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A Case Report of Pathological Rule-Governed Syllable Intrusion

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A detailed analysis of a unique speech disturbance, marked by the frequent appearance in the speech stream of a meaningless intrusive syllable, is presented. Following a lengthy thoracic surgery, an American English speaking patient began to speak with non-English prosodic patterns, which evolved to a conspicuous intrusion in his speech of the syllable /sis/. This syllable and its variants were attached to words in a manner which conformed to the regular phonological rules in English (for formation of plural, possessive, and third person singular morphemes). The distribution and frequency of the intrusive syllable are described, and possible explanations for the abnormal occurrence of this particular syllable are discussed.

On January 28, 1969, MM, a 61-year-old, right-handed white male presented with a wide-based, lurching gait. He had felt chest pains for about 3 months, and had experienced progressive weakness of the left leg for 10 days. Two days prior to the medical examination, the weakness had extended to the right leg. Speech expression and comprehension were intact. Neurological testing suggested a rapidly progressive

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compression of the spinal cord, probably from an extradural tumor. The same day, following myelography, the patient was operated on. A thoracic laminectomy at bilateral T3–T8 for decompression was performed, with relief of pain and recovery of function in the legs; biopsies showed a chondrosarcoma.

On May 6, 1969, an attempt was made to ablate the tumor. The procedure was lengthy and involved both chest and spinal approaches. A speech disturbance was observed immediately following the operation. MM was reported to "sound like a foreigner," perhaps like an "oriental," because of his non-English prosodic patterns. Melodic contor while singing was unaffected. By December 2, 1969, the dysprosody was much improved but still present, most notably when MM was fatigued. Over the ensuing year, the dysprosody gradually improved until it occurred only infrequently. As the prosody improved, however, there appeared in MM's speech an inappropriate syllabic intrusion. When the speech data for our analysis were collected in 1972, syllable intrusion was the predominant abnormality, with only an occasional occurrence of dysprosody. This condition stabilized and remained essentially unchanged until his death in 1973.

MM's speech deficit was unique and interesting to linguists and clinicians alike. One of the authors (JEB) observed MM's speech over a period of 2 years at his regular neurological examinations. Another (DVL) interviewed MM on several occasions and recorded speech samples of different types (counting, reading, reciting, and spontaneous speech). The other (GJC) listened to these recorded sessions and found this speech disturbance unique in his experience as a speech pathologist. Together these authors have analyzed MM's speech in detail and tried to give an overview of the pattern. This analysis was based on a recorded corpus of 2500 words, all collected at one interview session, on July 26, 1972.

The patient's speech was free of anomia, paraphasia, or press of speech. His verbal comprehension was good. Intellect was without apparent impairment, and affect was almost invariably appropriate. In 1972, when speech samples were recorded, occasional dysprosodic utterances involving word-stress and pitch contour were observed. Minor articulatory and grammatical deficits, described below, also occurred. But what made MM's speech remarkable was a conspicuous intrusive use of a syllable /sis/ and its variants. These intrusions occurred frequently, varying somewhat with speech mode.

The striking feature about the intrusive syllable was that it conformed to regular phonological processes in English. That is to say, the phonetic realization of the syllable matched the phonetic features of the sounds around it. For example, when /sis/ occurred after the word *girl*, the result was "girlzis"; in contrast, when /sis/ occurred after *want*, the pronounced form was "wantsis." The intrusive syllable /sis/ operated much like the plural morpheme, the possessive morpheme, and the third person marker

on verbs in English, which agree in voicing with the stem to which they are suffixed. From the point of view of a speech performance model, such as the one proposed by Fromkin (1971), our observations suggest that the insertion of the entity /sis/ occurred at a point where these other morphophonemic processes were represented. For example, MM often added an [ɨs] to a syllable ending in an affricate or another fricative, so that he produced "marriagis," "Jewishis," "muchis," and "successis" for *marriage, Jewish, much,* and *success.* This parallels the pattern for the plural and possessive morphemes.

The full syllable occurred 273 times (in the 2500-word corpus) in one of its three phonetic forms—[zɨs], [sɨs], or [ɨs]. In addition, the intrusive syllable appeared 28 times as a single [s] or [z] (conditioned by phonetic context): *natural* → "naturalz," *Bakersfield* → "Bakersfieldz," and *death* → "deaths." The corpus yielded a total of 301 occurrences of the 5 variants: [ɨs], [zɨs], [sɨs], [s], or [z]. Thus about one word in nine of MM's word output, or 12%, was flawed in this way.

