

Disconnected Phonology: A Linguistic Analysis of Phonemic Jargon Aphasia

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This paper reports on indications of the nature of the neurolinguistic connection between phonological and lexical components of language, based on a case of phonemic jargon aphasia. Following bihemispheric embolic infarcts, the subject presented with severe fluent aphasia, characterized by fluent strings of phonemes, with virtually no intelligible utterances. Despite nearly total jargonized output, the fundamental phonological processes of speech were largely intact. Specifically she demonstrated: (1) English phonotactics and English stress-timed rhythmic principles, (2) aspirated stops word-initially and glottalized stops word-finally, (3) utterance-final declination of pitch, and (4) stressed syllable vowel lengthening. Additionally, regional-specific (Southern American English) phonological processes, including monophthongization, in-gliding, and front vowel backing, were also preserved. Overall, the investigation reveals an example of an intact phonological rule system operating on a grossly disturbed input (lexical representation). © 1996 Academic Press, Inc.

INTRODUCTION

Jargon utterances are commonly produced by fluent aphasics and subtypes of aphasic jargon have been delineated. Alajouanine (1956) differentiated three types of aphasic jargon, based on comparative preservation of linguistic organization. *Paraphasic jargon* was characterized by fluent and grammatically intact output contaminated by semantic paraphasic errors. *Asemantic jargon* consisted of generally intelligible speech with preserved syntax con-

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taminated by neologisms. Finally, *undifferentiated jargon* consisted of unintelligible and totally meaningless phonemic sequences, with a tendency for stereotypy and perseveration. Perecman and Brown (1985) adapted Alajouanine's classification according to the presumed level of linguistic processing from which a particular type of jargon is derived. Accordingly, Alajouanine's paraphasic jargon, characterized by semantic paraphasias was referred to as *semantic jargon*. The presence of neologisms denoted *neologistic jargon*. And *phonemic jargon* referred to meaningless strings of utterances, presumably originating at the phonological level.

Numerous reports of patients with neologistic and semantic jargon are available in the literature, with regard to anatomical findings (Buckingham & Kertesz, 1974; Kertesz, 1981; Kertesz & Benson, 1970; Lhermitte, Lecours, Ducarne, & Escourolla, 1973), neurolinguistic analysis (Lecours & Rouillon, 1976), psycholinguistic analysis (Buckingham, 1987; Buckingham, Avakian-Whitaker, & Whitaker, 1978; Butterworth, 1979; O'Connell, 1981; Semenza, Cipolotti, & Denes, 1992), anosognosia (Lebrun, 1987; Weinstein & Lysterly, 1976), and language therapy (Kotten, 1982). However, relatively few empirical analyses of phonemic jargon are available, apparently due to the comparatively infrequent nature of such jargon in Wernicke's aphasia (Perecman & Brown, 1981; Cappa, Miozzo, & Frugoni, 1994).

In the case of K.S., a patient with phonemic jargon aphasia, secondary to bilateral temporoparietal infarcts, Perecman and Brown (1981) described the relative frequency distribution of phonemes. They found a markedly greater frequency of /m/ and /b/ than normal and relatively higher proportions of the phonemes /r/ and /s/. Anderson's (1981) examination of the syntactic boundary cues of K.S. revealed normal final vowel lengthening during spontaneous speech. Cappa et al. (1994, p. 85) reported a patient with phonemic jargon aphasia, which they called "glossolalic jargon" whose "prosodic quality was appropriate." Moreover, these investigators added that there were some instances of phonemes present not found in the native language of the patient (Italian) and also some violations of phonotactic rules "giving the listener the impression of a foreign language speaker ('Spanish')."

The anatomical correlates of neologistic jargon in Wernicke's aphasia were elaborated by Kertesz and Benson (1970) and Kertesz (1981). In a series of 10 patients with neologistic jargon, Kertesz and Benson (1970) consistently found involvement of the dominant posterior superior temporal gyrus (T1) and arcuate fasciculus. In an additional series of 10 cases, Kertesz (1981) confirmed that neologistic jargon is most consistently manifested following lesions of the left posterior superior temporal gyrus and the supramarginal gyrus. With regard to phonemic jargon, the bilateral temporoparietal involvement of the case described by Perecman and Brown (1981) represents the earliest lesion data previously available on this form of severe jargon. More recently, Cappa et al. (1994) reported a case of phonemic jargon aphasia (glossolalic jargon) resulting from bilateral temporoparietal lesions.

