phonological perspective of what is going on in the aforementioned geminated examples. He notes that a language like Italian is particularly rich in geminated consonants (see Loporcaro 1996 for a discussion of all relevant issues and the enormous literature on this topic in Italian linguistics), but that Spanish and English do not have any (1963:77). In a footnote, he explains further by stating that there are cases in which two successive consonants occur at morpheme boundaries, but that English and German have a tendency to reduce the group, i.e., to degeminate (1977:77, fn. 3). Degemination has been noted to occur in Serbo-Croatian as well (Spencer 1966:66). Malmberg (1963) specifically mentions degemination in the case of English *u[n]known*.<sup>6</sup>

Disagreeing with this perspective are Ladefoged (2001:233) and Kreidler (2004:116), both of whom assert that degemination is not a possibility here. In addition, there are many examples of CG in Kenyon and Knott (1953), *Oxford Advanced Learner's Dictionary of Current English* (3rd edn, Oxford: Oxford University Press, 1974), and *The American Heritage Dictionary* (*op. cit.*). Consider the following (numbers after the words refer to the pages in Kenyon and Knott 1953): *unknit* (452), *unknowable*, *unknown* (453), *bookcase*, *book-*

keeper (they also report nongeminated /k/ in the Eastern and Southern US; thus we have gemination and degemination possible here) (53), *innate* (also nongeminated [n]) (225), *innumerable*, *innumeros*, and *innutrition* (the last three have nongeminated variations, too) (226). The following occur in the aforementioned Oxford dictionary (1974:943): *unknown*, *unnatural*, *unnecessary*, *unnerve*, *unnoticed*, *unnumbered*. Roach and Hartman (1997:522) transcribe all of the *unn-* words with a geminated [nn]: *unnamed*, *unnatural*, *unnavigable*, *unnecessarily*, *unnecessary*, *unneighborly*, *unnerve*, *unnoticeable*, *unnatural*, and *unnumbered*. Jones (1956:448–9) transcribes all the *unn-* words with a geminated [nn] as well. It contains all the words found in Roach & Hartman (1997) except *unnatural*. Gussman (2002:26–7) also maintains that *unnecessary* and *unnatural* contain geminated [nn], as do *ten names* and *tin knife*. Another author who mentions that *penknife* and *unknown* have geminated [nn] is O'Connor (1973:255), whereas Abercrombie (1967:82) has this to say:

Double consonants must be distinguished from long consonants. A double consonant is one whose duration extends over two syllables, whereas the duration of a long consonant is confirmed to a single syllable. Double consonants are frequently found in English, especially at word junction: *wholly* (as said by many), *unknown*, *book-case*, *this Sunday*.

## A tentative hypothesis

In taking samples from dozens of American English native speakers over a period of many months and in examining their pronunciations of several key items and in trying to make sense out of all the scientific statements in the scholarly literature on the subject, I have felt that the following *tentative* hypothesis concerning the facts of CG may be correct.

In a more formal, careful speech style, some native speakers may geminate some words, as Trask (*op. cit.*) notes. Some of these for some native speakers might, in fact, be spelling pronunciations. Thus, a word such as *unknown* may actually be pronounced by some with a geminated [nn] due to the pronunciation of its orthographic representation. A geminated [nn] in *unknown*, however, sounds awkward in my own speech, but there is always the possibility of a pragmatically based, purposeful

gemination, i.e., for special effect. This situation is quite different from the reported case of geminated consonants which occur in British English dialectal words, such as *rabbit*, *apple*, and *adder*, interpreted as Welsh phonetic influence on English (Wakelin 1972:128).