DISTRIBUTION

We analyzed the 2500-word corpus and found that the intrusive syllable occurred on virtually all parts of speech. The only exempted grammatical categories were articles and conjunctions, although the relative conjunction *that* was affected: "I think thatsis maybe we get enough on the tapesis to do some goodzis." Nouns were the grammatical category most often involved. Of a total count of 420 nouns, 111 (26%) were said with the intrusive syllable (*sweet* → "sweetsis," *shepherd* → "shepherdzis," *liberty* → "libertyzis," *star* → "starzis," *machines* → machinezis"). Proper as well as common nouns were affected: *Phoenix* → "Phoenixis," *Bakersfield* → "Bakersfieldzis" (a doublet to the form "Bakersfieldz"). Thirty pronouns (7%) were involved: *it* → "itsis," *me* → "mezis," *you* → "youzis." Of 460 verbs and verbal auxiliaries in the corpus, 60 (13%) were said with the aberrant intrusion: *notice* → "noticeis," *read* → "readzis," *want* → "wantsis," *leadeth* → "leadethsis," *know* → "knowzis," *stands* → "standzis," *said* → "saidzis," *talk* → "talksis." Some examples of the 31 affected adverbs (13%) are *right* → "rightsis," *so* → "sozis," *slow* → "slowzis"; examples of the 23 involved adjectives (11%) are *Jewish* → "Jewishis," *good* → "goodzis," *chief* → "chiefsis," and *normal* → "normalzis." Of 200 prepositions counted in the sample, 9 instances (4%) appeared with the intrusive syllable: e.g., *to* → "tozis," *in* → "inzis," *on* → "onzis," *before* → "beforezis," *beside* → "besidezis."

The intrusion occurred on pause fillers (*you know* → "you knowzis," *well* → "wellzis," *and stuff* → "and stuffsis"), as well as on stereotyped or overlearned phrases, such as *all right* → "all rightsis," *I guess* → "I guessis," *that's the only way to go* → "that's the only way to gozis." The syllable (or its reduction to [s]) occurred nearly always at the end

of a word, often at the end of a phrasal unit. It did occur in our sample within a word: *concentrate* → "concenzistratesis," *biopsies* → "biopsissieszis," and within nominal phrases; *Officer Candidate School* → "Officer Candidatesis School," and *OCS* pronounced "Ow-Ceezis-Es." It appeared most often with falling intonation contour, but could occur also on rising intonation contours as in the question *Don't you agree?* → "Don't you agreezis?" Overall, the intrusive syllable occurred twice as often at the ends of grammatical phrases and clauses as it occurred within any such unit. It was most often added at the ends of utterances, as the sentence intonation declined. Selected portions of the transcribed interview are provided in an Appendix.

The original deficit had involved an abnormal placement of syllabic stress and pitch contour, such that, for example, the reduced vowels of unstressed final syllables were given main word stress (MM greeted JEB as "Dr. Bogén"). The 1972 speech sample contained a few such occasional errors: *different* as "differént," *enemies* → "enemiés," and *bedroom* → "bedroóm," all with a rise/fall pitch contour on the last syllable. On these examples, the intrusion did not occur. In one passage, the word *experience* appeared twice: first with final (misplaced) stress and rising/falling pitch (but no extra syllable), and a second time, a few moments later, as "experiencesis" with normal syllabic stress. Only one word was observed to have *both* misplaced stress *and* the intrusive syllable: *production* → "productiónzis."

Variation in frequency. The primary symptom, the intrusive syllable, occurred more frequently in some kinds of speech situations than in others. MM expended a great deal of effort trying (unsuccessfully) to suppress the intrusion on some occasions; at other times, it receded effortlessly. The intrusive syllable occurred more frequently during reading, counting, and reciting (Appendix, Nos. 1–6), while it decreased during free speech. During recounting of personal history, the extra syllable occurred only occasionally, on nouns, and at the overall most commonly involved locus, the end of an utterance (see Appendix, No. 12). It completely disappeared during singing. (Dissociations of singing and speech are not unusual in pathologies of speech and language. It is a common observation in stuttering. Moreover, a similar dissociation was found to correlate with hemispheric specialization (Bogen & Gordon, 1971; Gordon & Bogen, 1974). In MM's communicative speech behavior, the intrusion was more prevalent during formal than informal styles. This distribution of the intrusive syllable is parallel with what has been found in some cases of neurogenic stuttering (Canter, 1971).

Moreover, MM's pattern finds a parallel in normal speech. Sociolinguistic studies have shown that certain specific phonological features vary in frequency in normal usage along a range from formal to casual speech modes (Labov, 1970). It is interesting to note that MM claimed to "do

better" when concentrating. This was not borne out by our observations, however. Rather than decreasing, MM's problem tended to increase when he made specific efforts to monitor his speech.

