17. Preferential Representation of Personal Names in the Right Hemisphere

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Personal names do not have the linguistic properties of nouns and verbs. Nouns and verbs have morphological structure (as in *friend-li-er*), they form paradigms (such as *walk, walk-able,* etc.), and their denotations are generic (*table* refers to any table). In contrast, personal names are fixed patterns, they are not decomposable, and each has a unique referent. Because personal names do not have classic lexical features, they might not be processed in the brain in the same manner as other linguistic material. Instead, their holistic properties suggest a right-hemisphere (RH) specialization.

The suspicion that personal nouns might be represented in the brain differently from other lexical items was deepened by the performance of R. N., a patient with severe aphasia following a large lesion caused by a single left-hemisphere (LH) cerebrovascular accident (CVA). He was classified on the *Western Aphasia Battery* (*WAB*) as globally aphasic (Kertesz, 1982), with an Aphasia Quotient of 4.9/100 and a Comprehension Subtest score of 4.9/20.

In therapy, this patient was consistently observed by one author (D. V. L.) to match spoken words to pictures at 40%–55% accuracy (given two or four choices), while matching spoken names to one of four photographs of famous persons at 95% accuracy. To determine whether this preserved ability was present in other persons with severe aphasia, and whether the ability might be attributable to RH function, two experiments were conducted. We first evaluated proper name recognition in LH-damaged patients with global aphasia who had severe verbal comprehension deficits. Next, to investigate the role of the RH in the recognition of personal names, we compared the performance of LH-damaged patients with mild or moderate aphasia to patients with RH damage.

EXPERIMENT 1

Methods

Because we were interested in preserved auditory comprehension of personal names despite severe verbal impairment, only those patients were selected who scored lower than 10 (out of 20) on the Auditory-Verbal Comprehension subtest of the *WAB* (scores were 4.9–9.0, $M = 7.4$). We tested four right-handed male patients diagnosed on the *WAB* as globally aphasic, aged 58–68, ranging in education from 9 to 12 years, and tested between 2 months to 13 years poststroke. Computerized tomography (CT) scans revealed large, unilateral LH lesions. Ten normal-control subjects matched on age and education were also tested. Comprehension of single words was further assessed using common nouns (e.g., *window*) and the *Peabody Picture Vocabulary Test* (*PPVT*) (Dunn, 1959). The first personal names test ("Names1"), adapted from Albert, Butters, and Levin (1979), verbally presented 47 names (e.g., *Charlie Chaplin*). For "Names2," 25 stimuli were presented in both written and spoken form. On both tests, the response choices consisted of four photographs.

Results

As expected, the globally aphasic patients performed poorly on the *PPVT* and the noun recognition task. In contrast, in recognizing personal names, the patients performed similarly to normal-control subjects. An analysis of variance (ANOVA) revealed no significant differences between the two groups on either of the personal names tests. An ANOVA comparing the two groups on Names1, Names2, and *PPVT* scores showed significant main effects of group and task, and a significant interaction. Post hoc analyses indicated that these differences were accounted for by *PPVT* scores, whereas no differences were observed between normal subjects and patients on the personal names tests. Because the patients had extensive damage distributed throughout LH sites, we hypothesized that their superior performance on personal names might be attributable to functioning of their intact RHs.

EXPERIMENT 2

Method

Next, to assess the role of the RH in personal name recognition, patients with LH damage and mild-to-moderate aphasia were compared with

TABLE 17.1. INFORMATION ON SUBJECT GROUPS: MEAN VALUES AND STANDARD DEVIATIONS FOR AGE AND EDUCATION, MEAN MONTHS POST-ONSET (PATIENTS), AND *PICA* OVERALL SCORE

		Age		*Education*		*Months Post-Onset*	PICA *Overall Score*
	n	*M*	*SD*	*M*	*SD*		
LH	43	60.9	(7.3)	12.9	(3.2)	26.1	12.3 (7.2–14.5)
RH	30	60.0	(6.6)	12.6	(2.3)	24.4	—
NC	31	61.4	(5.5)	12.3	(2.3)	—	—

Note: Data were taken from 30 left-hemisphere-damaged patients. *PICA* = *Porch Index of Communicative Ability*. LH = left hemisphere. RH = right hemisphere. NC = normal-control.

patients with RH damage and a normal-control group (matched for age and education) (see Table 17.1). As determined by history, neurological exam, and CT scan, the patients had suffered only a single CVA. All but two in each group were male, and all were right handed.