In this paper, we report on a patient (J.L.) with dense phonemic jargon aphasia, who underwent extensive neurolinguistic analysis including phoneme frequency, prosodic features, utterance-final vowel lengthening, and regional-specific (Southern American English) phonological processes. It is not uncommon to see intact phonology in patients with impaired speech, but the point of this paper is to demonstrate the intact nature of the patient's phonological organization in the face of virtually complete dissolution of lexical organization. Our findings suggest that J.L. retained basic phonological processes despite the absence of recognizable English lexical items.

METHOD

Subject. The subject was a 55-year-old right-handed female who was a monolingual native English speaker. Following sudden onset of dense fluent aphasia, a CT revealed bilateral infarcts, involving the left temporal, frontal, and parietal regions, as well as the right temporal lobe and posterior frontal area, in the region of the insula (Fig. 1). Following medical stabilization, she was transferred to Baylor Institute for Rehabilitation for intensive inpatient rehabilitation. Upon admission, she underwent standard language assessment, including the Western Aphasia Battery (WAB) (Kertesz, 1982) and the Boston Naming Test (BNT) (Kaplan, Goodglass, & Weintraub, 1983), as well as the Comprehensive Apraxia Examination (Hanlon & Brown, 1994). Language assessment included extensive audio and video recordings.

Speech was characterized by nearly total jargon, consisting of fluent strings of phonemes and intermittent neologisms, with virtually no intelligible utterances (WAB Spontaneous Speech = 9/20). Narrative speech was characterized by normal rate and prosody, but was intermittently hypophonic. Not all of her speech was of the same quality. The utterances were variable in length, some being no more than a single syllable or two, but others having more than 20 syllables. We chose in our analysis to focus on longer stretches of speech estimating that information about intonation would be easier to extract from these richer structures. Although she demonstrated occasional perseverative phenomena, as well as normal coarticulation, her speech was nevertheless analyzable into discrete phonetic segments. As a rough measure of perseveration, we used the criterion of reduplicated syllable-initial consonants in successive syllables. Using this approach, she produced approximately ten percent reduplicated syllable sequences.

Auditory comprehension was grossly defective, characterized by inability to accurately respond to one-step commands or yes/no questions regarding personal information (WAB Auditory Verbal Comprehension = 16/200). Repetition was markedly defective and completely jargonized (WAB Repetition = 0/100). Naming was comparably defective, invariably characterized by phonemic jargon (BNT = 0/60). Oral reading and reading comprehension were totally nonfunctional and letter-naming was also defective, with no accurate responses. Written expression, including copying, writing to dictation and to command, was grossly defective, consisting of graphemic jargon similar to random letter generation. She demonstrated severe ideomotor and ideational apraxia, as assessed to command, on imitation, and when attempting to demonstrate object use. However, she demonstrated no evidence of oral apraxia or apraxia of speech. She also manifested features of Klüver-Bucy syndrome, specifically hyperorality, and commonly mouthed and licked objects small enough to be taken to the mouth.

Although her speech was extremely jargonized, it was unmistakable that she spoke Southern American English. She had the quintessential properties of this variety of American English: monophthongization of [ai] to [a], vowel breaking of [ɛ] to [ɛ^ɔ], and the lowering and backing of [ei], cf. Bailey (1985). Pragmatics, including eye contact and conversational turn-taking, seemed appropriate. She also presented with anosognosia and appeared to have no awareness

