

## Preserved Recognition of Familiar Personal Names in Global Aphasia

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Recognition of proper and common nouns was compared in four patients diagnosed with global aphasia secondary to ischemic left-hemisphere infarction. For proper noun recognition, subjects matched the spoken or written name of a famous person to a photograph, and for common nouns, subjects were tested on standardized and special word recognition tests. As expected, common noun recognition was severely compromised in the aphasic patients. In contrast, familiar personal names, despite their greater length and complexity, were recognized equally well by aphasic and normal control subjects. The right hemisphere may mediate the ability to recognize personally familiar names, as it may be specialized for establishing personally relevant environmental stimuli. © 1990 Academic Press, Inc.

### BACKGROUND

Isolated deficits observed after focal left-hemisphere (LH) damage have been of special importance to the development of neurolinguistic theory. The connectionist model of brain-behavior relationships can easily account for modality-specific anomias, such as the inability to name visually presented objects alongside accurate naming of palpated objects. According to that model, sensory-specific input to the language area is

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interrupted by lesions involving connecting tracts (Benson, 1979). For example, a recent case of "pure alexia" was described as a visual-verbal disconnection due to a subcortical lesion in the occipital lobe (Leegaard, Riis, & Andersen, 1988). Within sensory modalities, category-specific deficits, e.g., selective deficits in naming colors (Geschwind & Fasillo, 1966) or letters (Goodglass & Budin, 1988), fruits and vegetables (Hart, Berndt, & Caramazza, 1985), or body parts (Gentilini, Faglioni, & DeRenzi, 1988; Goodglass, Klein, Carey, & Jones, 1966), while other object-naming abilities are relatively intact, are somewhat less well accounted for by the connectionist model (Williams, 1983). However, whereas isolated deficits, especially modality specific ones, do lend themselves to disconnection accounts, "islands" of preserved function do not. The preserved ability to respond to axial commands (Geschwind, 1965; Poeck, Lehmkuhl, & Willmes, 1982) or to recognize a particular category of words, such as geographical names (McKenna & Warrington, 1978; Wapner & Gardner, 1979), while recognition of other categories of words is severely impaired, has not received adequate explanation (Goodglass and Butters, 1988; Weniger, Ketteringham, and Eglin, 1988) and is not readily amenable to a disconnection interpretation. We have observed another such selective ability in patients with language deficits following extensive LH damage: the ability to recognize familiar personal names. This preserved ability, together with other evidence, suggests that neurolinguistic theories of normal language function must consider linguistic capacities of brain regions not traditionally considered language areas, as well as the role of nonlinguistic functions such as familiarity and affect.

This article provides a preliminary report on a series of four patients diagnosed with global aphasia following extensive LH damage appearing in our clinic. All were noted to have a severe auditory-verbal comprehension deficit for single words, phrases, and sentences. Nevertheless, these patients showed preserved recognition of names of famous persons.

## SUBJECTS

The four patients were male, right-handed, Caucasian, and speakers of English since birth or (in one case) early childhood. All were born and educated in the United States. They ranged in education from 9 to 12 years, and ranged in time postonset of stroke from 2 months to 13 years. None had other medical conditions affecting cognitive or language performance, such as a history of mental disorder or dementia. They were classified as having global aphasia by the Western Aphasia Battery (WAB) (Kertesz, 1982), and had Aphasia Quotients (AQ—a measure of severity) of 10.0 or below (out of 100), indicating severe aphasia. Auditory-verbal comprehension scores ranged from 4.9 to 9.0 (out of a possible 20) (see Table 1). Computerized tomography (CT)-scans on the four patients revealed large, unilateral LH lesions extending over frontal, temporal, and parietal areas (see Figs. 1a-1d). Ten normal control subjects were matched in age and education to the patients.

TABLE 1  
DEMOGRAPHIC INFORMATION AND MEAN PERFORMANCE ON MEASURES

	Age	Education	Nouns	PPVT	Names1	Names2	WAB Comprehension	Aphasia Quotient
Individual patient data								
S1	60	12	50%	89	85%	92%	7.9	9.9
S2	68	09	50%	04	96%	88%	4.9	4.9
S3	66	08	50%	18	70%	80%	9.0	9.0
S4	58	12	83%	45	81%	52%	7.7	7.7
Summary data								
Patients ( $n = 4$ )								
	Mean	10.3	58.3%	39.0	83.0%	78.0%	7.4	7.9
	SD	2.1	16.5	37.4	10.74	18.0	1.7	2.2
Normal control subjects ( $n = 10$ )								
	Mean	11.4	(100%)	162.0	92.6%	84.8%	—	—
	SD	1.6	(0.0)	9.9	7.4	16.3	—	—

*Note.* Information on age, education, the Concrete Nouns Task, the PPVT, the two Personal Names Tasks, the Comprehension Score on the WAB, and the Aphasia Quotient from the WAB for each patient, and including mean values and standard deviations (SD) for patients and normal control subjects.

