

Severe Stuttering Associated with Right Hemisphere Lesion

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Following a right hemisphere stroke, a right-handed, 50-year-old male experienced a permanent dysfluency characterized by phoneme and syllable reiterations and, to a lesser extent, word and phrase reiterations. The reiterations occurred in initial, medial, and final positions and for all sentence elements (e.g., subject nouns, object nouns, verbs, modifiers). There was a notable loss of verbal automatisms (poems, songs, etc.). The patient's symptoms conform to the acquired stuttering syndrome described by A. Helm, R. Butler, and D. F. Benson (1978, *Neurology*, **28**, 1159-1165). © 1986 Academic Press, Inc.

Stuttering has been defined as an elocution defect formed by syllabic repetition and a difficulty in pronouncing various syllables, including stopping and spasms of verbal fluidity (Perello, 1970). Espir and Rose (1970) considered stuttering as a deviation of speech that attracts attention and which adversely effects the speaker or listener because of an interruption of the normal speaking rhythms by involuntary repetition, prolongation, or arrest of sounds. Palilalia is a speech disorder characterized by involuntary repetition of words or phrases during verbal output (Benson, 1979).

Horner and Massey (1983) mention two main patterns of neurogenic dysfluency: cortical stuttering and palilalia, the latter usually associated with bilateral pathology—either frontal (Valenstein, 1975) or basal ganglia (Boller et al., 1973). Transitory stuttering is usually associated with expressive language disorders. Permanent dysfluency expressed as stuttering or palilalia, along with an intact language, is quite unusual.

It has been mentioned that focal damage on the right hemisphere frequently leads to a slight tendency toward phonemic or syllabic repetition, feigning acquired stuttering (Ardila, 1984). Nevertheless, it is quite unusual to find cases of severe stuttering associated with damage on the right hemisphere, that present an adequate level of linguistic functions (Ro-

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senbek, Messert, Collins, & Wertz, 1978). Helm, Butler, and Benson (1978) reviewed 10 cases of acquired stuttering, which is characterized by absence of adaptation effect, occurrence of stuttering on any syllable within a word, and stuttering in both grammatical and substantive words. Permanent dysfluency was correlated with bilateral cerebral damage. Transient stuttering was correlated with unilateral multifocal hemisphere damage, generally associated with aphasia.

Horner and Massey (1983) have carefully presented the case of a 62-year-old patient who showed a dysfluency of 25.8% following an occlusion of the right carotid artery. The authors chose to call this dysfluency "palilalia" rather than "stuttering," due to the fact that repetition usually occurred in both words and phrases. This dysfluency was found to be associated with significant errors in reading, drawing, and copying. In addition, the patient experienced dress apraxia and difficulty with topographic orientation and constructive tasks. The neurological evaluation showed left homonymous hemianopia, left central facial paresis, and left Babinski's sign. The CT scan showed a low-density area which included the whole territory of the right middle cerebral artery.

In the case we report here there was a considerably smaller cortical area affected, almost limited to the right temporal lobe, but a more severe dysfluency (44.8%), especially with reference to minor unities (phonemes and syllables). We followed as closely as possible Horner and Massey's (1983) scheme for the evaluation of the dysfluency, in order to allow a direct comparison of the two cases.

CASE HISTORY

Medical Background

This is a 50-year-old, strongly right-handed patient (without left-handedness family history or personal or family stuttering history before the stroke); he is an engineer who had a thrombotic cerebrovascular accident in September 1980, characterized by left hemiparesis and speaking difficulty, which the patient describes as "kind of moaning without being able to articulate words." He was hospitalized after the accident and received medical care in his home town. No further information regarding the patient's clinical history was available. He received physical therapy, after which he regained movement of the left side of his body. He also started to recover language; and, as speed in his speech increased, phonologic and syllabic repetitions and blockades began to occur.

In April 1983 he visited the Neurological Institute of Colombia. A CT scan showed extensive low-density in the right temporal lobe (Fig. 1). No motor or sensory disturbances were found. Oral comprehension was excellent, and his language was correct in terms of grammar and lexical selection. Nevertheless, dysfluency was outstanding throughout the examination, characterized by tonic blockades and many repetitions, primarily

