Bilingual Aphasia and its Implications for Cerebral Organization and Recovery

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Although approximately 80% of the world is bilingual, and approximately 75% is illiterate (UNESCO, 1965) the current state of knowledge on the cerebral organization of language is based almost entirely on research conducted with literate monolinguals. There is, therefore, a need for empirical investigation of the cerebral organization of language in nonliterate and partially literate polyglot and bilingual samples. Secondly, apart from isolated instances where on-the-spot translations of tests have been used, accurate measurement of differential effects on each language have not been successfully undertaken. Previous clinical and experimental observations, such as those discussed by Galloway (1983) may have failed collectively to reveal a consistent pattern of deficit, not only because the factors she suggests were ignored, but also because reliable testing procedures were not used. As a result, despite the conceptual, theoretical, and empirical problems of extrapolating from clinical data to language organization in the brains of a nondamaged sample, as pointed out by Caplan (1981), our current state of knowledge on cerebral organization of language in bilinguals is still in its infancy.

Although Critchley (1956) pointed out the complexity of factors to be considered in polyglot aphasia over twenty years ago, and noted the inadequacies of simplistic and dichotomous explanations of polyglot aphasia in the contribution it can make to knowledge of the cerebral organization of language, systematic study of polyglot and bilingual aphasia has only begun in the last decade. The notion that the cerebral organization of language in bilinguals may not be the same as in monolinguals is not new, however, (Paradis, 1977). Many of the 19th-century neurologists and clinicians reported cases of language deficits in polyglots in order to shed light on this controversial idea.

In the late nineteenth century, Ribot (1883) and Pitres (1895) proposed their respective 'rules' of recovery, which illustrate the arguments as they were then formulated. Ribot claimed that the oldest and first acquired language would first return and be better preserved following brain damage and the resulting aphasia. Pitres, in opposition to Ribot's 'rule of primacy' claimed that the 'rule of recency' would better apply. According to this rule, the most currently used language at the time of the injury would be less affected by damage and would be the first to return.

Implicit in the formulations of Pitres and Ribot is the notion that in bilingual aphasic patients, languages are differentially damaged or impaired. The three comprehensive reviews of the literature on bilingual and polyglot aphasia (Minkowski, 1963; Paradis, 1977; and Albert and Obler, 1978) offer evidence to support both the rule of primacy and the rule of recency. Even after subjecting 108 cases which could be found in the older literature to a number of statistical analyses, Albert and Obler (1978) were unable to unequivocally establish a pattern of deficit in the languages of bilinguals following brain damage.

Galloway (1982) has suggested that a number of other factors may influence the pattern of deficit in bilingual aphasic patients. From her comprehensive review of some 500 clinical and experimental studies, Galloway (1983) concluded that (a) manner of language acquisition, (b) degree of proficiency, and (c) the