## Comparing Italian and English gemination

Let us now consider the cases of two words in juxtaposition. Ladefoged (2001:233) compares Italian geminates with those in English *white tie*. He states: 'The difference is that in Italian a long consonant can occur within a single morpheme ... But in English, geminate consonants can occur only across word boundaries, as in the previous examples, or in a word containing two morphemes, such as "unknown" [ʌn'noun] or "guileless" [ˈgailləs].' Catford maintains that English gemination does not occur, as it does in Italian, in the same morpheme, and cites *bookcase* and *good dog* as examples across word boundaries (1977:210).<sup>7</sup> In my own speech, the first Catford example degeminates.<sup>8</sup> If I am talking to a dog and saying *good dog* to him or her, I lengthen the first vowel while degeminating the [d] resulting in [gʊ::dɔg]. Furthermore, let me offer two parallel cases:

- 1 *ice tea* for *iced tea*, via a process of the devoicing of the final *d* of *iced* (regressive voicing assimilation → \**icet tea*) followed by its degemination (tt→t)
- 2 an erroneous written form in many a student composition – *it's a doggie dog world* ← *dog eat dog* → \**dog ead dog* [dɔg id dɔg] (via regressive voicing assimilation) → [dɔg i dɔg] via degemination = *doggie dog* (via morphemic misanalysis of the diminutive suffix, i.e., a reinterpretation of [id]).

This degemination should be understood in the light of Ladefoged's Rule 16 for English (2001:60): 'A consonant is short when it is before an identical consonant.'<sup>9</sup>

Let us now examine the following example, which may be used as a parallel to *white tie*: *gray tomb* and *great tomb* (examples from Takekiko Makino furnished by Ladefoged). In informal rapid speech, *white tie* sounds to me very much like *why tie*, and *gray tomb* sounds like *great tomb*. Not so, according to Kreidler (2004:116), who cites the geminated [mm] in *home-made* vs. a nongeminated [m] in *domain*,

and also the geminated consonants in *misspent*, *bad day*, *ten nights*, *ripe peach*, and *love Vickie*.

## Spectrographic analysis

Delattre (1968) conducted spectrographic analyses of selected English phrases: *it lend* vs. *it will end* (1968:110), where the former shows gemination of the /l/ at 1.3 to 1 (ratio of geminated to plain /l/); *the race ends* vs. *the race sends* at the same ratio; *I've seen Nelly* vs. *I've seen Elly* at a ratio of geminated to single at 1.5 to 1. I assume that the data reflect actual linguistic usage, i.e., a natural speech situation, and were recorded at normal tempo.<sup>10</sup> The most important conclusion reached by the author is (1968:161): 'Ratios between geminate and single consonants vary between 1.9 to 1 for French to 1.4 to 1 for English. The duration of the preceding vowel is not a factor in the perception of consonant gemination.' This means that English has geminated consonants which are approximately one and a half times longer than their nongeminated counterparts.

## Assimilation in English

Let us examine some common assimilations in English. It is well known that CG (and thereafter degemination) may occur as a result of assimilation: *is she* → [iʃʃi] → [iʃi]; *is this* → [izzis] → [(i)zɪs], etc. Spencer (1996:225) specifically mentions the degemination of the assimilation and palatalization found in *handbag*, *this shop*, and *would you*. Then he goes on to affirm that degemination is 'much less likely' in *milkcrate*, *unknown*, *solely*, *leanness*,<sup>11</sup> etc. (*ibid.*). Bowen (1975:152) notes the case of reduced clusters, as [bərsts] → [bərɪs] (*bursts*). In my experience, in rapid speech, the geminated [ss] in this example degeminates to [bərɪs]. Kenyon (1977:52) asserts that 'double consonants are often (italics mine) made single, as in *pen knife*,<sup>12</sup> *immaterial*, *innate*, and in *wholly*, often pronounced [holɪ] in spite of the homophone *holy*...' Kenyon (1977:51) maintains that 'double consonants are often distinctive, as in aɪ du, aɪd-du; aɪ o nən, aɪ on-nən; aɪm aɪk, aɪm maɪk, tɒp ʌp, tɒp-pʌp; wɪð ə mæn, wɪð-ðə mæn; ʌn'emd, ʌnn'emd.'<sup>13</sup>

In a discussion of the relationship between graphemes and phonemes in English, Wijk (1966:85) observes that double consonants orthographically 'never indicate any difference

in the quality or the length of the consonant sound in question,' noting exceptions such as *accent*, *accept*, *succeed*, and *accident*. Then he goes on to affirm that the <gg> in *suggest* is occasionally pronounced [gdʒ], viz., [sʌgdʒe'st] in American English (*ibid.*) – a pronunciation I have never actually heard in any region of the United States, yet listed first in the latest *The American Heritage Dictionary* (Boston: Houghton Mifflin, 2000:1731) and in *Webster's New Unabridged Dictionary* (New York: Barnes and Noble, 1996:1902); yet *Chambers English Dictionary* (Cambridge: Chambers, 1988:1470) refers to the *sug-* as 'old-fashioned.'<sup>14</sup>