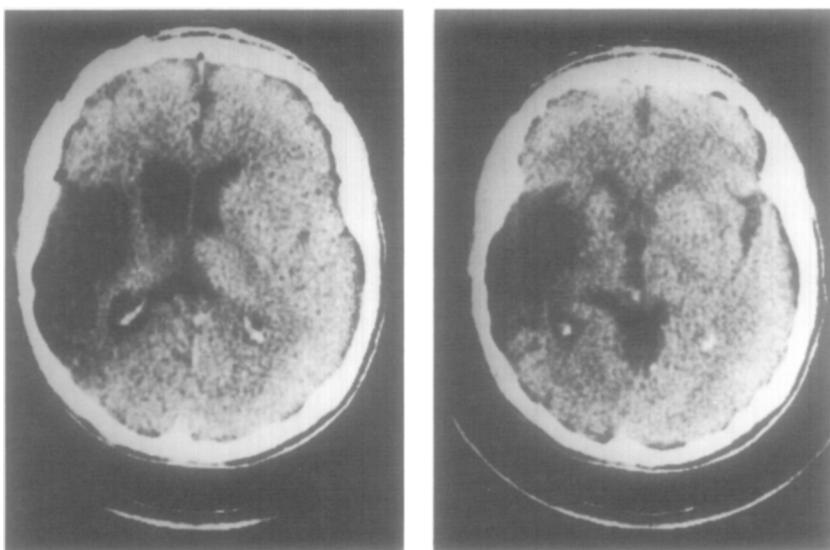


FIG. 1. CT scans. Note extensive low-density areas in the right temporal lobe.

syllabic and phonemic, during word and sentence repetition as well as in spontaneous oral speech. Many reiterations also occurred while he was reading aloud. There was no adaptation effect with repeated reading of a paragraph, during simultaneous reading with the examiner, or at a slower reading speed paced by a metronome. No gestures or associated synkinesis were observed. Even during repetitions, which were evident in all positions (initial, medial, and final) and for all the grammatical elements, the patient maintained a visual contact with his interlocutor. His ability to name parts of the body, external objects, and colors was normal. Word and sentence repetition showed the same characteristics as oral spontaneous language. Writing was satisfactory and reading aloud showed a large number of repetitions. Severe difficulties were found in remembering verbal automatisms: familiar songs, poems, the National Hymn, etc.

The patient was able to correctly draw simple figures after a verbal request (flower, clock, cube), showing no signs of hemi-inattention or spatial confusion. He was able to find geographic sites on a map, to perform simple arithmetical problems, and to rank numbers in columns. He correctly showed and named fingers of the hand. There were no signs of ideomotor or ideational apraxia (see Figs. 2 and 3).

When asked to express the changes experienced since the onset of the problem, the patient mentioned (1) occasional muscle pain on the left side of the body; (2) occasional feelings of double personality when performing personal actions such as bathing, shaving, etc.; (3) occasional

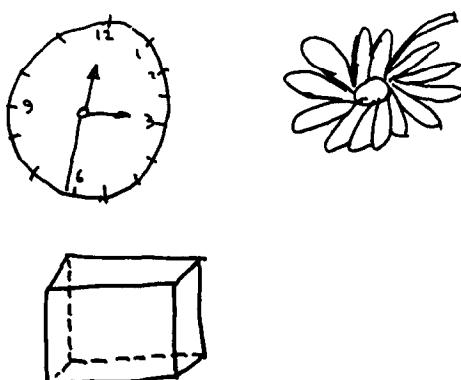


FIG. 2. Drawing by verbal order: a clock, a flower, and a cube.

lack of coordination of simple tasks such as tightening the tie; (4) forgetfulness of things that had been previously learned by memory such as sentences, poems, and songs; (5) temporary loss of memory (e.g., "Where did I leave the newspaper? my eyeglasses?"); (6) short, vague states associated with various factors: e.g., "an unknown person resembles somebody I know," "I have the feeling of going through past situations or problems again."

Language

The Boston test for diagnosis of aphasia was used (Goodglass & Kaplan, 1972). Figure 4 shows the patient's language profile. Except for the faults

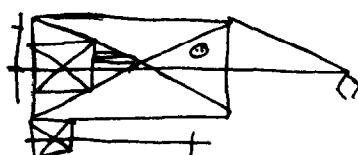
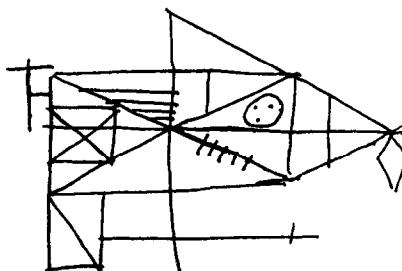


FIG. 3. Rey-Osterrieth figure. Copy (upper) and memory (lower).