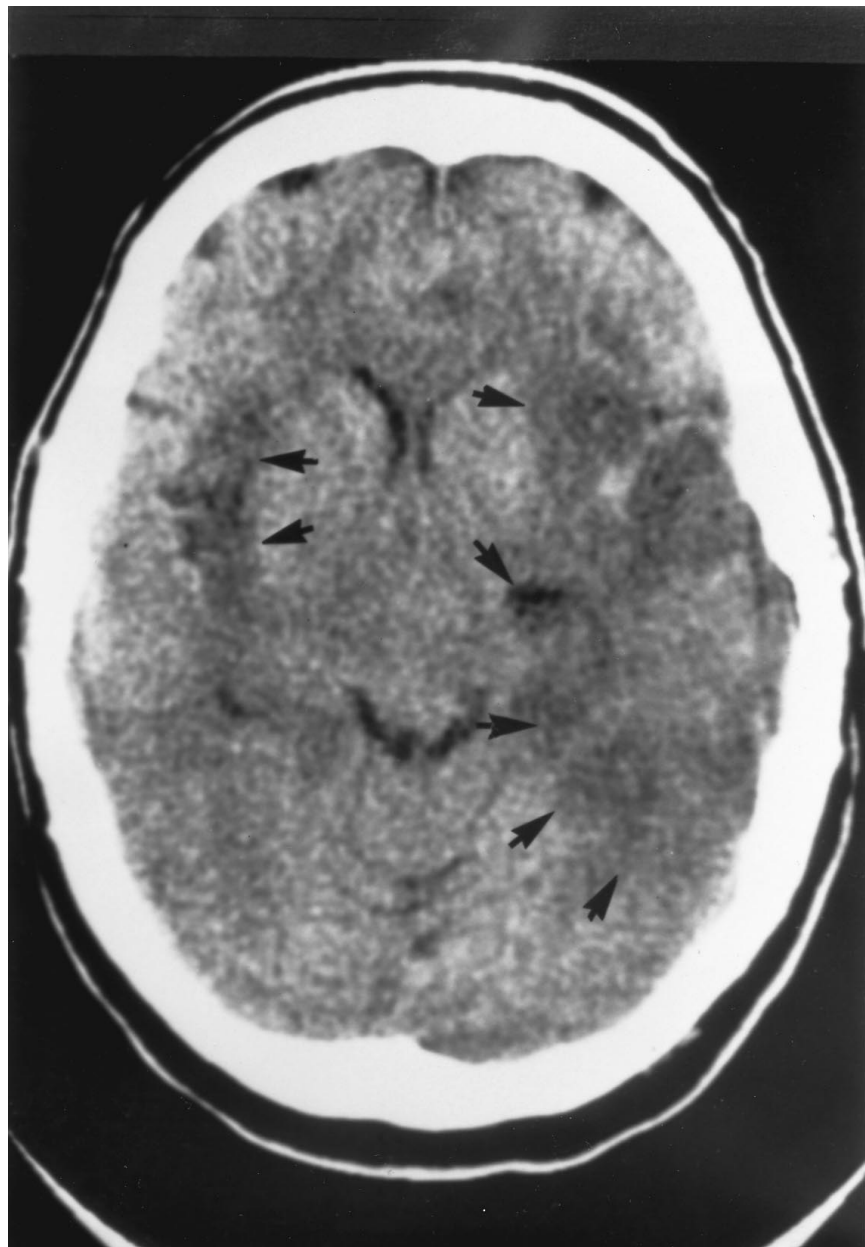


FIGURE 1

that her speech was incomprehensible. In fact, she accepted jargon produced by the examiner and readily engaged in jargon conversation.

Procedure. The data for the following computer-assisted, instrumental study of the subject's jargonized utterances were taken from the tape recordings made during the language assessment procedures described above. A Sony TCM-5000 Professional Cassette Tape Recorder provided input to a Speech Box (A-D converter) connected to the parallel interface of a DOS computer running the CECIL Speech Analysis Software (JAARS International, Waxhaw, NC). For the purposes of analysis and preservation, a transcription of several assessment sessions was also undertaken. The transcriptional system chosen was the 1990 version of the International Phonetic Alphabet, according to the conventions of transcription illustrated in Bailey (1985). A portion of the transcription protocols is provided in Appendix I.

As the subject's utterances were both rapid and copious and few strings corresponded to real English words, an interpretation of the raw acoustic signal was often necessary to arrive at a transcribed form. Instrumental help was called on to assist in making some of these judgments. For instance, voicing bars seen in the raw wave forms displayed by CECIL were used to establish the presence of voiced consonants. Also, intensity profiles were employed as measures of stress to determine the orthotones (the one full-stress per phonological word phenomenon) in her speech. Voicelessness between vowels helped us to decide the presence of a two-syllable sequence; pauses, on the other hand (complete lack of sound), were used to fix word boundaries. The auditory impressions and instrumental appearance of the waveforms for (1) syllable-initial aspiration of stops, (2) syllable-final glottalization of stops, and (3) Southern American English monophthongization and other regional phonology, were characteristic of her output. We chose not to carry out further quantitative investigation of these features of the patient's speech.

Once the segmental aspects of the utterances were determined, a syllable-by-syllable analysis of recorded utterances was completed to divide segmental strings into phonological words. Also, measurements of suprasegmental features, including pitch and intensity as well as vowel duration, were taken.