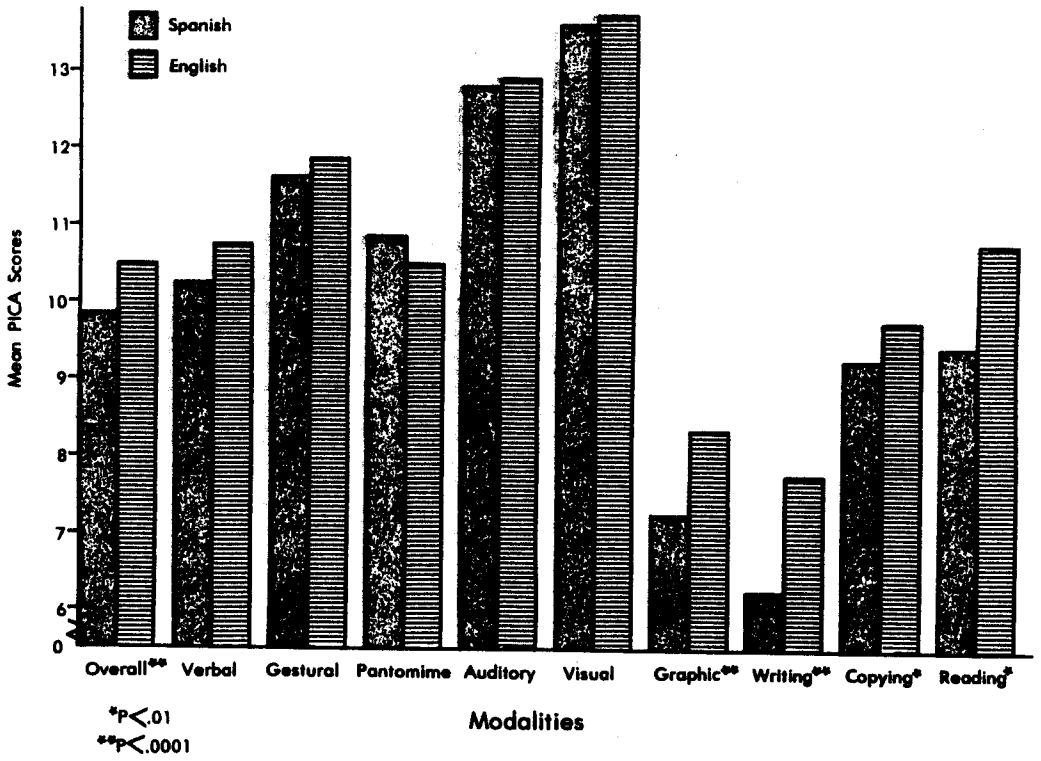

Figure 1. Mean PICA modality scores for English and Spanish groups.

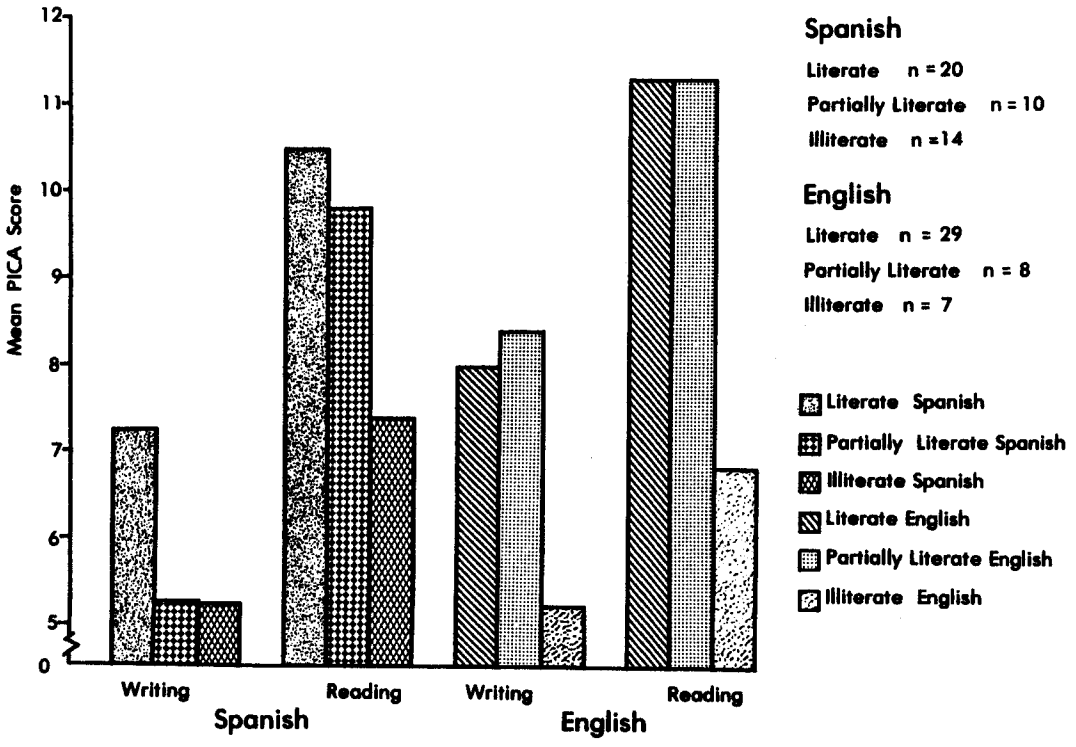

Figure 2. PICA means for reading and writing (adjusted for years of education) by literacy groups.