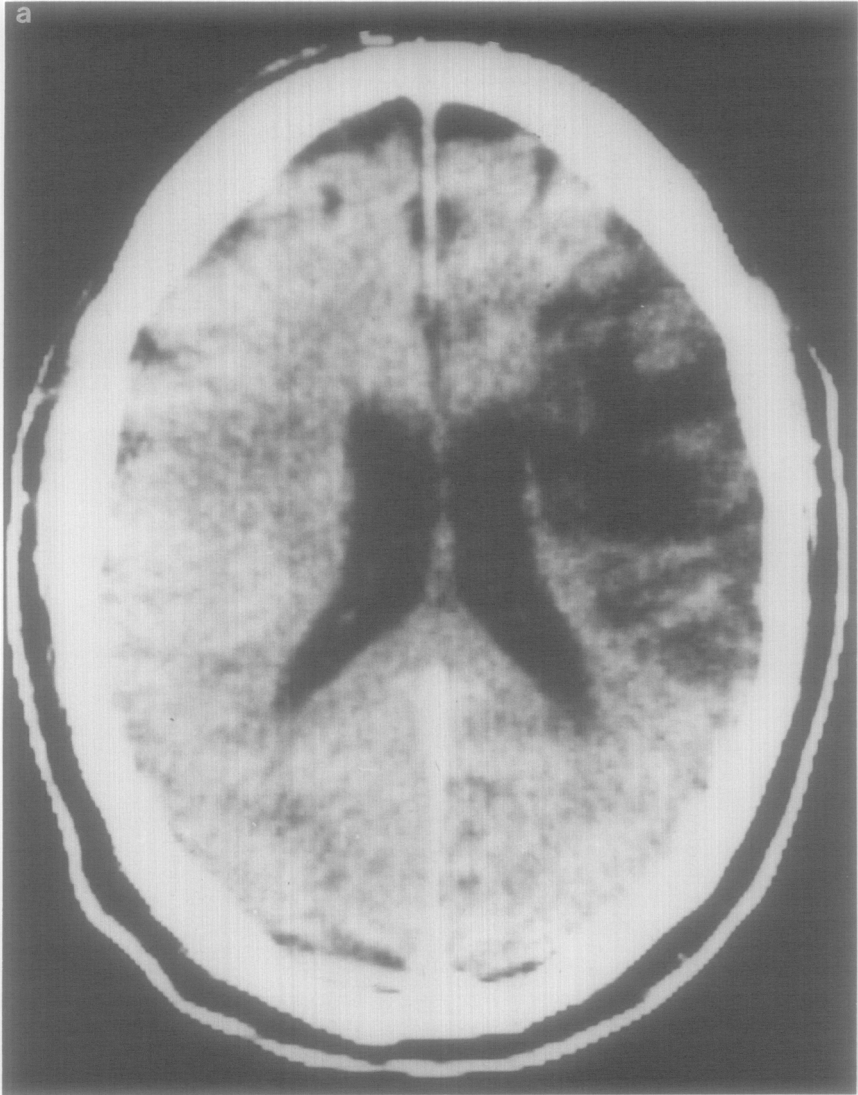


FIG. 1a. CT-scan of Case 1.

### *Case Reports*

*Case 1.* A 60-year-old former salesman suffered a stroke in August, 1988, producing a right hemiparesis, aphasia with apraxia and hemianopsia. A CT-scan of the head revealed a large left frontotemporal lesion consistent with an ischemic infarction (Fig. 1a). The patient's speech and language were evaluated 5 months poststroke. At that time, testing revealed severe comprehension deficits manifested by poor auditory word recognition and poor response to 1- and 2-step commands. Speech output was severely limited, consisting

