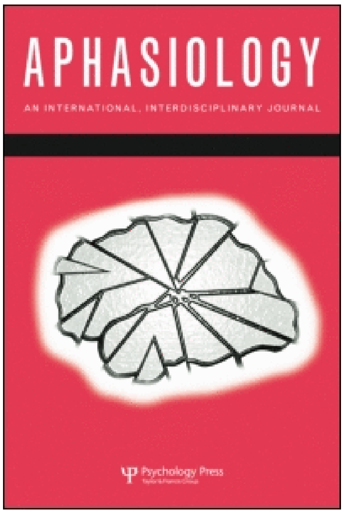

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Semantic paralexias in the Spanish language

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Abstract

The applicability of current psycholinguistic models of alexias (acquired dyslexias) to Spanish language is analysed. It is emphasized that Spanish language uses a graphophonemic reading strategy; and under *normal* circumstances logographic reading is not required. Four cases of alexia associated with semantic paralexias in Spanish speakers recently reported in the literature are examined. All of the patients were individuals with a high level of education, presenting a motor type of aphasia. Semantic paralexias were reported only after several months or years of intensive language therapy. Further, a review of 14 cases of patients with semantic paralexias published in English literature is examined. Most of these English speaking patients were males with a high school level of education, usually presenting with extensive lesions, and more frequently associated with a nonfluent aphasia. However, as a whole, the English sample appeared to be more heterogenous than the Spanish sample in most of the variables examined. It is proposed that, although Spanish reading proceeds using a graphophonemic strategy, additional strategies can also be introduced under special circumstances. Semantic paralexias represent a more commonly encountered and frequent phenomenon in English-speaking aphasics. This phenomena is quite unusual in Spanish-speaking aphasics, and is restricted to a very specific aphasic subsample. Lastly, it is proposed that the characteristics of alexic disturbances will positively correlate with the idiosyncracies of the respective writing systems.

Introduction

Different strategies to represent spoken language have been developed in human history. A major division has been established between logographic and phonographic writing systems (Sampson 1985). Logographic systems are those based on meaningful units (morphemes, words); whereas phonographic systems are those based on phonological (sound) units (table 1).

It seems reasonable to expect that alexia characteristics may correlate with the idiosyncracies of writing systems (Coltheart 1982). Unfortunately, alexias and agraphias have been studied particularly in Indo-European language writing systems, and cross-linguistic analyses are scarce. With the exception of some studies on the Japanese Kana and Kanji reading disturbances (e.g. Sasanuma and Fujimura

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Table 1. Different types of writing systems

Type of system	Writing unit	Example
Logographic	Morphemes, words	Chinese
Phonographic	Features	Korean
	Consonants	Hebrew
	Phonemes	Spanish
	Syllable	Kana
Mixed	Phonemes, morphemes	English

1971, Yamadori 1975, 1988, Sugishita *et al.* 1992), and a recently published case of alexia without agraphia in Arab language (Al Alaoui-Faris *et al.* 1994) comparative research on alexias and agraphias in different languages has been limited (Miceli *et al.* 1994).

It is important to note that among bilingual brain damaged individuals, the ability to read in different writing systems can become dissociated. That is, alexia can affect only (or, mainly) one of the two reading systems. And this holds true not only for overtly and evidently different writing systems, such as syllabic Kana and logographic Kanji (Sasanuma and Fujimura 1972, Yamadori 1975, Iwata 1984), but even for closer alphabetic writing systems, such as Russian and French (Luria 1960); and even Spanish and English. Reading in different writing systems may represent different cognitive tasks; and therefore, brain organization of written language may be somewhat different.

Some studies have approached the question of interlinguistic differences in written word recognition (lexical decision) tasks. Haata (1978, 1992) observed in Japanese Kanji a left-visual field advantage for single-character words and the reverse for two-character words. Similar results have been reported in the Chinese language (Rastatter *et al.* 1989). Rastatter and Scukanec (1990) suggested that, when comparing English-proficient Chinese-mandarin speakers and a group of monolingual English speakers in a lexical decision task, English-speakers had a dissociation between the left and right hemispheres for linguistic processing; while in Chinese subjects, the left hemisphere was responsible for the final phonological stages in linguistic analysis.

Lukatela and Turvey (1990) proposed for the Serbo-Croatian languages, a model of written language recognition in which word processing was mediated by phoneme processing units. Additionally, Yamada *et al.* (1990) proposed a dual-route hypothesis for reading syllabic Japanese Katakana: lexical access may be achieved by both a process of assembled segmental phonology and the use of a visual orthographic lexicon. These studies as a whole indicate that lexical access and lexical decision can be under the influence of the idiosyncracies of the individual reading systems.