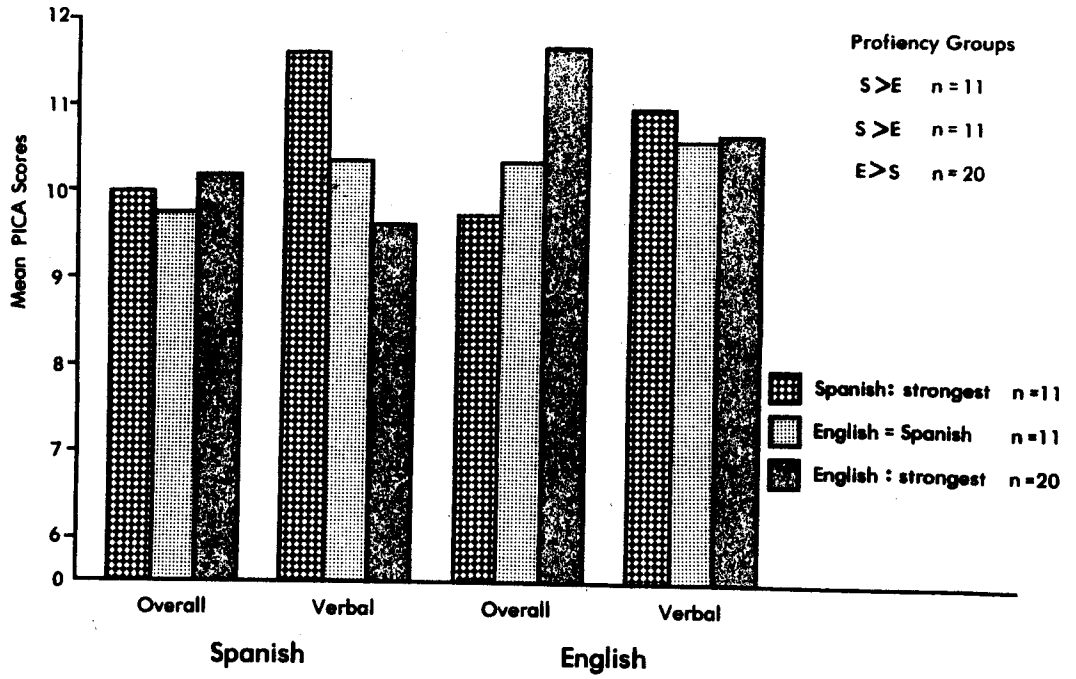

Figure 3. English and Spanish PICA Overall and Verbal means by proficiency groups.