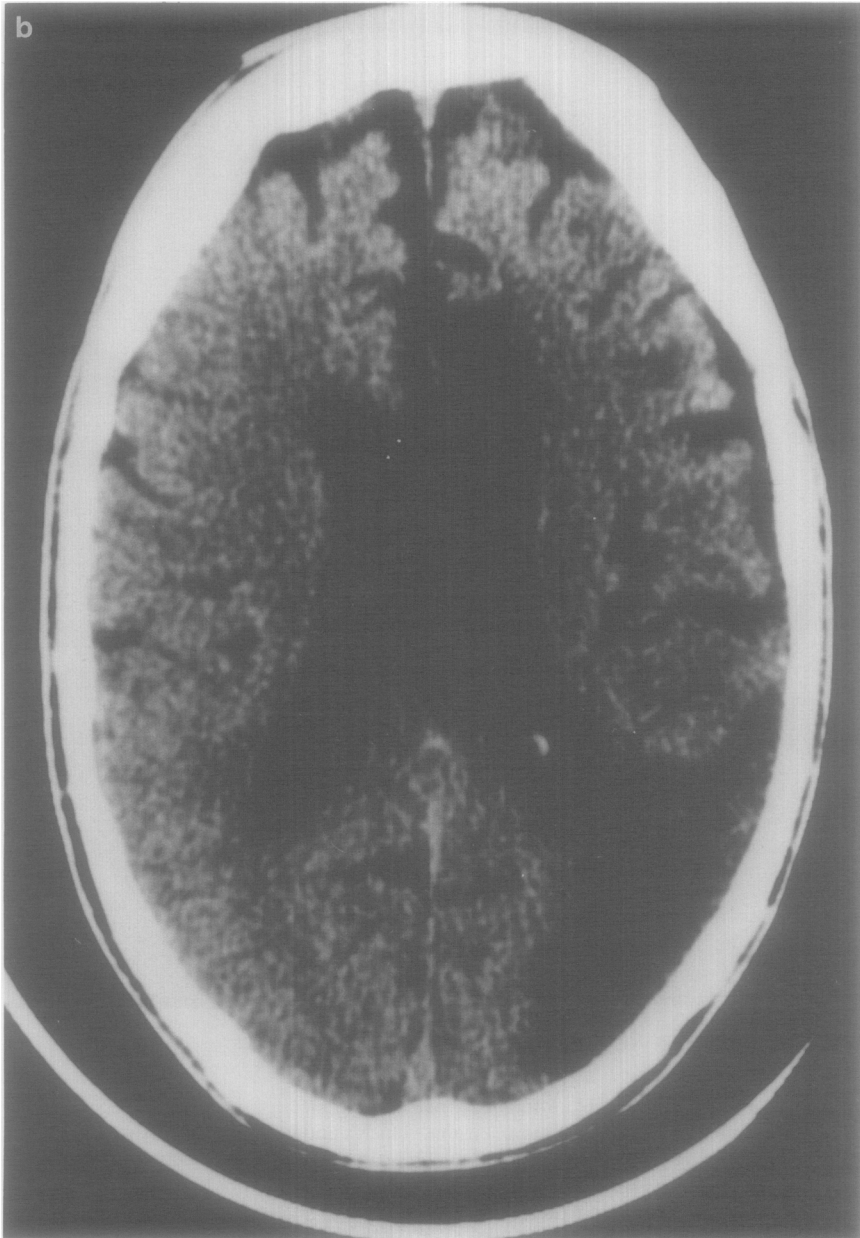


FIG. 1b. CT-scan of Case 2.

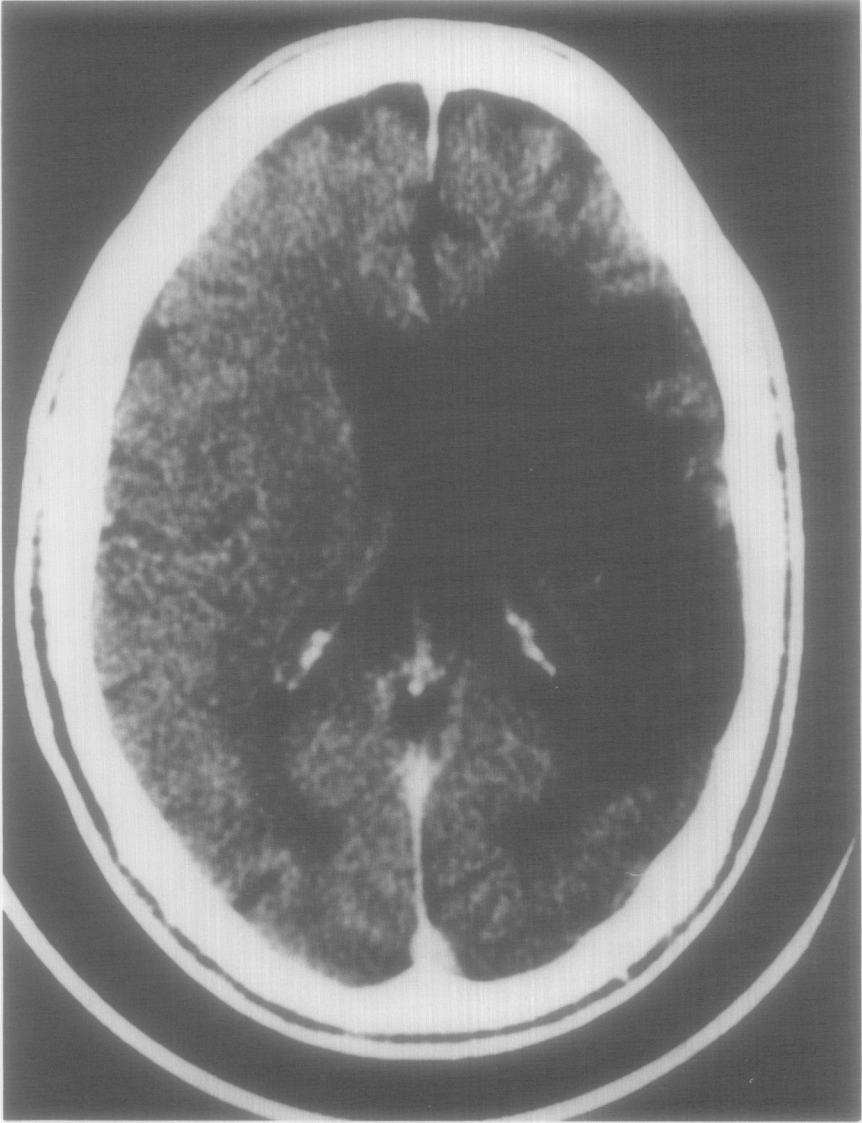


FIG. 1c. CT-scan of Case 3.

of small sets of single syllable utterances, and he was unable to count, name, repeat, or complete sentences. Reading comprehension, which continued to recover, was relatively spared, and writing using the left hand (nondominant for writing) was superior to speaking but showed deep dysgraphia. WAB AQ was 9.9/100, and his Comprehension Subtest score was 7.9/20 (see Table 1 for patient information).