Psycholinguistic and cognitive approaches to alexias

During the 1970s and even more so in the 1980s a new approach to the alexia (dyslexia) analysis was introduced. Investigators began to wonder about the nature of the cognitive and linguistic deficits responsible for the observed reading disturbances (Marshall and Newcombe 1973, Patterson 1978, Beauvois and

Dérouesné 1979, 1981, Coltheart 1980a, b, Shallice and Warrington 1980, Patterson and Kay 1982, Coltheart *et al.* 1983, Shallice *et al.* 1983). In the alexia sphere, the interest somehow switched from the anatomical correlates of acquired reading disturbances to the functional mechanisms underlying the alexias (Friedman and Albert 1985, Friedman 1988, Ellis 1993). This new cognitive and linguistic approach to the study of alexias, implied the development of models for normal reading. During the following years, several (partially, but not completely coincidental) cognitive models of normal reading were presented (e.g. Coltheart 1980a, Marcel 1980, Morton and Patterson 1980, Friedman 1988, Roeltgen 1993). In general, it was proposed that reading, after initial letter identification, may proceed along two different routes:

(1) A 'direct' route: the written word is associated with a visual word in the lexicon memory. The string of graphic symbols is matched to an abstract representation of the orthographic composition of the word; and the meaning of the written word can then be retrieved. Ideographic writing systems (e.g. Chinese) rely on this direct route, because a graphophonemic correspondence is nonexisting. In languages such as English, a great amount of homophonic heterography is observed (e.g. morning, mourning; blue, blew) and the direct route has to be frequently used when reading. Also, English has dreadful words like 'yacht'.
(2) An 'indirect' route: the written word is transformed into a spoken word following a graphophonemic set of rules, and the meaning of the word is attained through its phonological mediation, as when understanding spoken speech (Marcel 1980, Friedman and Albert 1985). This indirect route is strongly used in graphophonemic reading systems, using sufficiently clear graphemes-to-phonemes correspondence rules (e.g. Spanish language).

Cognitive models for normal reading were developed using the English language, which has a quite irregular reading system. The English writing system does not directly map onto the phonological language system. It might be described as a compromise between the phonological and logographic reading principles (Sampson 1985). Reading words is partially achieved following some specific grapheme/phoneme correspondence principles, and partially achieved following a visual whole *gestalt* recognition—not necessarily analysed into individual letters. Words like 'Dog', 'Man', and 'Pistol', are regular (i.e. grapheme/phoneme correspondence is regular) and pronunciation is predictable from their spelling. Whereas 'Island', 'Women', 'Yacht', and 'Knight' are irregular words (i.e. pronunciation cannot be predicted from their spelling). Words such as 'Through', (in opposition to 'Thought' or 'Though') can be read only taking into account the whole word.

In English writing, each letter combination can represent different sounds (homographic heterophony), and different letter combinations can represent the very same sounds (homophonic hetegraphy). The English alphabet has 26 letters to represent nearly 40 phonemes; and English ortography has 219 spellings for 24 consonants, and 342 spellings for about 17 vowels (Dewey 1971, Taylor 1981). Hence, its enormous complexity is clearly evident. The irregularity observed in English results from the mixture of different spelling systems that have been used throughout English history (Sampson 1985), and the changes in pronunciation presented during the last centuries. It is therefore understandable that two different reading systems have been proposed for English language ('direct' and 'indirect', or simply, logographic and phonographic) (e.g. Marshall and Newcombe 1973, Patterson 1978, Coltheart 1980a, Warrington 1980).

Departing from this dual reading system, three types of alexias (or acquired dyslexias) have been distinguished in English language: phonological alexia, surface alexia, and deep alexia, each one with its specific pattern of errors. Within reason, this three-alexia-model fits quite well in the partially mixed English writing system: logographic (surface alexia), phonological (phonological alexia), or both (deep alexia) reading abilities can be impaired in cases of brain pathology. The applicability of this three-alexia model to other writing systems, particularly to purely graphophonemic reading systems, such as Spanish, has been challenged (e.g. Ardila *et al.* 1989, Ardila 1991).