All subjects were given a personal name recognition test (Names3) and a story comprehension task (Story Recall Test). On Names3, subjects identified photographs of famous individuals when their names were spoken by the examiner. The subject was shown 10 photographs at a time, was instructed to point to the photograph that corresponded to the name, and was told that some of the names would not be pictured.

The Story Recall Test probed subjects' abilities to comprehend and repeat verbal material. A simple fable ("The Fox and The Crow") was read aloud to subjects (Riege, Harker, & Metter, 1986). Following oral presentation of the story, subjects were asked to tell the story back to the examiner, presenting key ideas and details of the story in whatever manner they wished. Units of information were identified on an answer sheet and were later scored by the examiner in terms of percentage correct.

Results

Three types of responses on the Names3 test were used to calculate a score based on the theory of signal detection. A "Hit" was recorded if a person recognized the name by correctly identifying the photograph. A "False Alarm" (FA) was recorded if the subject pointed to a distracter when he or she heard the name of a person whose picture was not in the array, rather than stating that an appropriate match could not be made. If the subject matched an incorrect photograph to a target name, a "False

TABLE 17.2. *d'* SCORES ON NAMES3 TEST AND STORY RECALL

	Names3		*Story Recall*	
	M	*SD*	*M* (%)	*SD*
LH	1.34	(.83)	38.9	(21.7)
RH	.71	(.68)	51.2	(17.4)
NC	1.80	(.72)	57.4	(15.8)

Note: LH = left hemisphere. RH = right hemisphere. NC = normal-control.

Identification" (FI) was recorded. The total number of Hits, FAs, and FIs was used to calculate a *d'* value.

An ANOVA indicated a significant difference between LH, RH, and controls on the Names3 test (Table 17.2). (All significance levels are reported at $p < .001$.) A Scheffe test ($\alpha = .05$) indicated that the RH group had more difficulty than the LH and controls, and the LH group did not perform as well as the controls. When individual components that make the *d'* score (Hits, FAs, and FIs) were evaluated, it was found that although both the LH- and RH-damaged groups committed significantly fewer Hits than the control group, on FAs and FIs, the RH-damaged group made significantly more errors, and the LH-damaged group performed as well as the control group.

On the Story Recall Test, the groups differed significantly on their ability to report accurately the content of the fable. The LH-damaged group had more difficulty on story recall than the RH-damaged group or the control group. The RH-damaged group did not differ significantly from the control group on this task (Figure 17.1).

DISCUSSION

LH patients with global aphasia, despite severe auditory recognition deficits for single words, recognized spoken personal names as well as normal-control subjects. LH patients with mild or moderate aphasia were significantly better than RH patients at recognizing familiar personal names, while the LH patients performed worse than RH patients on story comprehension. Similar results, preserved recognition of names of celebrities in patients with aphasia and impairment in those with RH damage, have been reported previously (Van Lancker & Canter, 1982), whereas sparing of recognition of a similar linguistic category, geographic names, was reported by Wapner and Gardner (1979).

Preservation of personal name recognition in aphasic patients calls for an explanation, because it challenges the usual assumption and observa-