Other speech abnormalities. In addition to the intrusive syllable, other speech changes, less striking and less consistent, deserve mention. Certain initial sounds were often associated with stuttering-like repetitions, most notably *th, d, pl,* and *pr.* MM sometimes added /k/ to words ending in /ŋ/, pronouncing *thing* → "think," *young* → "younk," *interesting* → "interestinksis," (with the voicing of /sis/ conforming to the aberrant pronunciation). MM occasionally pronounced *business* as "beesnis." Another word which posed a special problem to him was *yes,* said as [yazis], or with the vowel lengthened and fronted to [yae:z], often [yae:zis]. MM expressed awareness of these changes in his speech but was typically unable to correct them (see Appendix, No. 10 and *passim.*)

Certain abnormalities related to morphological rules of grammar were consistently observed in MM's speech. Portions of the auxiliary system within the verb phrase were deleted. The copula (*to be*) was often inappropriately omitted: *I was thirteen* → "I thirteen"; the perfect *has* was occasionally deleted: *everything has been wonderful* → "everything been wonderful." The past tense marker was often missing for "strong" (irregular) verbs: *I met a guy in Chicago* → "I meet a guy in Chicago"; *I went to travel* → "I go to travel," *broke up* → "break up," and *I got out of the army* → "I get out of the army." However, the past tense marker of "weak" (regular) verbs in this sample was invariably intact (*asked, lived, moved, worked,* and *served*). Another grammatical feature in MM's speech worth noting is the use of the double negative (see example in Appendix, No. 13). Nielsen and McKeown (1961) described this same change in their case report of a dysprosodic patient.

MM and his wife both assured us that these speech aberrations emerged suddenly and were never present before (see Appendix No. 11). This report is entirely consistent with the patient's history. MM was born and raised in the Midwest, of English ancestory and Baptist upbringing. He was a college graduate. He had traveled extensively and became a successful executive of upper middle-class status, retiring before the age of 60. MM's premorbid speech dialect was general American, and we cannot attribute any of the phonological or morphological features highlighted in this paper to substandard or idiolectal usage.

DISCUSSION

There have been scattered reports of patients sounding like foreigners (Ustvedt, 1937; DeReuck & O'Conner, 1964; Whitaker, 1975; Pick, 1919; Monrad-Krohn, 1947a,b; Nielsen & McKeown, 1961; Whitty, 1964). Because it is difficult to know the exact nature of the speech abnormality from the clinical descriptions, we cannot determine how similar to any of these was the dysprosodic element of MM's speech.

An overview of 25 cases of "pseudoforeign dialect" recorded at the Mayo Clinic and at other centers is given by Aronson (1980). In most of these, Broca's area was implicated. One report (Cole, 1971) attributed the deficit to a brain-stem lesion. Recently, right-hemisphere damage has been associated with "dysprosody" of speech (Ross, 1981; Kent & Rosenbek, 1982). Clearly, the anatomic correlates of dysprosodic elements of speech following brain damage remain to be discovered.

With regard to MM's primary deficit, the intrusion of a phonological syllable, to our knowledge only one case has been reported in the literature.

> . . . a simple consonant sound like, for example, the sibilant "s" . . . emitted without difficulty, finds its way into the speech in an inappropriate fashion. A curious mannerism then arises, the letter "s" being tacked on to the end of nouns in an unnecessary and unexpected fashion, almost as though endowing them with plurality. In this way the patient might say "Good-mornings doctors, I am better todays thankyous." (Critchley, 1970, p. 221)

Critchley (1970) provided no neurological explanation for the speech behavior of his patient, nor has he encountered any comparable speech disturbance since that reported case (personal communication, 1982). In the case of MM, no anatomical abnormality conceivably related to the problem was found. EEGs were normal. Moreover, later postmortem examination of the brain—done with particular care in view of the unusual symptomatology—disclosed no cerebral abnormality.

The present case recalls in some ways Gilles de la Tourette's syndrome with its characteristic verbal tics (Shapiro et al., 1978). In Tourette's syndrome, the verbal tics are usually coprolalic, they cooccur with nonverbal motoric tics, and they are inserted into running speech as separate units or occur alone. However, unintentional utterances of nonsense syllables are also sometimes observed in Tourette's patients. MM's disturbance might also be said to bear certain features in common with palilalia in that both involve extraneous word- and phrase-final material. But MM's case also differs notably from both these disorders. MM is the only case known to us where an aberrant phonological syllable is consistently affixed to words and phrases throughout his speech performance in a rule-governed manner.