In particular, deep alexia has generated a great deal of interest in recent years. Several distinguishing characteristics have been proposed to be found in deep alexia:

(1) The most important feature of deep alexia is the occurrence of semantic paralexias in oral reading (Coltheart 1980b). Semantic paralexias refer to reading errors related to the meaning of the target word (e.g. hand → foot; house → building). Different types of semantic paralexias have been distinguished: (a) the paralexic error may be a synonymous of the target word (e.g. lawyer → attorney); (b) it may be an antonym (e.g. big → small); (c) it may be associated to the target word (proximity) (e.g. cigarettes → matches); and (d) it may correspond to a superordinate word (e.g. dog → animal) (Friedman 1988).

(2) The success in reading single words is affected by: (a) the grammatical category: function words (grammatical particles) are particularly difficult to read, and nouns are easier to read than adjectives or verbs. This reading pattern is observed in the alexia associated with Broca's aphasia (anterior or frontal alexia; Benson and Ardila 1996, Benson 1977), and in fact, deep alexia is usually associated with Broca aphasia (Coltheart *et al.* 1980, Kaplan and Goodglass 1981); and (b) Concreteness: concrete nouns are read better than abstract nouns. Paralexic errors are more frequent in abstract than concrete words.

(3) It has been observed that in phonological alexia, the patient cannot make use of the grapheme-phoneme rules of conversion; in consequence, pseudo-words cannot be read (Coltheart 1980a).

(4) Visual and derivational (i.e. verbal morphological) paralexias are always present.

(5) Deep alexia is always associated with aphasia and agraphia (Friedman and Albert 1985).

Different explanations of semantic paralexias have also been proposed: (a) It has been suggested that language semantic system is imprecise. Upon presenting a written word, several related words can become activated, and the correct selection requires the use of (unavailable to these patients) phonological mechanisms (Marshall and Newcombe 1973, Saffran and Marin 1977, Newcombe and Marshall 1980). (b) Sometimes, semantic paralexias are not clearly related to the target word (they correspond, strictly speaking, to verbal unrelated paralexias, not to verbal semantic paralexias; Ardila and Rosselli 1993), and in consequence, there is a semantic deficit in addition to the phonological deficit (Morton and Patterson 1980). (c) Several authors have argued that deep alexia, and particularly, the presence of semantic paralexias simply reflects the reading capability of the intact right hemisphere (e.g. Coltheart 1980b, 1983). (d) Deep alexia in general, and semantic paralexias in particular, have been interpreted as a stage in the recovery from total alexia (Benson 1985).

Reading and writing in Spanish language

There are idiosyncratic characteristics of the Spanish language which should be specially recognized. The Spanish language possesses a phonologically transparent reading system, and a less transparent writing system. Ambiguity in its reading writing system goes only in one direction: many words potentially can be written in different ways (orthographic rules) (e.g. the spoken word /muxer/ (woman) might be written *mujer* or *muger*; the first one corresponds to the accepted spelling), but read in only one way (e.g. *mujer*—as any word or pseudoword—can be read in *only one* way, as /muxer/). In other words, in Spanish, homophonic heterography can be found, whereas homographic heterophony is absent (table 2).

Two different types of errors can be found in Spanish writing:

(1) 'Homophone errors' (usually referred in Spanish as 'orthographic errors') (e.g. the word *mujer* is written as *muger*, both are read exactly the same and both phonologically represent the spoken word /muxer/). Thus, phonographemic conversion is appropriate, but not performed according to the accepted Spanish orthographic rules; and

(2) 'Non-homophone errors' (usually referred to in Spanish as 'writing errors'). The 'non-homophone errors' are due to *some* letter additions, letter omissions and letter substitutions which change the written representation of the spoken word (e.g. if the word /muxer/ were written as *muer*-omission- it not longer corresponds to phonographemic conversion of the spoken word /muxer/).

The first type of error ('homophone' or 'orthographic') is very frequently observed in Spanish-speaking subjects, particularly in low educational-level individuals. The second type ('non-homophone') is extremely unusual, except in brain-damaged individuals (Ardila *et al.* 1996). Spanish-speaking people consider only the second type of error ('non-homophone') to be a *real* writing error, because graphophonemic reading results in a pseudoword. The first type of error ('homophone') is referred to only as 'orthographic errors'.

From the Spanish language perspective, a word containing a homophone ('orthographic') error is *not* a nonsense pseudoword. Homophone errors do not involve the substitution of a phoneme (in such a case, the error would be a 'non-homophone' error), but that substitution (or addition, or omission) of a letter which in that particular position results in a string of letters that is phonologically equivalent to the target word.