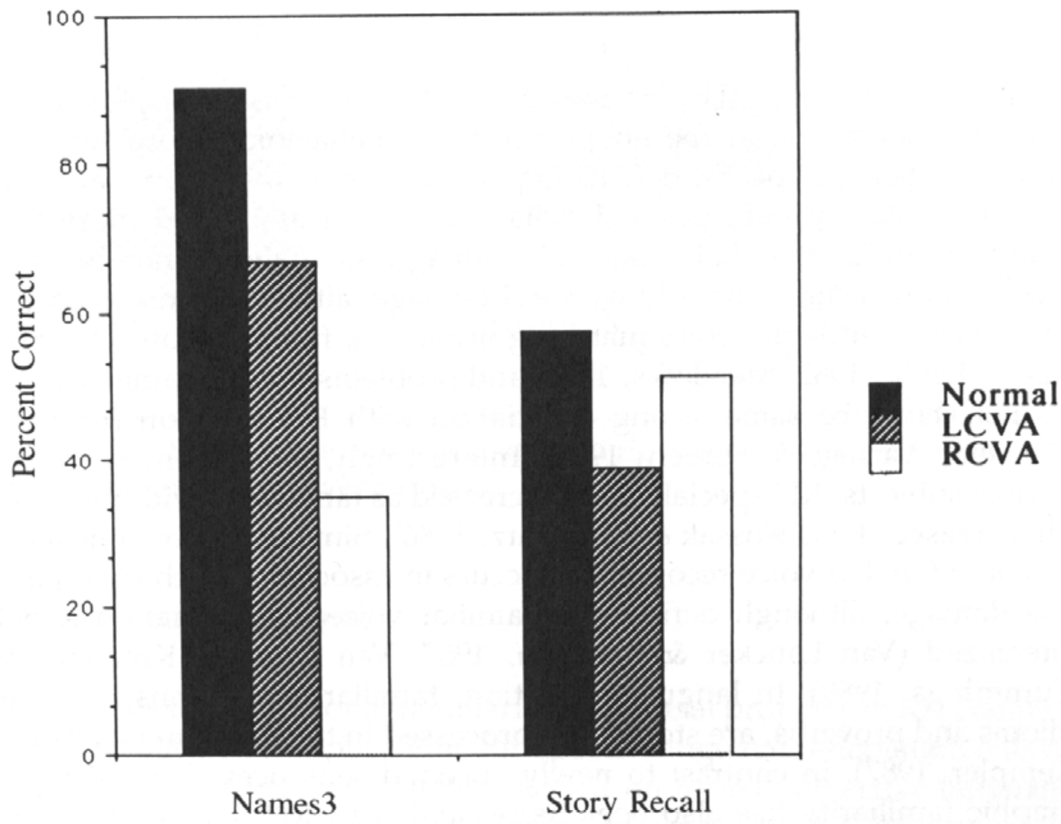

Figure 17.1. Performance by left-hemisphere, right-hemisphere, and normal-control groups on personal name recognition and story recall. LCVA = left cerebrovascular accident. RCVA = right cerebrovascular accident.

tion that language disability is correlated with difficulty of the language task, which predicts that common nouns, being simpler, will more easily be recognized than personal names. Personal names are usually longer by phoneme and syllable counts (e.g., "Dwight D. Eisenhower" vs. "dog"), they are less frequent ("Charlie Chaplin" vs. "chair"), they are often irregular in phonology ("Audrey He*pb*urn," "Nikita Kru*shch*ev") and orthography ("S*y*lvester Sta*ll*one"), and (except for the diminutive ending *-y*) they do not have morphological structure, but are processed as "chunks" (Simon, 1974). From the observations reported here, we propose that personally familiar proper nouns are retained in aphasia because they are stored and processed preferentially in the RH. This proposal has implications, first, for models of hemispheric specialization, and second, for clinical treatment of aphasic patients.

A Model of Brain Function

We propose that the RH identifies and maintains classes of personally familiar phenomena in the environment. In behavioral neurology and neuropsychology, specific deficits in perceiving personally familiar stimuli, or familiarity perception deficits, have been associated more frequently with RH than LH damage. Prosopagnosia (deficient familiar face recognition) occurs primarily with RH damage, although prosopagnosic patients have little difficulty matching unfamiliar faces (Malone, Morris, Kay, & Levin, 1982; Meadows, 1974) and problems with unfamiliar faces do not show the same strong association with RH function (Benton, Hamsher, Varney, & Spreen, 1983). Interestingly, in a recent study on normal subjects, RH specialization increased as familiarity with the stimuli increased (Ross-Kossak & Turkewitz, 1986). Similarly, phonagnosia, a deficit in familiar voice recognition, occurs in association with right parietal damage, although deficient unfamiliar voice discrimination is not lateralized (Van Lancker & Kreiman, 1987; Van Lancker, Kreiman, & Cummings, 1989). In language function, familiar expressions, such as idioms and proverbs, are stored and processed in the RH (Van Lancker & Kempler, 1987), in contrast to newly encoded sentences. Loss of topographic familiarity has also been associated with RH damage (Landis, Cummings, Benson, & Palmer, 1986). Thus there is evidence from other disciplines that the overall experience of familiarity, or the attribute of familiarity associated with specific behaviors, is disrupted in RH damage.