*Case 2.* A 68-year-old former carpenter suffered a left cerebrovascular accident in January, 1989, leaving him with a right hemiparesis and a severe speech/language deficit. A

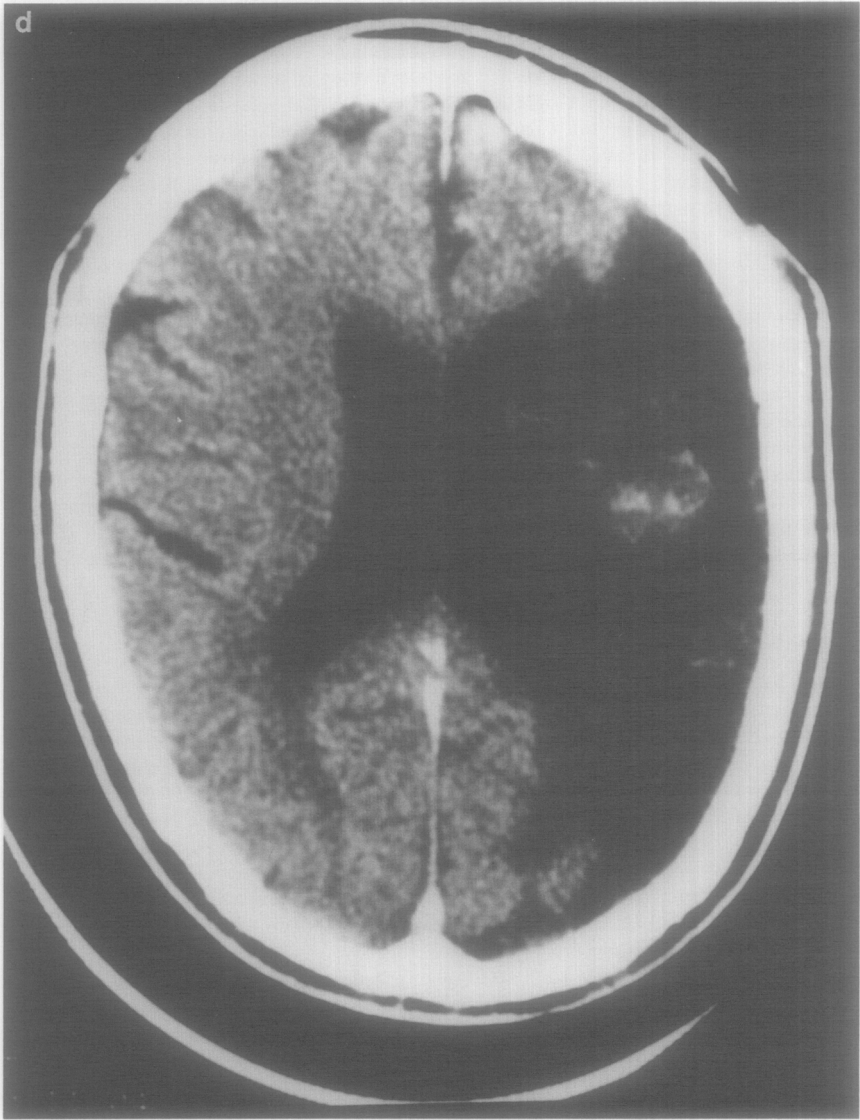


FIG. 1d. CT-scan of Case 4.

CT-scan demonstrated a large tripartite left-sided lesion (Fig. 1b). He had 9 years of education. The patient underwent a formal language evaluation 2 months poststroke. Expressively, the patient had no functional speech, making confrontation naming and repetition impossible. His spontaneous speech output consisted entirely of the words "well," "you know," and a few expletives which were well articulated. Testing revealed severely impaired auditory language comprehension of words and phrases. The patient was unable

to read letters, single words, or sentences, and no legible writing could be elicited. WAB AQ was 4.9/100, and his Comprehension Subtest score was 4.9/20.

*Case 3.* This patient is a 66-year-old, retired mechanic, who spoke German as a young child and learned English in school. His medical history is significant for a LH stroke 13 years previously resulting in a right hemiparesis and global aphasia. CT-scan revealed a large left-sided lesion (Fig. 1c). Comprehension of single words, phrases, and 1-step commands was severely impaired. Some appropriate gestures were observed in conversation but expressive speech was limited to a small set of consonant-vowel syllables. Therefore, he was unable to name objects, complete sentences, repeat, or perform responsive speech tasks. He was unable to read aloud, identify letters, write to dictation, or copy single words. WAB AQ was 9.0/100, and his Comprehension Subtest score was 9.0/20.

*Case 4.* The fourth patient, a 58-year-old retired farmer, suffered a stroke in January, 1986, leading to right hemiplegia, severe aphasia, and a right homonymous hemianopsia. A CT-scan revealed the lesion to be in the area of the left middle cerebral artery (Fig. 1d). A history of diabetes mellitus, hypertension, and coronary artery disease was also noted. The patient was unable to perform tasks which required object naming, repetition, sentence completion, or responsive speech, as spontaneous speech was severely limited to stereotypic utterances such as "dillo-dillo". During language assessment, the patient responded appropriately to yes/no questions approximately 60% of the time. He followed some 1-step, but no 2-step, commands. The patient was able to write his name somewhat legibly using the left hand (nondominant for writing), but otherwise writing and reading abilities were severely impaired. WAB AQ was 7.7/100, and his Comprehension Subtest score was 7.7/20.