The first task was to determine frequency of occurrence of the subject's phonemes and to compare it with the values for American English found in Roberts (1965). The procedure employed was to count the number of tokens of a particular phoneme (segment), for example, /n/, in the transcribed section (see Appendix I). The counting of the frequency data required interpreting the phonetic manifestation of a sound in some cases into its corresponding phonological form (e.g., [i] was interpreted to represent /ə/ for the purposes of this tabulation). This procedure was repeated for each phoneme that occurred in J.L.'s phonemic inventory, for example, for /m ə æ ŋ t/ and so forth, until all phonemes had been counted. The number of tokens of a particular phonological segment in J.L.'s speech was then divided by the total number of segments produced in that utterance to determine the percentage of occurrence. The percentage of occurrence for each phoneme in J.L.'s speech was compared to the percentage of occurrence found by Roberts (1965) and plotted with J.L.'s values on the X axis and the values for normal spoken English on the Y axis. (The system of phonemic notation used by Roberts is that of Trager & Smith (1958), which we have altered in our notation to reflect current IPA usage, e.g., /j/ not /y/. Roberts' also employed the following segmental inventory: Vowels / i u e ə o a æ ɔ/ and consonants /p t k b d g ʃ ʒ f θ v ð s ʒ z ʒ m n ŋ l j h r w/.)

We could easily observe in the patient's speech periodic elevations of the pitch followed by gradual lowering and then a longer pause, cf. Fig. 3. We took these long-term characteristic prosodic profiles as initial indications of the phonological phrase. Ten simple declarative phrases so determined were selected from J.L.'s corpus of utterances for quantitative analysis. These were digitized using the CECIL version 2.0. Hardware and Software Speech Analysis System. CECIL's pitch-extraction algorithms displayed the fundamental frequency as a track across the screen of the CRT. Programmable cursors were placed at the onset of voicing of the first syllable of the utterance and also at the offset of the last syllable. FØ values were taken for these two points as well as for duration and fundamental frequency declinations. The same ten utterances were used to determine the distance between orthotones (stressed

vowel syllables in a phonological word). The digitized utterance (raw wave form) was placed in one window at the top of the CRT and the intensity was displayed in a window below it. It was visually evident that there were a number of intensity prominences followed by reduced peaks at intervals across the utterance. The programmable cursors were used to measure the duration between these high points.

Duration of phrase final stressed vowel length was measured. According to Lindbloom & Rapp (1973), Cooper, LaPointe, and Paccia (1977), and Sorensen and Cooper (1980), for both English and Swedish, normal speakers demonstrate vowel lengthening in their utterances; duration of stressed vowels is longest in phrase final (V_f) position, as compared to the durations at phrase initial (V_i) and phrase medial (V_m) positions. The same ten utterances used to determine J.L.'s fundamental frequency declination values were also used to study phrase final lengthening effects. The vowel duration of the first syllable in each of the ten was measured from the first vowel burst at syllable onset. Similarly, a medial vowel duration was measured at a point approximately halfway through the utterance. And finally, the vowel duration of the last syllable in each utterance was established.

RESULTS

Table 1 and Fig. 2 compare the subject's phoneme frequency with the normative data on phoneme frequency found by Roberts (1965) for spoken American English. Table 1 lists the normative frequency of the American English segments and comparable values for the patient. Roberts (1965) determined that /ə/ occurred most frequently (11.82 percent) followed in turn by /i t j r n e a w s l d h m k ð z/ ranging from 9.29 to 2.0 percent. The remaining English phonemes occurred much less frequently. The corresponding phoneme frequency of the subject was surprisingly similar to normative data. Only one phoneme /ə/ occurred more than 10 percent of the time. Six segments occurred more than 5 percent of the time. And the remainder occurred less frequently. In other words, the frequency distribution does not demonstrate values that radically differ from the norm.

Figure 2 presents the normative segment frequency in comparison to that of the subject. We found a significant correlation between the normative data and J.L.'s segment frequency $r = +.76, p < .001$). This comparison resulted in a regression line with a slope of .79 and an intercept of .008 with 58% of the variance accounted for by this line.