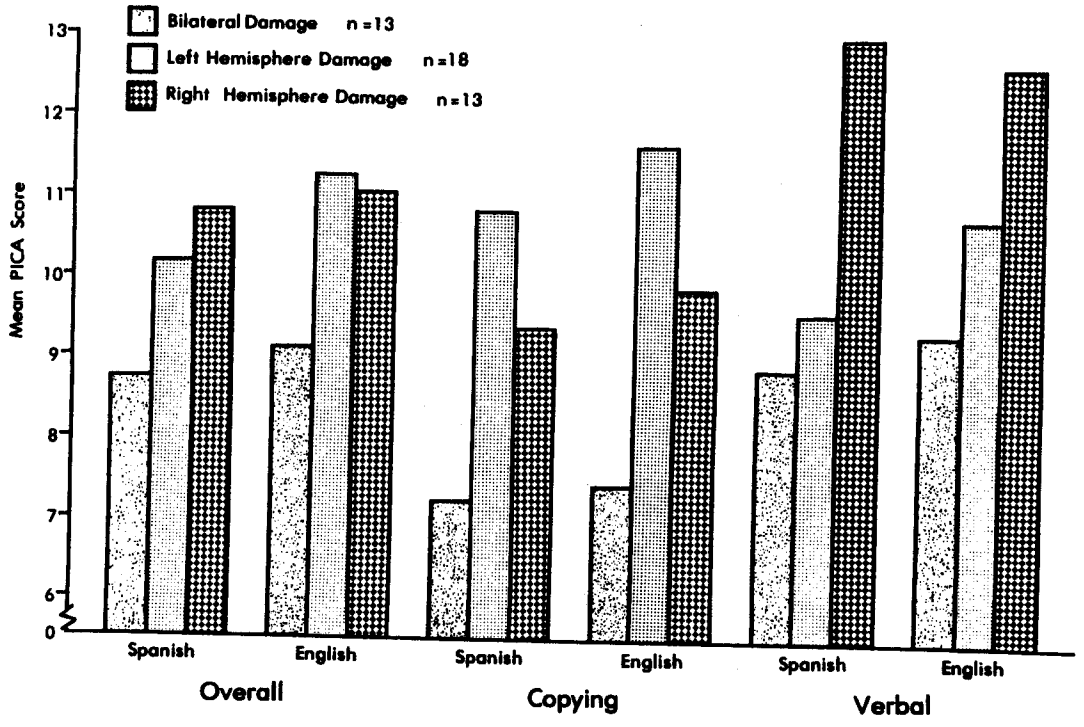

Figure 4. English and Spanish PICA Overall, Verbal, and Copying means, by hemisphere groups.

sociocultural setting of the use of the languages may all affect the cerebral organization of language in bilinguals and therefore affect the patterns of deficit that appear following brain damage.

Another factor which has remained a controversial issue in the literature is whether literacy contributes to the cerebral organization of language. While one study suggests that illiterates have cerebral organization which is different from that of literates (Cameron, Currier, and Haerer, 1971) another reports no differences (Damasio, Castro-Caldas, Grosso and Ferro, 1976). Since Weber (1904) there has been speculation that acquisition of reading and writing skills contribute to left hemisphere dominance for language (Bogen, 1975; Geschwind, 1972; Sperry, 1973).

It appears, therefore, that there are a number of controversial factors which have been said to affect the cerebral organization of language in bilinguals, and which need to be carefully studied. Although some of these factors have been examined in experimental studies using a variety of paradigms, clinical studies have been largely restricted to individual case histories. While single case studies can be a source of information, study of a larger clinical sample which examines a number of variables simultaneously can address questions of a wider range of interests. The present study, therefore, was designed with the following objectives:

1. To quantify, by use of a standardized test available in English and Spanish, the impairment in the two languages of bilingual patients.
2. To relate the relative deficits in the two languages to four factors;
   a. premorbid proficiency in the two languages,
   b. premorbid level of literacy in the two languages,
   c. premorbid relative use of the two languages,
   d. age and manner of acquisition of the two languages.

METHOD

Over a six-month period, all patients admitted to the neurology ward of the Albuquerque Veterans Administration Medical Center who were both bilingual and whose neurological examination included a diagnosis of brain damage were asked to volunteer to be subjects in this study. If a patient agreed to be a subject, the family was contacted to ascertain if they would be willing to complete a questionnaire about the patient's premorbid status.

An additional sample of patients was obtained by searching the records of the VAMC Speech Pathology Department. Bilingual patients with New Mexico addresses were contacted and about half agreed to participate in the study. An additional six patients were referred by a private speech pathologist. Any patient who had a history of chronic alcohol abuse or psychiatric problems was excluded.

The final number of patients included in the study was 44. Of these 18 had sustained left hemisphere damage, 13 right hemisphere damage, and 13 had bilateral damage. The localization of the lesion was obtained from neurological records, and whenever possible, verified by CT scan.