### *Special Tests*

Each patient was given four tests of comprehension of single words and four tests of comprehension of proper nouns (names of famous persons). Stimuli were presented as auditory-verbal (spoken) input, written input, or both. To respond, subjects pointed to one of four line drawings, photographs, or written words. Ten normal control subjects matched for age and education were also given these same tests.

Comprehension of common nouns was assessed using (1) a Concrete Noun Recognition Task, which is composed of 12 common nouns (e.g., bat, window, saw, typewriter) presented as spoken stimuli, and providing four line drawings as response choices; and (2) the Peabody Picture Vocabulary Test (PPVT) (Dunn, 1959), a standardized test which includes nouns, adjectives, and verbs also presented as spoken stimuli, and also providing four line drawings as response choices.

One set of proper names tests used photographs as response choices. The first, "Names1," was adapted from the Boston Famous Faces test (Albert, Butters, & Levin, 1979), made up of a total of 188 black/white photographs, similar in size and style, of male ( $n = 131$ ) and female ( $n = 57$ ) personalities well-known in politics, entertainment, and sports, spanning decades from the 1920s to the 1980s. Photographs of the 57 famous women were distributed unevenly throughout the set, such that response cards contained from zero to four feminine choices. Forty-seven proper names, such as Charlie Chaplin, Jimmy Carter, and Elizabeth Taylor, were presented verbally (nine of the target names were feminine). On the second proper names test, "Names2," 25 names of famous men were presented in both written and spoken form, and response choices were four photocopied photographs, all famous male personalities. Distractors were chosen to be of similar occupational background (e.g., four comedians, actors, news commentators, or politicians were arranged together). Target names on this test, for example, were Johnny Carson, Spencer Tracy, and Woody Allen.

A second set of tests used written response choices. Stimuli were either spoken or pictured. In the spoken version, a name was said by the examiner and the subject pointed



to one of four written names on a response card. For the pictured version, the subject matched a photograph of a famous personality (a set of 20 personalities, different from those used in the spoken version) to one of four written names. For each condition, a different set of 20 concrete nouns was compared with each set of 20 personal names.

In addition, patients were tested using the Benton Facial Recognition Test (Benton, Hamsher, Varney, & Spreen, 1983), a standardized test of ability to discriminate unfamiliar faces. This was done to determine whether patients were able to process facial stimuli and to obtain an independent measure of right-hemisphere (RH) function.

## RESULTS

A severe deficit in auditory recognition of single words in all four patients, as compared with that in the normal control scores, is reflected in their performance on the WAB, on the concrete noun recognition task, and on the PPVT. On the WAB, patients performed poorly in matching auditorily presented words to objects, line drawings of objects, geometric shapes, letters, numbers, and body parts (subtests of the auditory-verbal comprehension portion of the WAB), yielding a mean WAB auditory-verbal comprehension score of 7.4 ( $SD = 1.7$ ) (out of a possible 20). On the concrete noun recognition test, three of the globally aphasic patients scored 50% correct and the 4th scored 83% correct, compared to 100% correct performance by 87 normal control subjects (in previous testing). On the PPVT, the patients' mean score (39 points) falls far below that of the control group's (162 points) (Table 1). One patient, Case 2, seldom matched single words, such as "eat" vs. "drink" and "yes" vs. "no" to pictures or to written words, given two choices, at better than chance performance in 2 months of practice. Thus, the patients' auditory verbal comprehension of frequent lexical items was severely impaired. In striking contrast, on the personal names tasks, patients performed similarly to normal control subjects. These results are schematically shown in Fig. 2. A one-factor ANOVA revealed no significant differences between the two groups on either the Names1 ( $F(1, 12) = 3.8$ , NS) or on the Names2 ( $F(1, 12) = 1.0$ , NS) tasks. When a repeated measures ANOVA compared the two groups on the three tasks (Names1, Names2, and PPVT), a significant main effect of group ( $F(1, 12) = 90.5$ ,  $p < .0001$ ), a significant main effect of task ( $F(2, 22) = 226.6$ ,  $p < .0001$ ), and a significant group  $\times$  task interaction ( $F(2, 22) = 70.7$ ,  $p < .0001$ ) were found. Post hoc analyses indicated that these differences were accounted for by the PPVT scores, while no significant differences were observed between normal subjects and patients on the personal names tests.