Table 2 presents F_0 at onset, F_0 at offset, length of utterance, number of vowels, duration of initial vowels, duration of medial vowels, and duration of final vowels. A representative utterance is exhibited in Fig 3. The measurement of ten utterances was used to establish the "top line." By measuring the fundamental frequency at the onset of a polysyllabic utterance, the mean value found was 42.0 ± 1.6 semitones (the relationship between semitones and the more familiar Hertz scale is $f_{ST} = 39.86 \times \log_{10}(f_{HZ}/16.35)$, cf. Ross, Edmondson, & Seibert (1986) for discussion of the hertz vs. semitones scale). As can be seen in Table 2, the onset frequency was rather tightly clustered around the mean with a range of 39.8 semitones in utterance #2 to 44.3 semitones in utterance #7. (The particular utterances used in this task

TABLE 1
Comparison of Phoneme Frequency

Phoneme	J. L.	Normal English speakers
f	0	.0072
ʒ	0	.0003
ŋ	.0053	.0092
ð	.0057	.0225
ɔ	.007	.0064
dz	.0088	.0036
p	.0088	.0161
o	.0088	.0154
θ	.0105	.0042
v	.0105	.0188
h	.0123	.0263
z	.0123	.02
j	.0123	.0677
w	.0158	.0452
b	.0176	.0163
g	.0193	.0087
u	.0228	.0191
d	.0333	.0304
e	.0351	.0474
m	.0422	.0261
f	.0439	.017
k	.0439	.0245
s	.0457	.039
r	.0492	.0658
t	.0509	.0695
l	.0545	.033
æ	.0562	.0154
i	.058	.0929
a	.0615	.0463
n	.0756	.0629
ə	.1195	.1182

are indicated by the number in parentheses in the transcribed protocols given in Appendix I.)

Measurement of the fundamental frequency of offset was also completed and a mean value of 36.2 ± 2.9 semitones was determined. There was a somewhat looser distribution of offset values than of onset values. The maximum occurred in utterances #3, #5, and #6 and was equal to 39.6 semitones, whereas the minimum occurred in utterance #1 and was equal to 31.7 semitones.

The values of F₀ declination of J.L. were compared to the values found by Cooper & Sorensen (1981) in their study of fundamental frequency in sentence production. They determined that the mean frequency of ten speak-

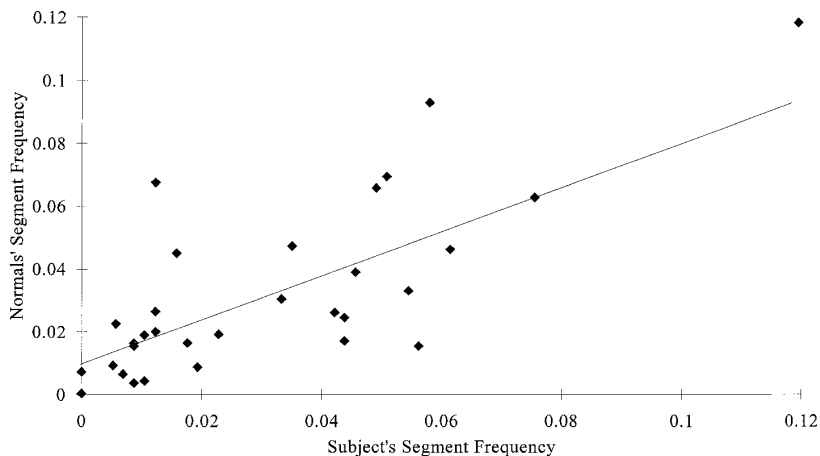


FIG. 2. Scatterplot of subject's vs. normals' segment frequency.

ers was 200 Hz in the initial stressed syllable and 159 Hz in the final syllable of test sentences. If one converts these values to semitones to allow a comparison to the patient J.L., then Cooper & Sorensen's normals had values of 43.35 semitones at onset and 39.38 semitones offset, whereas J.L. had the values 42.01 at onset and 36.20 at offset, cf. Table 2.

Duration was determined for each utterance by calculating the time of onset minus the time of offset of voicing, resulting in a mean value of 2.18 ± 0.80 secs. The length of utterance values varied considerably with a range of 1.2 secs in utterance #4 to 3.5 secs in utterance #10. The duration of the utterance directly reflected the number of vowels, whereby the greater the number of vowels, the longer the duration of the utterance, generally.