Z-SCORE PROFILE OF APHASIA SUBSCORES

NAME: _____

DATE OF EXAM

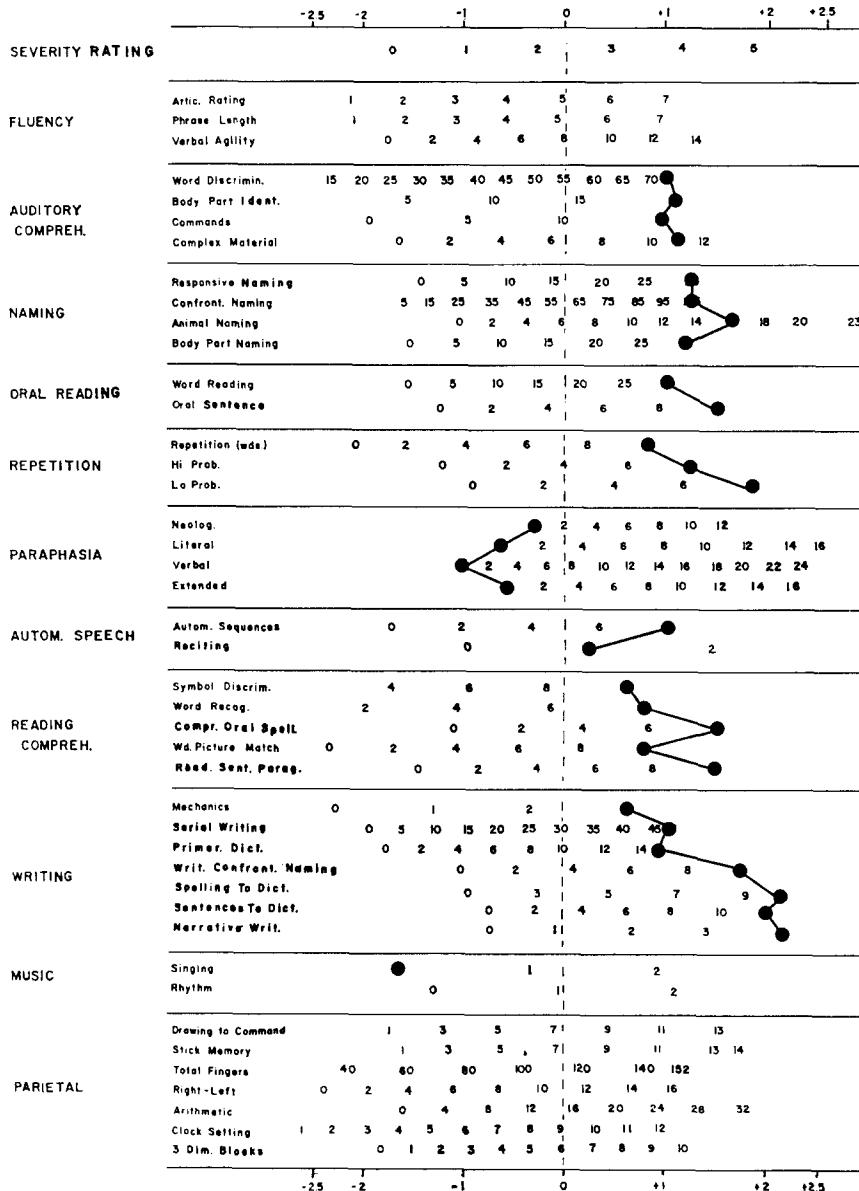


FIG. 4. Patient's language profile in the Boston Test for Diagnosis of Aphasia.

due to his severe stuttering, there is no significant language impairment, i.e., there is no aphasic impairment. His speech seems logical, coherent, and appropriate to his educational level. The patient continues with his professional activities as an engineer, meeting satisfactory performance standards. His reading comprehension is normal, though while reading aloud, he shows the same disturbances as in his oral language. In writing, he shows a tendency toward separating letters, a phenomenon sometimes observed in writing after right hemisphere damage (Ardila, 1984).

ANALYSIS OF DYSFLUENCY

Dysfluency evaluation followed that of Horner and Massey (1983). The language sample (243 words) was made up of six different tasks: (1) conversational speech (25 words), (2) description of a picture (46 words), (3) sentence repetition (50 words), (4) counting (19 words), (5) reciting (25 words), and (6) reading sentences (78 words).