Patients' results on the second set of tests using written and pictured stimuli matched to written responses support the initial results (Table 2). When patients' scores on proper noun stimuli (spoken and pictured) were compared to results on common noun stimuli similarly constructed,

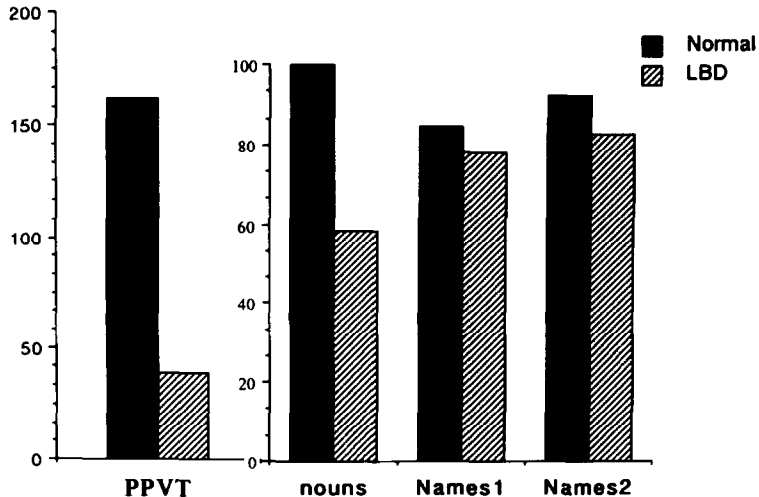


FIG. 2. Results of performance on PPVT, nouns, Names1, and Names2 for globally aphasic and normal control subjects.

a significant difference between tasks was observed ( $t = 2.903$ , 2-tail,  $df = 7$ ,  $p = .0229$ ).

Some variability in individual patient performance was observed, as can be seen in Table 1. For example, on the test session reported here, patient 1 performed relatively well on the PPVT (although below the performance of any normal control subject), and patient 4 performed relatively poorly on Names2 (although well above his WAB comprehension subtest). We know of no features of the tests that might account for these differences; of course, fluctuations in performance are common in patients who have severe neurological deficits. First, these perturbations must be viewed in the context of the fact that the names tests were more challenging than the nouns tests. Second, retesting over a period of several months was supportive of the pattern of performance reported here: recognition of proper (personal) names was significantly better than recognition of common nouns whether spoken names, written names, or pictures were matched to pictures or written names.

## DISCUSSION

By definition, LH-damaged patients diagnosed with global aphasia have a severe language comprehension deficit that includes difficulty recognizing single words presented in auditory-verbal or written modalities (Goodglass, Gleason, & Hyde, 1970). Such patients perform poorly in tasks requiring them to match spoken or written single words to pictures or line drawings, including short, high-frequency nouns such as pen and

TABLE 2  
 MEAN PERFORMANCE ON TESTS WITH WRITTEN RESPONSE CHOICES AND THE BENTON FACIAL RECOGNITION TEST

	Response array: Four written words				Benton Facial Recognition
	Spoken stimulus (%)		Picture stimulus (%)		
	Proper	Common	Proper	Common	
Patient data					
S1	75	75	100	95	44
S2	90	45	70	40	38
S3	80	60	85	80	43
S4	85	75	90	80	40
Summary data					
Patients ( $n = 4$ )					
Mean	82.5	63.7	86.2	73.7	41.2
SD	6.5	14.4	12.5	23.6	2.8
Normal control ( $n = 4$ )					
Mean	100	100	96.25	100	49
SD	0	0	4.78	0	2.94

*Note.* Tests using spoken and pictured stimuli with written words as response choices. (Normal performance on the Benton Facial Recognition Test ranges from 41 to 54). Table includes mean performance and standard deviations for patients and normal control subjects.

glass. Since common, high-frequency nouns form the building blocks of auditory-verbal comprehension and are usually viewed as elemental in language behavior, we were surprised to discover that such patients could recognize proper nouns, i.e., familiar personal names, such as Charlie Chaplin and Elizabeth Taylor, which are relatively longer, linguistically more complex (see below), and (presumably) less frequent than common nouns (we know of no text-frequency counts that include proper names). Yet comprehension of spoken and written personal names was preserved despite a severe language deficit in four globally aphasic patients. To our knowledge, proper noun recognition has not been attempted with severely language-compromised patients, although in a related finding (Wapner and Gardner, 1979) patients with global aphasia showed preserved ability to identify place names on a map, and McKenna and Warrington (1978) reported on a single patient who showed category-specific preservation for naming countries.

These findings, that personal name recognition was preserved where noun recognition was impaired, challenge certain assumptions and beliefs about the effects of LH damage on language function. One such assumption is that disability is correlated with difficulty of the language task, such that performance decreases as linguistic complexity increases

(Shewan & Canter, 1971). This assumption predicts that common nouns would be more readily recognized than personal names, because by any linguistic measure, personal names must be viewed as more "complex" than common nouns. They are usually longer by phoneme and syllable counts (e.g., "Elizabeth Taylor" vs. "glass"), they are presumably much less frequent ("Charlie Chaplin" vs. "chair"), they are more often idiosyncratic in phonology ("Audrey Hepburn," "Nikita Krushchev") and orthography ("Sylvester Stallone"), and they ordinarily do not have morphological structure (i.e., they cannot be broken down into smaller meaningful units, such as *un-believe-able*). However, if proper names can be processed holistically (as chunks), then a linguistic evaluation on a complexity metric is irrelevant, and it follows that proper nouns are capable of being processed without linguistic analysis. Further, in the sense that word recognition has to do with appreciation of a lemma (the formless representation of word-form and word-meaning), our findings suggest that globally aphasic patients can access lemmas for proper nouns, but not common nouns, from visual or acoustic form.