TABLE 2
Frequency Declination and Utterance-Final Vowel Lengthening

Utterance	Onset (freq in st)	Offset (freq in st)	Length of Utt (sec)	# of Vls	Length Initial (sec)	Length Medial (sec)	Length Final (sec)
1	40.10	31.70	2.25	6	0.31	0.20	0.21
2	39.80	38.80	3.03	7	0.18	0.25	0.39
3	45.00	39.60	1.41	4	0.18	0.24	0.44
4	40.70	36.00	1.23	3	0.17	0.22	0.24
5	42.30	39.60	1.87	7	0.17	0.17	0.38
6	41.00	39.60	1.99	5	0.20	0.30	0.53
7	44.30	34.90	1.90	5	0.35	0.30	0.47
8	43.00	32.30	3.36	6	0.20	0.22	0.60
9	42.80	34.00	1.28	3	0.13	0.27	0.23
10	41.10	35.50	3.50	6	0.18	0.25	0.26
Mean	42.01	36.20	2.18	5.2	0.21	0.24	0.37
SD	1.67	2.90	0.80	1.4	0.07	0.04	0.13

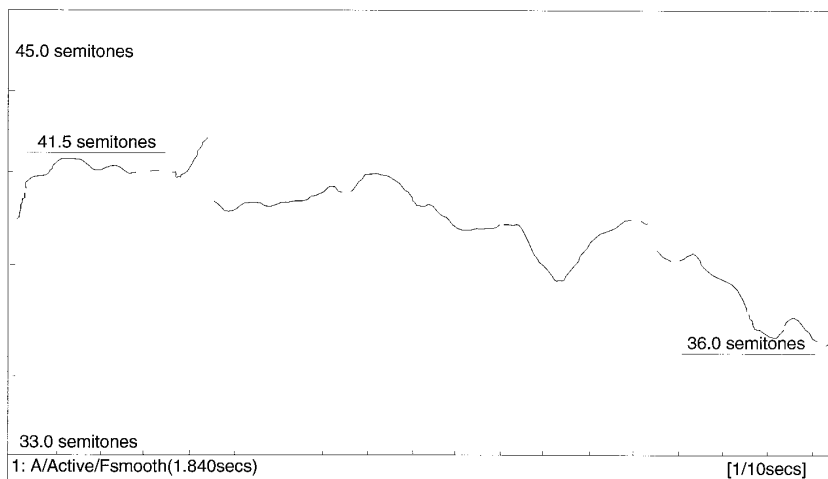


FIG. 3. Example of pitch declination.

The utterance with the greatest number of syllables (i.e., 7 vowels) had a duration of 3.0 secs, whereas the trisyllabic utterance (#9) lasted only 1.3 secs. The correspondence between syllable number and total duration, however, was not exact. Utterance #5, for example, contained 7 vowels, but had a duration of only 1.9 secs.

We also completed an analysis of vowel lengthening in utterance-final position, as compared to vowel length in utterance-initial and utterance-medial positions. As can be seen in Table 2, as well, the vowels in initial position in the 10 utterances had a mean duration of $.21 \pm .07$ secs. Those in medial position had a duration of $.24 \pm .04$ secs, and those in utterance-final position demonstrated a duration of $.37 \pm .13$ secs. The vowels obviously increased in duration as a function of utterance position with utterance-initial being the shortest, utterance-final the longest, and utterance-medial position occupying a middle value.

The findings for the patient were consistent with the values of utterance-final vowel lengthening determined by Oller (1973) and Cooper & Sorensen (1981, p. 32-33) for normal English speakers. They used a slightly different procedure in which the initial syllable was set to the unit length and the times of the medial and final syllables were then determined as a factor of the duration of the initial syllable. Converting the values of J.L. given in Table 2 in the same fashion shows the following result. Normals in initial syllables had a value of 1.00 ± 0 , in medial syllables of $1.52 \pm .07$, and in final syllables of $2.12 \pm .13$, whereas the patient had values in the initial syllable of 1.00 ± 0 , in the medial syllable of $1.25 \pm .37$, and in the final syllable of $1.90 \pm .56$.

DISCUSSION

The present case represents an example of pure phonemic jargon, in the sense that J.L. produced fluent phonologically intact utterances that contained virtually no lexical items of English. Similar to the previous reports of patients with phonemic jargon aphasia by Perelman and Brown (1981) and Cappa et al. (1994), the language dissolution of the present case was secondary to bihemispheric lesions. All three of these cases of phonemic jargon involved bilateral temporal infarcts, suggesting that involvement of the right temporal area may be necessary to produce a language impairment of this magnitude.