The Spanish PICA and the English PICA were administered in the standard manner, with the order of administration randomized. Twenty-five of the patients received the English PICA before the Spanish PICA, and 19 completed the Spanish PICA first. For patients less than six months post onset, the maximum time between the two tests was one week. For chronic patients, the time lapse between tests was no greater than two weeks. The questionnaire about the patient's language use and education was completed in an oral interview between the researcher and the family member or the patient, if the latter was above the 80th %ile and competent to answer the questions.

RESULTS

Degrees of differential impairment and abilities in the two languages of this sample of 44 patients are clearly related to premorbid differences in literacy, age of acquisition, proficiency, and usage. These significantly influential factors all appear to be linked to years of education, and to the language in which that education had taken place. Verbal-auditory abilities are not significantly differentially impaired.

The consistent, though generally nonsignificant superiority of English over Spanish offers evidence in contradiction to Freud's contention that the mother tongue is never more severely impaired than a second language. Minkowski's view that the language with the strongest affective and emotional ties would recover better was not supported.

No significant differences related to handedness were found, reiterating Ebing's (1981) recent views that the correspondence between motoric laterality and cognitive dominance is probably even more imperfect than previously believed.

Contrary to the usual, expected severity levels, the left-hemisphere damaged patients were less involved than would have been predicted in such a random sample, and the right hemisphere damaged patients were more involved than expected. In keeping with the recommendation of Porch and Callaghan (1981) that we should search for more correction factors to improve our prediction for recovery, this finding offers an intriguing possibility. One interpretation might be that the bilingual brain tends to use both the left and the right hemispheres for language processing. Therefore, patients with left hemisphere lesions may have extra language areas in the right hemisphere to assist the damaged left side of the brain, and consequently, left lesion patients may either have fewer deficits or better recovery than is typical. In contrast, bilingual patients with right hemisphere lesions should have more defitits or poorer recovery than usual, since the right hemisphere is partially responsible for communicative processing.

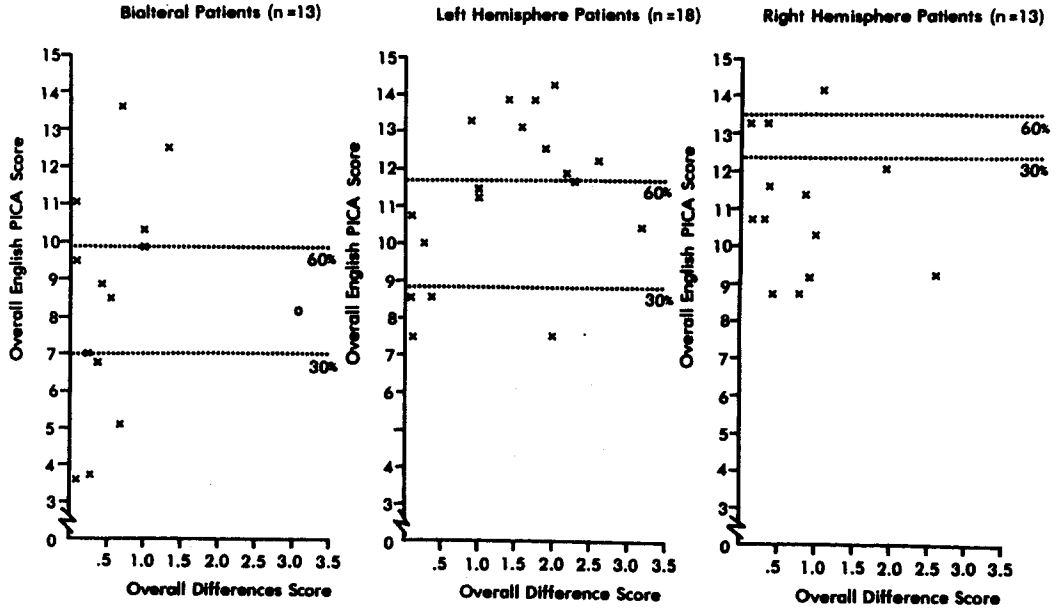

Figure 5. Scattergrams of differences between English and Spanish by overall English level of impairment, by hemisphere groups.

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