The following errors were qualified: (1) phonemic repetition (e.g., /k-kasa/); (2) syllable repetition (e.g., /li-libro/); (3) part-word repetition (e.g., /maki-makina/); (4) word repetition (e.g., /mesa-mesa/); and (5) phrase or sentence repetition (e.g., /él no tiene-él no tiene/). Any string of uninterrupted reiterations of a single type was considered an "episode" of dysfluency; each episode could contain one or more reiterations.

Table 1 shows the number of dysfluent episodes which occurred during the six tasks, as well as the number of reiterations analyzed. For the 243-word sample, a total of 104 dysfluent episodes and 109 reiterations (of all types across the episodes) were found (i.e., in 44.8% of all words). Dysfluent episodes during reading (31.8%), repetition (21.2%), describing

TABLE 1
DISTRIBUTION OF DYSFLUENCY BY TASK TYPE

Task	Distribution of reiteration episodes			Distribution of No. of reiterations	
	No. of words	No. of episodes	Percentage of total episodes (104)	No. of reiterations	Percentage of total episodes (191)
Conversational speech	25	13	12.5	24	12.6
Describing a picture	46	21	20.1	44	23.0
Counting	19	7	6.7	8	4.2
Repeating phrases	50	22	21.2	48	25.1
Reading	78	33	31.8	55	28.8
Reciting	25	8	7.7	12	6.3

a picture (20.1%), and conversational speech (12.5%) were more frequent than in other tasks. Counting and reciting were the least affected by reiterations.

Table 2 shows the distribution and respective percentages for the different types of reiterations. The maximum repetition percentage was found in syllables (33.5%) and phonemes (30.9%), while phrase reiteration was minimal (5.2%). Word and part-word repetition were in the middle.

The number of repetitions per episode reached a maximum of seven for all the repetition tasks and five for the conversational speech and describing a picture task. The reciting and counting tasks reached a maximum of three and two reiterations per episode, respectively.

DISCUSSION

The patient under study shows a series of important differences in relation to the case reported by Horner and Massey (1983).

1. Damage is considerably less and apparently confined to the right temporal lobe. Consequently there are fewer associated neurological and neuropsychological signs. Dress apraxia, depersonalization, and *déjà vu* phenomena and some episodic amnesia are the only signs associated with the severe stuttering.

2. The dysfluency is greater for this case (44.5% vs. 25.8%), affecting basically minor unities (phonemes and syllables) which totaled 64.4% of the observed reiterations. This fact allows us to consider this a case of stuttering rather than one of palilalia.

3. Reiterations are almost the same for picture describing (23.0%), repetition (25.1%), and reading (28.8%); considerably smaller for counting (4.2%) and reciting (6.3%). Conversational speech is in the middle (12.6%).

4. The severe loss of verbal automatisms (songs, poems, sentences, National Hymn, etc.) showed by the patient call for special attention. Such a loss, under the case of right hemisphere damage has already been reported (Ardila, 1984; Luria, 1973).

TABLE 2
DISTRIBUTION OF REITERATION EPISODE BY REITERATION TYPE

Reiteration type	No. of episodes of reiteration	Percentage of grand total reiteration episodes (191)
Phoneme	59	30.9
Syllable	54	33.5
Part-word	19	10.0
Word	39	20.4
Phrase	10	5.2

It is worth mentioning some differences between the acquired stuttering observed in our patient and developmental stuttering (Perello, 1970):

1. The absence of synkinesis or abnormal movements of the lips, tongue, inferior maxilla, eyebrows, eyelids, body, arms, or legs which are associated symptoms of developmental stuttering.
2. The absence of vasomotor alterations such as transpiration, blushing, or paleness. Also, the patient does not seem to avoid situations which necessitate verbal communication. His behavior with reference to difficulties in communication seems to correspond more to discontent than to anxiety.
3. The invariability of the symptomatology in certain circumstances (stress situations or procedures that produce adaptation effects, such as repeating reading, simultaneous reading with examiner, reading with metronome).
4. The reiterations are observed for all the positions within the word and for all kind of words.

Five distinctive characteristics of acquired stuttering stated by Helm et al. (1978) have been confirmed: (1) no adaptation effect, (2) stuttering not restricted to initial syllables, (3) stuttering occurs on small grammatical and substantive words, (4) the speaker may be annoyed but not anxious, and (5) a lack of secondary symptomatology (facial grimacing, fist clenching, etc.).

Probably the most evident aspect of our patient is the association between stuttering and the loss of verbal automatisms. Perhaps his stuttering could be even interpreted as a disautomatization of the speech outflow as the underlying mechanism of this type of stuttering, somehow different from developmental stuttering.

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