Despite her jargonized speech, our investigation showed a relatively intact inventory of phonological segments and that these segments occurred with a frequency not unlike that found in normal speech. Moreover, we found no clear cases of non-English phonemes in her utterances nor examples of obvious violations of English phonotactics, unlike the Cappa et al. (1994) case mentioned above. The phonetic-to-phoneme linkage expressed through the idea of phonological processes appeared to be undisturbed, as we concluded from the fact that her phonetic units were very much like the units of normal speakers and showed the distribution and change in context as found in English. What was impaired was that she no longer had access to the lexical representation of English words.

Not only was her segmental phonology relatively undisturbed, her longer term prosodic phonology also resembled normal speech. For example, she demonstrated the "top line" rule with concomitant F \emptyset declination and stressed vowel lengthening utterance-final, characteristic of spoken English. Beyond that, her speech had many phonological characteristics of Southern States American English, including monophthongization, (e.g., [skai] sky becomes [ska]), vowel breaking, (e.g., [wɛt] well becomes [wɛæt]), and lowering and backing of [ei], (e.g., [wɛit] weight becomes [wɛit]).

English has been classified as a *stress-timed language* (Bailey, 1985), in which each stressed syllable is separated by about the same amount of time, unlike French or Spanish, which are syllable-timed languages, in which each syllable occupies about the same amount of time. Moreover, each phonological word in English contains a single syllable with main stress, an *orthotone*. This characteristic feature of English prosody appeared undisturbed in the speech of J.L. Measurements of vowel duration, intensity, and pitch all showed that J.L. retained the orthotonic rhythm of the phonological sentence that is characteristic of English speech. (See Anderson, 1981.)

Consistent with the findings of Cooper, Danly, and Hamby (1979) and Cooper and Sorensen (1981), J.L.'s F \emptyset declination exhibited most of the features found in normal speakers of English. Secondly, although she demonstrated the phonetic segments that correspond to English phonemes, she failed to demonstrate the organization of the phonemes into the lexical words

of the language, resulting in jargonized output more severely disturbed than the classic paraphasic and neologistic errors of Wernicke's aphasics. In summary, this case of phonemic jargon aphasia provides evidence that the basic prosodic features of language, basic processes of phonology, and even some properties of regional vernacular can be preserved while lexically driven phoneme choice is impaired. That is to say, this neurolinguistic analysis suggests phonology can be disconnected from the lexical inventory of forms that make up the material of words so that phonological words can be intact while lexical words can be nonexistent.

APPENDIX I

Transcription of J.L.'s Speech

A = therapist

B = patient

Dialogue 1:

A: Tell me how you slept last night. OK?

B: 'hæʔε 'dʒɛlən 'tʰræʔŋ 'tʰræk 'nəʒŋ (1)

A: Uh huh!

B: 'θei 'gʊdə 'hædi zæn 'grauʔŋ 'fæs (2)

A: Uh huh! Was somebody loud?

B: [Yeah.] 'ɛʔ 'lɛhɛm 'daʔm 'tʰaʔm. [Yeah]. (3)

A: Uh huh!

B: [Ya know]. jə 'dʒə 'tʰɛl θə 'fæks 'raʔt. (4)

A: OK!

B: 'khæʔn bə'lɛʔl'lɛʔl 'laʔs 'saʔd.

A: So, What did you do about it? What?

Did you do anything?

B: 'səʔ

A: Tell me.

B: 'hwæ 'hwædʒu 'fæ ,dʒu'w æ ni 'khænikhæni,kʰæn. (5)

A: Uh huh!

B: ,nou'fæs tə də'liə 'kʰin 'geiʔm. (6)

A: Is that all?

B: 'bin 'fɪzl.

'ðɪs 'naʊʔ, 'ɪsə 'flɪf əvə 'fɪs ɪ'fændə 'meɪ 'ziŋ skʰeɪm ə'kʰlæmə'kʰauʔ. (7)

æn kʰə'rʊmən 'pʰleɪs ə 'tʰrɪviʔ oʊ 'ɪʔ 'kʰrɛmə 'beɪ. (8)

A: Uh huh. Are you still talking about last night?

B: [Yeah.]

A: OK. Go on.

B: [Well.] 'a də'dɛs. [I don't] 'vʊmən.