## Possible conclusion

Could it be that we have the following scenario, at least with some speakers? In more careful, slower (*lento*) registers, English does have CG, but in informal (*allegro*) speech we have degemination. Such a scenario is exactly the situation for modern Persian (Windfuhr 1997:681): 'The phonetic realization of gemination appears to be confined to formal registers, but even there it seems to be rare; e.g., both *korré* "foal" and *koré* "globe" are mostly pronounced non-geminate. Distinct gemination is occasionally provided by native speakers in cases of potential ambiguity, which are few' (*ibid.*).<sup>15</sup> Modern Greek has also degeminated Classical Greek geminates: *hellas* → *elas* 'Greece', *thalassa* → *thalasa* 'sea'; *ennea* → *enea* 'nine'; *kappa* → *kapa* 'a letter of the Greek alphabet equivalent to *k*'. See Spencer (1996:61).

## Bailey on gemination in English

Let me now turn to the writings on gemination in English by Charles-James N. Bailey, whose ideas on the topic are at odds with mainstream views. Bailey (1983) and (1985) refer to sonorant gemination in English lects. According to Bailey (1983:178), Scottish English *hairy* has a simple [r], whereas Southern and Northern American English and Southern BE have a rhotacized schwa plus [r], which amounts to a situation of geminated [rr]. He also notes geminated [ll] in various English dialects: *hilly*, *tell it*, *mellow*, *Jello*, and *sell enough*. Bailey (1983:17) affirms that 'in rapid speech, the effects of forward-gemination (of a peak) are made opaque by the deletion of the syllabic

sonorant: *seasonal* ['siz(n)] ... Degemination is less likely to occur as the tempo is slower and as the following syllable is more heavily stressed ...' The crux of the matter, thus, at least for some speakers and under some sociolinguistic conditions, is precisely what we are suggesting here – the difference between *lento*, formal speech and *allegro*, informal speech. To put it in slightly different terms, we are suggesting a sociolinguistic-phonological explanation for these facts of English pronunciation.

Bailey (1985) repeats many of the things contained in Bailey (1983). However, we can note some refined statements of the rapid speech idea. Citing examples such as *harboring*, *botany*, *sell enough*, and *scary* (1985:166–7) as well as *silly* (1985:17) and *million* (1985:19), we then note his statement that 'sonorant-degemination [sic] is an allegro development,' and further 'sonorant-degemination [sic] operates more often as the tempo is faster' (1985:123). It remains unclear what the author means when he speaks of the 'ungemination' (his quotation marks) for which some dialects are noted (1985:168–9).<sup>16</sup>

### The Grand Dictionary of Phonetics

*The Grand Dictionary of Phonetics* (1981:215) contains some puzzling statements on gemination, citing the [s] in *kiss*, *passive*, *voiceless* as either a half long [s.] or a fully long [s:]. It goes on to mention the geminated [m:]<sup>17</sup> in *grammar*: 'These consonants are usually called double consonants.' As far as I can tell, the author(s) of this dictionary has (have) confused phonetic and orthographic phenomena.<sup>18</sup> The pronunciation of *grammar* with geminated [mm] sounds awkward, to say the least, and does not occur. I do not believe that geminated [mm] = [m:] in this word occurs in any variety or dialect of English.

### Experimental phonetics as the solution to the problem

The best way to resolve the issue of CG in words such as *unknown* and *unnamed* was to record native speakers in natural speech situations. The following experiment, suggested to me by Peter Ladefoged, was undertaken. Twenty-five cards with pictures of name-brand and non-name-brand athletic shoes were shown to informants,<sup>19</sup> who were instructed to say *named* or *unnamed* as they looked at each

card. They were then asked to say the following three words to measure their normal pitch ranges for computer voice-recognition purposes: *annoyed*, *announced*, *annulled*. However, the experiment was really interested in the phonetic length of the [n] in these words. The same cards were used with other informants who, however, completed the same test using the words *known* or *unknown* (the brands were either known to them or unknown). The full set of directions was as follows:

Please help us investigate the extent to which brand-name items are associated with specific marketing logos and designs.