Another claim which is indirectly challenged by these findings is that enduring prosopagnosia—defective recognition of familiar faces—requires damage to both the LH and RH (Damasio, Damasio, & Van Hoesen, 1982; Meadows, 1974). In this model, RH damage is said to interfere with processing of the facial pattern, while concomitant LH damage interrupts the association of the face with an identifying verbal label, the personal name. This model of face recognition predicts that LH damage would interfere with verbal labeling of familiar faces, although familiar face recognition processes might be intact.

Given these linguistic and neuropsychological models of name and face association, how are we to explain these new observations? Preserved abilities of language function in aphasia may be attributable to intact LH structures or to RH function. If represented in the RH, language abilities were there premorbidly or were transferred there from the LH (Burton, Kemp, & Burton, 1987). Several observations lead us to propose the RH as the present source and premorbid residence of the personal name recognition ability. First, these patients have variously distributed, extensive LH damage, encompassing the language areas. Yet in spite of such variability, each patient demonstrated the same preserved ability. Given the extent of LH damage and the poor performance on traditional linguistic tests, it is highly likely that the RH is playing a significant role in this function. That likelihood is further strengthened by patients' performance on the Benton Facial Recognition Test (Benton et al., 1983)<sup>1</sup> and data previously obtained on RH- and LH-

<sup>1</sup> Note that on the Benton Facial Recognition test, a test of unfamiliar face discrimination, patients with *either* LH or RH damage have been observed to perform below normal; we

damaged patients using a famous face–proper name matching test lend support to our hypothesis (Van Lancker & Canter, 1982). In that study, only 1 of 21 LH-damaged patients was impaired in matching proper (personal) names to (famous) faces; in contrast, in the RH-damaged group, 4 of 9 patients were so impaired.<sup>2</sup> Finally, the manner in which our patients performed the personal names tests was supportive of the RH hypothesis. All four patients responded quickly and confidently on personal names tests, a marked change from behavior in traditional language testing. Behavior in the proper names tests was organized and focused. Patient 2, who had the most profound language deficit, for example, chuckled while correctly matching the name of Rachel Welch and produced an expletive when correctly matching the name of Ronald Reagan to the corresponding photographs. In contrast, during the common noun task, his responses were hesitant and apraxic. As all patients used the left hand to respond on all the tests (because the right arm was hemiplegic), we suggest that the intact (contralateral) RH ability to perform the personal names tasks might account for greater ease of responding. We speculate that personal name matching to faces tapped RH competence, and therefore, output behavior was organized and correctly monitored by that hemisphere (Zaidel, 1987).

Finally, indirect support for the RH hypothesis comes from observations of patients' errors: of 32 errors, 6 were masculine names matched to feminine photographs or vice versa. From these choices, at least, we speculated that patients were either comprehending the *entire* proper name correctly, or they were not comprehending the stimulus at all. That is, inferences based on likely gender of first names were not utilized, suggesting that patients were not generally using a strategy of analyzing the words into components, an observation possibly related to the inability of the RH to perform phonological analysis (Zaidel & Peters, 1981). This notion remains to be confirmed by designing a test with balanced presentation of masculine and feminine targets and foils on a larger population of subjects.

We tentatively suggest that three qualities, or properties, of RH processing may account for the personal name results. The first is the well-known *pattern recognition superiority* of the RH, which contrasts with the *featural analysis* approach that is apparently specialized in the LH. We might explain the finding for personal names, invoking the ana-

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infer that these LH-damaged patients performed as well as they did because they have intact RHs.

<sup>2</sup> As further support, a RH-damaged patient in our clinic was tested on the proper/common protocols and found to have a pattern opposite to the LH patients, performing normally on comprehension of words, but scoring at 47% on the personal names tests. We have begun testing RH patients on these protocols.

lytic/holistic dichotomy (Bradshaw & Nettleton, 1983; Bogen, 1969), as follows. Language is characterized by sequences of discrete units which may be permuted according to specifiable rules. Sequencing and analysis of componential parts or "utilization of fully formed" codes (Goldberg & Costa, 1981) are the special abilities of the LH. We suggest that rather than being instances of language in that sense, proper names are unique (or, in this sense, "novel") (Goldberg & Costa, 1981) complex patterns, and thus can be efficiently processed by RH mechanisms. Thus they are not processed as linguistic sequences but as unanalyzed, unitary "chunks" (Simon, 1974), without phonological encoding (Zaidel & Peters, 1981). In the auditory modality, they are like musical chords (Gordon, 1970), pitch (Sidtis and Volpe, 1988), affective prosody (Bryden, 1982; Heilman, Scholes, & Watson, 1975; Ross, 1981; Tucker, Watson, & Heilman, 1977; Weintraub, Mesulam, Marcel, & Kramer, 1981), and the acoustic material cueing voice identity (Van Lancker and Kreiman, 1987; Van Lancker, Kreiman, & Cummings, 1989), which are better processed in the RH than in the LH. The graphemic representations of proper names may be compared to complex visuospatial constructions, which also, under many conditions, are specialized in the RH (Levy, Trevarthen, & Sperry, 1972). These auditory and visual stimuli all have in common that they are more successfully processed as unitary patterns than as sequences of units or features.