'walə'walə 'wanə tʰə'liŋ 'wəʔ bjəʔ. (9)

'ges hiz dɛə? 'tʰɛinɪn 'kʰɛinɪn.

A: Uh huh.

B: (Inaudible).

A: So why were you in such a good mood when I came up to get you?

B: (Hypophonic speech.)

A: Speak up. I can't hear you.

(Long pause.)

B: 'nɛmə 'mai 'mən 'spən 'æmə 'sənəp mə'bəis 'səi mə'se'lf. (Pause). 'hwədəjə 'nou a° gə'gəθ pʰə. gə'lanɪ 'galni (Pause.) (Inaudible)

'sou jə 'gə? də'brɛ fæəs i'nəki'nək. (Long pause.) feəl pʰe'l. haifi'næk 'sɪf. (Long pause.) 'tʃju 'hæl mi? (10)

Dialogue 2:

A: How are you today?

B: Hypophonic speech.

A: How are you today?

B: 'hau? ju meik mi. 'rəni 'gɛtɪ 'glɛtɪn in'mau? 'məʔn min'au 'minə 'kʰen? θɛiθə dədəi dei'dɪŋ 'tʰɛi. (Pause)

'ou 'hwædai 'es kʰə'vɛk 'tʰi (Inaudible).

A: OK. Hey! Have you been in here before?

B: [Today?]

A: Uh. Huh.

Have you been in here before, today?

B: Uh. Huh. (Pause).

A: What is your name?

B: [Well.] (Pause) 're'l 'bəlɪ 'bælmɒz 'bɒtsɪ æz 'ri:l. 'sæm 'fou 'fəʊ 'fe. æni 'kʰau fɪs 'sæmə 'leik 'feida feijæ'vɛk anɪmə'vɛk. 'fɛtə 'fæk.

A: Hm. OK. What is your address?

B: Hypophonic speech.

A: Speak up! Hm! OK.

Where do you live?

B: [I don't even] 'dau 'æk 'tʰ rei 'dæə 'rə 'rɛə't 'pʰrauən 'frəm eim 'frəmən. (Pause).

ɒlə'ðəðə 'lɔθl ɒl'stəfənə?. 'hævnə,voulə ɛm'badəs 'ʔet 'θɛi 'nɒsɪŋ. (Pause.) 'θɛiəsən. a'i'le 'fɒ 'fɛθ 'fɒ 'fe'ən 'tʰɪŋ 'tʰaiə 'mɛə 'hɛə 'sku [because]pə'kʰɒz [he is] 'hei'əz 'mɑ,di 'ælrə'tʰ.

Example of a response to a Yes/No question from WAB:

A: Are you wearing red pajamas?

B: ɪ 'hæəsəm 'alɪs 'gidə 'θɛsə 'ʔa 'ʔalə 'sprau 'mauθ kʰəʊ 'tʃʌgə ʔə'təʊmɔʒə 'skaha 'dɛŋ məkʰɛɪ? bə'lədə,lədə 'ʔə'dən. 'hɪno 'ranɪ? (Pause) 'flɪn,l 'θɪŋ 'ʃlɒ,nɪə.

Examples of responses to BNT items:

A: What is that called? (Item no. 1 ‘‘bed’’)

B: t^hɑ 'fɑ fə

A: What’s that called? (Item no. 2 ‘‘tree’’)

B: 'ʌ mə'lɔŋ oi'jeə mɔ'jau. maumoə 't^hai.

A: Alright. Let’s try this next one. (Item no. 3 ‘‘pencil’’)

What is this called?

B: (Inaudible)

A: OK. What’s that? (Item no. 4 ‘‘house’’)

B: 'tʃ^hæt^hə

A: Alright. The name of this thing starts with? [hɑ]

B: Itsei'ʔaiə.

A: What is this called? (Item no. 5 ‘‘whistle’’)

B: No response.

A: What do you do with this thing? (Item no. 5 ‘‘whistle’’)

B: hænon 'doi 'wæk 'mɔst də'zi 'ʔoumi 'hædɪ 'kɦɪt 'bi 'ɡɪd,n 'mæt. 'wɔ 'nusə.
(Laughter) 'hi wənə'wədə. (Laughter) 'wəthə

A: Alright. The name of this thing starts with? <wɪ> (‘‘whistle’’)

B: ŋæ. nɑ'dædə'læt bou'hæ də'læt ɡə'k^hei'k^hein.

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