We have prepared 25 flashcards with pictures of different types of shoes. As the interviewer shows them to you, look to see if the shoe has any logo or writing on it that you recognize. If you can identify that the shoe is a specific brand, please say 'known.' If the picture looks like it could be from any manufacturer and you can't identify it as having a specific name, please say 'unknown.' As we are doing a machine scoring of the responses, please respond just 'known' or 'unknown.'

The cards are not in any order, and there are no wrong answers. [Some generic shoes are included.] Even if you don't recognize any of the pictures as 'known,' it's Okay. Just relax and be honest. The survey is completely anonymous. Thank you.<sup>20</sup>

### The results

Sound spectrograms (using Wave Surfer) of the relevant data were analyzed, and the averages (= means) for all ten speakers are as follows (see Table 1):

[n] named ([n] is a nongeminate)	30 milliseconds
[nn] known (the [nn] is a geminate)	50.7
[nn] annulled	91.5
[nn] announced	92.4
[nn] annoyed	101.9
[nn] unnamed	119.2
[nn] unknown	121.9

### A second experiment

The pronunciations of *unnamed* and *unaimed* were also compared, in a second experiment designed with targets and arrows either hitting a bull's eye or far removed from it. The following instructions were given to the informants:

We are developing computer software that recognizes human voice commands. We hope to use this technology for computer and video games, so we need your help.



**Table 1 Study of gemination among English native speakers**

Speaker	unaimed	unknown	unnamed	annoyed	announced	annulled	known	named
<b>S1</b>	84.0	115.0	138.6	107.2	94.4	94.5		
	40.7	110.0	110.7					
	67.4	110.8	103.4					
	65.1	89.5						
	51.6	107.9						
	56.1	127.7						
	64.7	138.9						
		127.9						
		110						
		107.7						
<i>AVG S1</i>	61.4	114.5	117.6	107.2	94.4	94.5		
<i>STDEV</i>	13.7	13.8	18.6					
Speaker	unaimed	unknown	unnamed	annoyed	announced	annulled	known	named
<b>S2</b>	94.6	116.9	116.8				85.2	24.7
	94.7	122.0	126.2				23.8	12.4
	62.3	127.6	116.8				28.0	
	55.3	124.4	98.7					
	65.6	122.8	114.2					
	62.5	110.4	101.3					
	48.8	107.9	102.4					
	60	127.7	112.1					
	43.3	138.9	116.9					
	43.5	127.9	108.8					
	49.1	110.0	116.3					
		107.7	98.8					
		98.7	121.4					
			64.7					
			101.8					
<i>AVG S2</i>	65.3	118.4	107.8				45.7	18.6
<i>STDEV</i>	18.1	11.6	14.7				34.3	8.7



Look through the cards in the pile, and say either 'aimed' if the arrow looks like it hit a bull's eye, or 'unaimed' if it looks like a poor shot (i.e. one that was not aimed). Please use just these two words 'aimed' or 'unaimed' as these are the words we are trying to get the computer to recognize.

The object is for us to collect as many samples

as we can of different people so that the computer can learn to understand normal speaking voices. Thank you.

The informants were also asked to say the following three words for comparative purposes: *annoyed*, *announced*, and *annulled*.