The second well-known property that may be related to storage and processing of personally familiar names is cognitive organization and management of affective stimuli. Several studies suggest that the RH is significantly involved in processing affective information in speech (Bryden, 1982; Heilman et al., 1975; Ross, 1981; Tucker et al., 1977; Weintraub et al., 1981), in facial expression (Borod, Koff, Lorch, & Nicholas, 1986), and in discourse content (Brownell, Carroll, Rehak, & Wingfield, 1989; Molloy, Brownell, & Gardner, 1990; Wechsler, 1973). Patients with severe aphasia are able to utilize affective information in communication (Boller, Cole, Vrtunski, Patterson, & Kim, 1979). In speech production, patients lacking interhemispheric connections were found to use a lower percentage of affect-laden words compared to that used by normal controls (Tenhouten, Hoppe, Bogen, & Walter, 1985) and were impoverished in affective content on several other measures (Tenhouten, Hoppe, Bogen, & Walter, 1986). (The large bodies of research associating affective behaviors and pattern recognition abilities with RH function need not be reviewed here).

A third property which may characterize RH specialization is *familiarity*, where "familiar" refers *not* to standard, conventional, well-routinized (Goldberg & Costa, 1981), or frequent (Layman & Greene, 1988) but to the sense of familiar that entails *personal meaning and relevance*. Using the term "familiar" in this sense, specific deficits in perceiving

personally familiar stimuli, or in familiarity perception, have been associated more frequently with RH than LH damage. Prosopagnosia, deficient familiar face recognition, occurs with RH damage, while prosopagnosic patients have little difficulty matching unfamiliar faces (Malone, Morris, Kay, & Levin, 1982; Tsavaras, Hecaen, & LeBras, 1970), and problems with unfamiliar faces do not show the same strong association with RH function (Benton et al., 1983; Malone et al., 1982). Studies in normal subjects have associated familiar face recognition with RH function (Ellis, 1983; Glass, Bradshaw, Day, & Umilta, 1985); in a recent study, judgments of facial expression and facial identity were performed independently (Young, McWeeny, Hag, & Ellis, 1986), and in another, RH specialization increased as familiarity of the stimuli increased (Ross-Kossak & Turkewitz, 1986). Phonagnosia, a deficit in familiar voice recognition, occurs in association with right parietal damage, while deficient unfamiliar voice discrimination is not lateralized (Van Lancker et al., 1989). Dichotic listening results support this association of familiar voice recognition with RH specialization in normal listeners (Kreiman & Van Lancker, 1988). The familiar/unfamiliar dichotomy exists also in language function: recent evidence suggests that familiar language, such as idioms and proverbs, is stored and processed in the RH (Van Lancker and Kempler, 1987), in contrast to newly encoded sentences. Finally, a number of neurobehavioral diagnoses involving distortions of familiarity perception or judgment implicate the RH. Capgras' syndrome, a belief that relatives and friends are imposters, often appears in RH damage (Alexander, Stuss, & Benson, 1979). Another neurobehavioral syndrome, loss of topographic familiarity, has been associated with RH damage; Landis, Cummings, Benson, and Palmer (1986) recently reported on 16 such patients suffering a loss of a sense of familiarity with their surroundings, all of whom had RH lesions (three had bilateral lesions). Deja vu sensations have been associated with damage in both hemispheres (Ardila, Montanes, Bernal, Serpa, & Ruiz, 1986; Brickner and Stein, 1942), but a predominance of RH foci has also been reported (Cole and Zangwill, 1963).

We speculate that the RH establishes *personal familiarity*, or *personal relevance*, for a variety of stimuli, attending to affective valences of those stimuli and managing these stimuli as "wholistic", i.e., unanalyzed or unitary. An interrelatedness between affective content and the sense of familiarity has long been noted (Zajonc, 1968) indicating, for example, that both positive and negative affects increase perceived familiarity judgments (Stephens, 1988). This use of affective labeling may aid the RH in distinguishing familiar from unfamiliar input in the environment. This model proposes that the RH identifies and maintains classes of personally familiar phenomena. Personal names qualify because, like familiar faces, voices, persons, idioms, and personal topography, each

is contextually unique and has a "personal history," unlike common nouns, literal language, and unfamiliar faces and voices. We propose that these three properties of stimuli (personally familiar, affective, and wholistic) together account for many of reported RH abilities.

These are preliminary observations, requiring confirmation from further testing, such as comparison of LB- and RB-damaged patient groups on familiar and unfamiliar personal names, and tachistoscopic and dichotic listening studies using proper nouns in normal subjects. It is also possible that proper nouns are more diffusely represented than common nouns in both hemispheres, with a greater RH role; it may be that the respective hemispheres utilize different strategies to successfully process proper nouns. Indeed, a recently reported naming deficit (in the production mode) for proper nouns was associated with LH damage in a single patient (Semenza and Zettin, 1988). Further studies in normal and clinical subjects may elucidate these questions. If supported by further testing, our observations suggest that familiar personal names, along with the associated familiar faces, can be successfully processed by the RH. Further, the proposal, that personal familiarity (or personal relevance) interacting with affective content and managed as unique patterns is a special property of RH communicative ability, has implications for rehabilitative techniques, which have traditionally focused on formal, objective language tasks. Greater success in management of severe language deficits may come from the use of individualized (Edelman, 1984), personally familiar (Holland, 1989) stimuli in speech/language therapy.

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