It is generally believed that the RH mediates a great deal of affective and emotional behavior (Borod, Koff, Lorch, & Nicholas, 1986; Heilman, Scholes, & Watson, 1975; Ross, 1981; Wechsler, 1973; Weintraub, Mesulam, & Kramer, 1981). An interrelatedness between affective content and the sense of familiarity has long been noted (Stephens, 1988; Zajonc, 1968). Thus, we suggest that the RH attends to affective valences of environmental stimuli, using affect to identify, label, store, and retrieve familiar mental objects. Further, the RH manages familiar stimuli as "holistic" or unitary (Bogen, 1969; Bradshaw & Nettleton, 1983; Bryden, 1982). The absence of structure in personal names makes them well suited for RH processing. We propose that these properties of stimuli—personally familiar, affective, and holistic (Figure 17.2)—together account for many reported RH abilities. In this model, while the LH is specialized for the neutral and objective units and features that are legally permutable, the RH is more favorably disposed to process unique, unitary patterns, which, in association with affective valences, have become personally familiar.

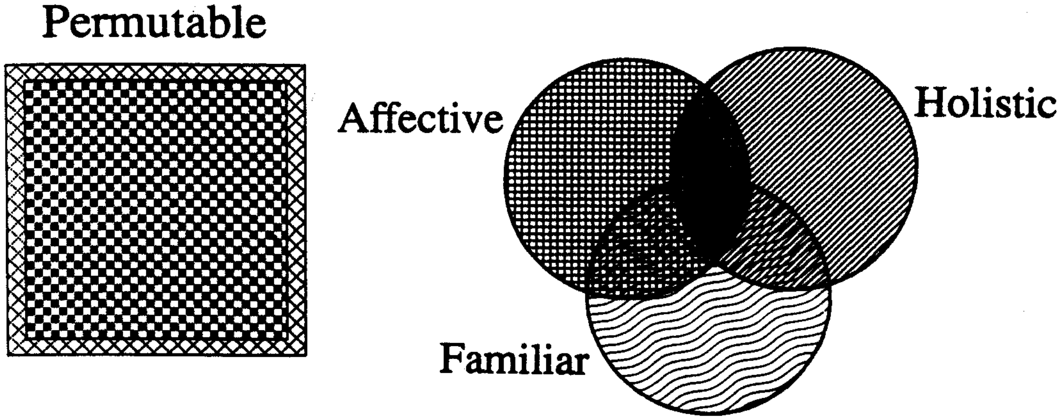

Figure 17.2. Schematic illustration of left- and right-hemisphere properties underlying communicative function.

Clinical Implications

The proposal that personal familiarity is a special property of RH communicative ability has implications for speech/language rehabilitative techniques, which have traditionally focused on formal, objective language tasks. Greater success in management of language deficits may come from the use of individualized (Edelman, 1984) and personally familiar (Holland, 1989) stimuli in speech/language therapy. Indeed, clinicians experienced in treating severe aphasia report using names that are personally familiar to the patient to stimulate language function (Goldojarb, 1989; Hadler, 1989). As a reflection of this current awareness, familiar items have been included in recent assessment instruments (e.g., Helm-Estabrooks, Ramsberger, Morgan, & Nicholas, 1989). Similarly, a study by Hunt and Square-Storer (1990) reported that contextually familiar settings facilitated language comprehension in severely aphasic patients. We suggest that these new trends in therapeutic approaches and recent experimental results can be explained by a model that proposes a special role of personal familiarity for the RH.

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