**Table 1** *continued*

Speaker	unaimed	unknown	unnamed	annoyed	announced	annulled	known	named
<b>S3</b>	57.7	131.2	150.0	85.4	81.7	103.3	77.6	51.6
	57.9	126.5	173.4				44.1	29.6
	59.1	127.4	157.3					32.1
	70.6	146.4	133.9					
	63.2	152.7	165.1					
	50.9	152.3	151.6					
	59.6	173.6	147.5					
	55.2	156.6	137.1					
		146.6	163.2					
		147.5	145.1					
		141.6	139.8					
		145.3	147.5					
<i>AVG S3</i>	59.3	145.6	151.0	85.4	81.7	103.3	60.8	37.8
<i>STDEV</i>	5.8	13.2	11.9				23.7	12.0
Speaker	unaimed	unknown	unnamed	annoyed	announced	annulled	known	named
<b>S4</b>	47.5	67.0	72.4	118.1	84.5	84.7	20.5	
	60.6	106.8	77.0				37.5	
	48.0	112.2	90.3				32.5	
	65.6	101.9	89.5					
	55.1	74.0						
	73.4	89.4						
	95.5							
	57.4							
	88.0							
<i>AVG S4</i>	65.7	91.9	82.3	118.1	84.5	84.7	30.2	
<i>ST DEV</i>		18.3	9.0				8.7	
Speaker	unaimed	unknown	unnamed	annoyed	announced	annulled	known	named
<b>S5</b>	31.0	133.3	117.9	101.2	90.8	81.9	83.1	33.8
	43.0	52.1	91.4	122.7	81.6	82.0		
	47.7	117.1	107.1					
	36.7	114.8	116.1					
	43.5	109.4	115.8					
	37.8	113.3	119.6					
	26.8	123.1						
	46.0							
	51.2							
<i>AVG S5</i>	40.4	109.0	111.3	112.0	86.2	82.0	83.1	33.8
<i>ST DEV</i>	8.0	26.3	10.7	15.2	6.5	0.1		➔

**Table 1** *continued*

Speaker	unaimed	unknown	unnamed	annoyed	announced	annulled	known	named
<b>S6</b>	48.5	128.6	128.9	102.8	80.2	81.3	77.7	
	43.7	124.0	132.9	86.0	70.2	76.8	35.0	
	51.4	148.1	129.6				55.2	
	33.9	151.1	142.3				69.2	
	43.7	134.1	112.4					
	52.3	128.5	143.2					
	45.7							
	AVG S6	45.6	135.7	131.5	94.4	75.2	79.0	59.3
ST DEV	6.2	11.2	11.2	11.9	7.1	3.2	18.7	
Speaker	unaimed	unknown	unnamed	annoyed	announced	annulled	known	named
<b>S7</b>	40.2	115.8	114.5	83.4	113.1	99.0	50.8	
	65.5	123.7	130.1				39.4	
	60.6	120.7	137.1					
	23.3		117.5					
	22.1		118.1					
	50.9							
	23.4							
	39.9							
AVG S7	40.7	120.1	123.5	83.4	113.1	99.0	45.1	
ST DEV	4.3	4.0	9.7				8.1	
Speaker	unaimed	unknown	unnamed	annoyed	announced	annulled	known	named
<b>S8</b>	59.4	103.3	102.7	79.4	77.1	89.6		
	47.1	124	107.8	91.4	99.7			
	79.9	124.2	112.3					
	62.1	129.4	118.7					
	59.6	150.2	117.5					
	64.9	120.0	120.4					
	64.7	122.5	92.1					
			112.9	103.6				
		113.2	116.0					
AVG S8	45.4	122.2	110.1	85.4	88.4	89.6		
ST DEV	18.3	13.1	9.4	8.5	16.0			➔

**The results**

The average of all attestations of [nn] in *unaimed* is 51.3. Speaking from a narrow phonetic point of view, this figure is clearly indicative of a long [nn] when compared to the [n] of *named*. See further Table 1.

**Overall conclusions**

The following conclusions are now offered:

- 1 There is a gemination of [nn] in *known* and *unaimed* when compared to *named*, i.e., the length of the former two are longer (not quite double)



**Table 1** *continued*

Speaker	unaimed	unknown	unnamed	annoyed	announced	annulled	known	named
<b>S9</b>	37.8	90.9	108.4	136.2	159.3	125.3	37.1	
	47.2	144.7	124.5	110.3	86.6	66.9	33.7	
	48.5	150.3	154.9					
	45.8	137.6	141.5					
	32.9	146.9	157.6					
	40.0		170.2					
	36.4		158.0					
	44.4		103.2					
	97.6		122.4					
	49.3		111.7					
	66.0							
<i>AVG S9</i>	49.6	134.1	135.2	123.2	123.0	96.1	35.4	
<i>ST DEV</i>	18.2	24.6	24.1	18.3	51.4	41.3	2.4	
Speaker	unaimed	unknown	unnamed	annoyed	announced	annulled	known	named
<b>S10</b>	17.2	131.0	126.7	108.4	84.9	95.3	45.7	
	27.6	127.3	139.8					
	25.6	123.8	136.6					
	19.6		134.7					
	21.0		122.9					
			129.9					
			111.5					
			142.6					
			164.8					
			152.8					
			135.1					
			132.5					
<i>AVG S10</i>	22.2	127.4	135.8	108.4	84.9	95.3	45.7	
<i>ST DEV</i>	4.3	3.6	13.8					➔