In an attempt to explain why this particular syllable was the intrusive one, it is interesting to look to facts about English grammar. The morphophoneme /s/ has three grammatical uses in English: as a plural and possessive inflectional marker on nouns and as a third-person marker on verbs. It also occurs in the contraction of a subject noun and following *is* or *has: e.g., the girl's leaving, Jack's been asking.* Here the voicing agreement also applies. The rules that generate the appropriate forms of these morphemes are highly productive; these suffixes occur with extremely high frequency in ordinary language. In view of the protean nature of this phonetic shape, and its high frequency in normal speech, one might

speculate that a mere slight degradation of a neurological structure subserving a particular stage of its generation during speech performance might result in a disinhibition, yielding an overabundance. In MM's case, it was the longer phonetic form [sɨs] (or [zɨs]) that usually occurred throughout his speech, generated according to phonological rules in English, but without meaning. It is possible that this longer form emerged from the earlier dysprosody, which involved extra stress placed on a normally unstressed syllable. In other words, perhaps this extra energy "pulse" was transformed into a phonetic syllable, attaching the most common of the inflectional affixes, which then became subjected to the regular phonological rules already in the grammar. An alternative possibility is that the intrusive syllable was generated from a disordered representation of one or more of the English morphophonemes, with an application of phonological rules but with an "unhooking" of the usual sound–meaning relationship. There is little doubt that MM's case involves a rule-governed usage of a phonological syllable which is applied aberrantly. What remains unsettled is whether this syllable involves a bizarre surface production or whether it arises from an underlying morpheme.

We present this unusual case in some detail, even though a definitive explanation of the speech disturbance is not apparent. Our hope is that thorough linguistic analysis of such enigmatic disorders will delineate more precisely the range and nature of the underlying linguistic structures.

APPENDIX

Transcriptions of portions of MM's speech are given in standard English spelling. Where mispronunciations occur, a regular English grapheme is used to indicate the error. Comments to the reader are given in parentheses.

1. *Counting:* fourzis, sixsis, sevenzis, eightsis, ninezis, ten. Elevenz, twelvezis, thirteenz, fourteenz, fifteenz.
2. *Recitation:* Violetsis are bluezis. Rosezis are redzis and sugarzis is sweetsiz and sozis are youzis.
   Query from DVL: Do you know any poems you could recite for me?
3. *Answer from MM:* I knowzis some but I could not tell them to youzis!
   DVL: Well go ahead; I won't listen.
   MM: No it be on the tapesis! (laughter).
   DVL: How about reading something.
4. *MM:* I readzis from the Biblez. No; anythink you wantsis, we dozis. Okay, the Psalmzis twenty-threezis. Nope. Psalmzis of David.
5. *Reading:* The Lord is my shephardzis. I shall not wantsis. He maketh me to lie down in green pasturezis. He leadeth me (vocal tension) besidezis the still waterzis. He restorezis my soulzis.

He leadesez me in the paths of righteousnessis for his namezis sakesiz. Yeazis, though I walk through the valley of the shadowzis of deaths, I will fear no evilz.

6. *Recitation:* . . . and to the Republic for which it standzis. One nation individualzis for (sic) libertyzis and justicesis for allzis.
7. *Free speech:* Yazis (yes). But I think that I get . . . I think I dozis better (stress) when I concenzistratesis onzis it. See now I . . . it . . . I concentratedzis on that and I said to myself, I am not gonna dozis that and on *that* I says *that*. Well I didn't put no es's on *that*.
8. (later) But not toozis muchs successis. Allrightsis. So just talksis naturalz. And . . . and forgetsis about trying to dozis rightsis. Yazis (yes). The easiest thing for me is (stress) to watch a pretty girlzis! I notice that, and I think that is (stress) the chiefsis, chiefsis pr (block) problemz, is, essizis (s's). Do you not think sozis? I knowzis that I, some wordzis I can not get out so goodzis . . . and I notice that I say 'yas' instead of (tries to say yes).
11. *DVL:* Is your speech different now?
    MM: Well it is completely differént 'cause my speech wazis normalzis.
    DVL: Would you say you talked fast or slow?
    MM: I would say slowzis. . . . I was a sales managerzis and ownerz of a furniture storezis . . . In Bakersfieldzis and also here.
12. *MM:* (near end of this interview) She was with them for I think about two or three yearzis. But she has not worked for quite a few yearzis . . . Course I've been sicksis now for four yearzis. So naturally she could nots worksis. And fortunatelyzis, I get a little small veteran's compensation, and a . . . with social security, that sort of think and some investments I have, we get along beautiful. We have never had no financial problems at all. No. Never had that and we've had some terrible ones with this illness of mine that's cost . . . oh we figured it up a few months ago and it's cost us over fifteen thousand dollarzis. No . . . insurance covered a little of it . . .

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