- The purported geminated [nn] in *unnamed* and *unknown* is about four times longer (i.e., ‘super-gemination’) than the [n] of *named*
- the [nn] of *known* (50.1) is almost identical with the [nn] of *unaimed* (51.3).

Alternatively, one might analyze the [n] of *named*, *known*, and *unaimed* to range from 30 to 51.3 milliseconds (a relatively short duration). All other cases are clearly longer, and the gemination ranges from 91.5 to 121.9 milliseconds. The fastest time for the [n] of *named* was 18.6, indicative of a flapped [n]. The fastest

geminated [nn] in *unknown* was 91.9, and the longest 134.1. Similarly, for *unnamed*, the ranges are from 82.3 to 135.8. It was the same speaker who came in at 91.9 and 82.3, but different speakers for the longest times had 134.1 and 135.8 respectively.

### **Spectrographic analysis of *mature/immature***

A final experiment was devised. Ten speakers were shown pictures of adults and children. They were prompted to say *mature* when they

Table 1 continued

Average for all speakers								
Speaker	unaimed	unknown	unnamed	annoyed	announced	annulled	known	named
<b>S1</b>	61.4	114.5	117.6	107.2	94.4	94.5		
<b>S2</b>	65.3	118.4	107.8				45.7	18.6
<b>S3</b>	49.6	145.6	151.0	85.4	81.7	103.3	60.9	37.8
<b>S4</b>	40.7	91.9	82.3	118.1	84.5	84.7	30.2	
<b>S5</b>	40.4	109.0	111.3	112.0	86.2	82.0	83.1	33.8
<b>S6</b>	59.3	135.7	131.6	94.4	75.2	79.1	59.3	
<b>S7</b>	22.2	120.1	123.5	83.4	113.1	99.0	45.1	
<b>S8</b>	45.6	122.2	110.1	85.4	88.4	89.6		
<b>S9</b>	62.5	134.1	135.2	123.3	123.0	96.1	35.4	
<b>S10</b>	65.7	127.4	135.8	108.4	84.9	95.3	45.7	
<i>Average</i>	51.3	121.9	120.6	102.0	92.4	91.5	50.7	30.0

saw the picture of an adult and *immature* when confronted with a picture of a child. The actual directions were as follows:

Thank you for helping us to develop a voice program that we hope will be able to recognize normal speech patterns. When looking at the pictures we show you, if you see a child, please say 'immature.' If you see an adult, please say 'mature.' Please say either 'mature' or 'immature' in the usual way, as you would in any regular conversation.<sup>20</sup>

## Results of the experiment

The results (see Table 2) are clearly indicative of a gemination of 1.82 to 1 ratio of geminated [mm] to nongeminated [m] in *mature*. The overall average for all speakers for *immature* was 73.3; 40.2 was the overall average for *mature*. The shortest [mm] duration in *immature* was 30 milliseconds;<sup>21</sup> the longest was 149. The shortest [m] in *mature* was 23 milliseconds, while the longest was 70. Thus, the well-known fact of degemination in *immature* (and presumably *innocuous* as well) is in need of revision, since my data support gemination from a narrow phonetic point of view (*contra* Harris 1994:20). Although some speakers are degeminators, the average (defined as one who tabulates with the average measurement in milliseconds given here) is not.

Thus, from a narrow phonetic perspective,

English does have CG. Most speakers are geminators, but, clearly enough, there are degeminators among us. ■

## Notes

**1** I wish to express my gratitude to Peter Ladefoged, John McWhorter, and Paul Newman for their comments on a preliminary version of this essay. The usual disclaimers apply.

**2** Maddieson (1985:212) affirms that all languages for which data are available, with the exception of Japanese, have a shorter vowel in a syllable closed by a geminated consonant. This leads one to conclude that a shorter vowel is one of the ways native speakers have of detecting a contrast between geminated and nongeminated consonants. Maddieson (1985:214) further notes that Delattre (1968) maintains that 'in distinguishing a geminate from a single consonant, the duration of the preceding vowel is a negligible factor' in English, French, Spanish, and German. However, these four languages, according to Maddieson, 'are not languages that have geminates of the sort found in the languages surveyed above' (*ibid.*).

**3** One may disregard any difference implied in the vocalic renditions of the [eɪ] vs. [e].

**4** The word *bookcase* is discussed by Connor (1974:64), who quotes extensively from Thomas (1958:156–61): '... the period of compression has been lengthened, and the final explosion delayed, till the resulting long consonant has taken as much time as two separate consonants.' The gemination in *bookcase* is mentioned by Kenyon (1977:50–1) paralleling: *hoppole*, *coattail*, *grabbag*, *headdress*,

**Table 2: Immature average**

	immature	mature	immature	mature	immature	mature	immature	mature	immature	mature	immature	mature		
<b>S1</b>	74	70	<b>S3</b>	57	28	<b>S5</b>	58	36	<b>S7</b>	67	46	<b>S9</b>	50	29
	70			73			57	37		66	42		45	23
	76			63			59			87			59	
	79			70			59			71			59	
	64			62			85			78			74	
	74			67			56			90			78	
	90			46			56			99			69	
	149			84			23			96			60	
	74			82			74			98			64	
	79			62			70			82			77	
	96			68			63			62			83	
	84			64			84			88			75	
	82			65			52			76			67	
	79			63			42			62			bad	
	85			77			55			84			sound	
	70			75			68			88			quality	
	78			63			74			86			for rest	
	83 mat avg			66 mat avg			58 mat avg			88 mat avg			of session mat avg	
	120	70		bad	28		61	36.5		71	44			26
	95			bad			30			77				
	85.05 average			67.0 average			59.2 average			80.8 average			66.1 average	
<b>S2</b>	95	54	<b>S4</b>	80	45	<b>S6</b>	80	33	<b>S8</b>	39	34	<b>S10</b>	72	29
	69			78	44		58	42		70	31		85	29
	90			80			74			82			92	
	85			83			76			65			78	
	83			77			61			71			68	
	74			92			47			68			78	
	76			60			64			68			87	
	71			70			66			65			77	
	80			68			61			79			87	
	80			72			59			78			89	
	80			92			83			68			73	
	82			80			100			66			67	
	78			78			70			66			80	
	91			83			80			72			75	
	80			73			98			78			73	
	82			74			65			63			85	
	79			70			32			89			90	
	84 mat avg			77 mat avg			35 mat avg			85 mat avg			missed mat avg	
	76	54		73	44.5		59	37.5		73	32.5		missed	29
	71			missed			missed			77			missed	
	80.3 average			76.8 average			66.7 average			71.1 average			79.7 average	
	Total overall <i>immature</i> average				73.3									
	Total overall <i>mature</i> average				40.2									
	Overall ratio <i>immature/mature</i>				1.82									

*big game, half full, home-made, penknife, Dutch cheese, George Jones, etc.*

**5** This would be similar to the unnatural \*[bukkiʃ] with geminated [k] for *bookish*, which no native English speaker, I believe, would accept.

**6** Mohanan (1986:18) specifically mentions *innavigable* and *innumerable*, which he says parallels *inedible* and *ineffective*. However, he then asserts that degemination does not apply to *unknown, unnatural, suddenness, fineness, soulless, and guileless*. He offers no explanation why the first two of the aforementioned words should work differently from the others.

**7** He considers *book case* two words. *The American Heritage Dictionary* (2000:211) only records them as a single word with a geminated [kk] in pronunciation (as *bookkeeping*).

**8** Harris (1994:20) notes degemination in words such as *innocuous* and *immature*, and further stipulates that when English borrows words from other languages with geminates, they invariably come out in English with corresponding nongeminates (e.g., *spaghetti* from Italian).

**9** This explains why, when *give me* assimilates to *gimme*, it comes out as a degeminated [gʲimi]. Kenyon (1977:79) transcribes this as *gɪm(m)ɪ* paralleling *ai don-no* 'I don't know'. In rapid, informal speech, the degemination of [nn] is, I would think, noteworthy. Although these two aforementioned phrases may contain geminated consonants for reasons of emphasis or pragmatic purposeful gemination, they almost certainly would degeminate in rapid, informal speech. Cf. also the degemination present in *for God's sake* → *for God sake, for Christ's sake* → *for Christ sake* → for ['kraɪseɪk] = *Chrisake*, and similar such cases. In the latter instance, the final *t* and the *s* before it also can be lost, in which case we note "multiple degemination."

**10** Magnetic resonance imaging (MRI) has been used for the first time by Narayanan *et al.* (2004) to examine fluent speech in real-time, making it possible to evaluate segmental duration quantitatively. The authors have made available the real-time MRI movie for gemination across word boundaries in [l] in 'say peal leap again' and [n] in 'say bean knee again' at <[sail.usc.edu/production/rtmri/jasa2004](http://sail.usc.edu/production/rtmri/jasa2004)>. The real-speed MRI evaluates speech at 20–24 images per second. My thanks to Peter Ladefoged for bringing this article to my attention.

**11** In my own mesolectic speech, I believe I geminate the [nn] in *leanness, meanness, greenness, fineness* (contrasting with a single [n] in *freeness, dryness, blueness, redness, moistness, etc.*). Consider the following: *the leanness of the meat, the meanness of the man, the greenness of the lawn, and the fineness of the linen*. Giegerich (1992:191) affirms that there is a geminated [nn] in *openness*, which is absent in my speech, and also that geminate consonants cannot occur next to each other in the same syllable (1992:322). The author specifically

notes degemination, however, elsewhere in his tome (1992:288): '... sequences of identical ("geminate") consonants at word and morpheme boundaries are usually simplified in connected speech: *keenness* /kɪnnəs/ [kɪnəs], *bus-stop* /bʌsstɒp/ [bʌstɒp], *weight-training* /weɪttrɛnɪŋ/ [weɪtrɛnɪŋ], *call Linda* /kɔːllɪndə/ [kɔːlɪndə/].'

**12** I have changed the phonetic transcription given to normal orthographic symbols for simplicity's sake. I am unaware of any native speaker of English producing *distinctive* geminates in words such as *innate* or *immaterial*.

**13** These (in order of presentation) are spelled as follows: *I do, I'd do; I owe none, I own none; I'm Ike, I'm Mike; top up, top pup; with a man, with the man; an aimed, unaimed* (perhaps the last example should read *unaimed, unnamed*). It is, however, beyond the scope of the present essay to verify this claim.

**14** John McWhorter and Paul Newman both inform me (p.c.) that the [gɔʃ] pronunciation reflects their speech.

**15** Degemination and the loss of gemination are two fairly common processes in languages of the world with gemination. Modern Israeli Hebrew lost most of the gemination of Biblical Hebrew. Geminates survive across morpheme boundaries only. In some cases, forms like *šavatti* 'I was on strike' have variants with epenthetic vowels – *šavateti*. See Bolozky (1997:293) for details. Another Semitic language which lost CG is Chaha, an Ethio-Semitic language of the Gurage cluster (see Hudson 1995:786).

**16** The term *un-gemination* must be different from *degemination* because, presumably, there would be no need to use both to mean the same thing.

**17** It is possible to indicate geminated consonants (and long vowels) with a colon instead of writing the consonant (or vowel) twice.

**18** Hughes & Trudgill (1979:51) report (and this seems accurate to me) that in Pontypridd, South Wales, consonants may be geminated between vowels when the first vowel is stressed, citing *city* ['stɪtɪ:]. Of course, this sounds quite strange to speakers of American English who pronounce this as ['sɪri].

**19** The informants were native speakers of American English who were not linguists, thus ensuring that their answers would not be biased. They were told the object of the experiment was for marketing purposes, so that their oral data would be judged as authentic, natural speech.

**20** The goal of this experiment, as with the others, was to obtain the most natural speech possible. There were 20 pictures of children and only five of adults, thus netting many more pronunciations of *immature*.

**21** The time of 30 milliseconds would be indicative of a degeminating speaker.

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