Correct writing in Spanish requires the appropriate use of an established set of rules ('orthographic rules') (Seco 1988). Homophone errors are often found in those syllabic clusters where alternative ways of writing are possible (homophonic heterography). Evidently, this distinction between 'orthographic' and 'writing' errors is not applicable to the English language. In English, both error types are

Table 2. Phoneme-grapheme correspondence in Spanish language

Phoneme	Grapheme
/b/	b, v
/s/	c (before e, i), s, z
/tʃ/	ch
/d/	d
/f/	f
/g/	g (before a, o, u) and gu (before e, i)
/i/	i, y (as a conjuction and in diphthongs)
/x/	j, g (before e, i)
/k/	c (before a, o, u) and qu (before e, i)
/l/	l
/ʎ/ or /j/	ll
/m/	m
/n/	n
/ɲ/	ñ
/p/	p
/r/	r
/r̊/	rr, r (at the beginning of a word)
/t/	t
/k/ + /s/	x
/j/	y
—	h
/a/	a
/e/	e
/o/	o
/u/	u

simply referred to as 'spelling errors'. From a Spanish language perspective, the error 'Doctor → Doktor' would obviously be an orthographic error, and the error 'Taking → Taging' would represent a writing error. However, the errors 'Through → Thrugh' and 'Mourning → Morning' are not easily classified as either orthographic or writing errors.

Oral spelling involves the provision of a verbal response in which the correct sequence of letters forming a word is spoken. Because of its phonographemic writing system, spelling is not used in the Spanish language as a meaningful cognitive task as it is in the English speaking world. The spelling of a word is an artificial (and nonsense) task in Spanish writing. This also holds true in other phonological writing systems (e.g. Russian, Italian, etc). Spanish speakers request information about orthographic decisions, not about phonographemic transcriptions (i.e. to the question, 'How do your write the word /muxer/?', every Spanish speaker will answer 'With J /xota/'). Highly educated Spanish speakers very often have difficulties spelling a word orally. Usually, they cannot understand spelled words. If they are required to spell a word, very likely they have to write it down.

Orthographic decisions are frequently taken by writing down the word, to see 'how it looks'. Orthographic errors in the Spanish language are not necessarily associated with aphasia. They are more frequently found in cases of right hemisphere pathology (Ardila 1984, Ardila *et al.* 1996). The increased number of

Table 3. Word recognition (lexical decision) task in Spanish language. Effects of frequency, number of letters (NOL), and number of syllables (NOS) on reaction times (only polysyllabic words) (according to Ardila *et al.* 1993)

	Frequency	NOL	NOS
Correlation	0.319	0.247	0.281
Regression: $F =$	13.373	7.689	10.135
$p <$	0.0004	0.007	0.002

orthographic errors found in cases of right hemisphere pathology could point to the hypothesis that orthographic knowledge may represent a somehow visuo-perceptual ability for Spanish-speakers.

Logographic reading is not required (under normal conditions) to read Spanish. The longest units read as a whole (i.e. only considering the whole-letter sequence, the phonology, and further the semantics, can the word be deduced; even though, the phonology of these letter-clusters is rule-governed) are certain syllables composed of three letters (in letter combinations such as GUI and GUA). It would seem reasonable to assume that Spanish reading proceeds using a syllabic reading (syllable-by-syllable) system, whereas the English language might resort to a stronger morphemic reading (Morpheme-by-morpheme) system.

It is also interesting to note that in the Spanish language, written-word recognition (lexical decision) tasks are influenced by both a word-frequency effect, and a word-length effect. Moreover, the correlation between word frequency with the number of syllables ('phonological length'), is higher than the correlation of word frequency with the number of letters in the word (Ardila *et al.* 1993) (see table 3). Accordingly, it seems reasonable to assume that the syllable, might be the fundamental 'reading unit' in Spanish, whereas in the English language, the basic 'reading unit' more likely corresponds to the morpheme.

The 'reading unit' (quite likely, the syllable) is usually meaningless in Spanish. In polysyllabic words (accounting for the majority of words in Spanish) the word meaning is attained only after sequencing a string of syllables. This process evidently requires phonological mediation. Conversely, in English, the 'reading unit' (the morpheme) might be meaningful, and in consequence, the reading system could be interpreted (at least partially) from a logographic system (Sampson 1985).

Departing from these theoretical considerations, and from direct clinical observations, it has been proposed that, semantic paralexias, and in consequence deep alexia, should be rather infrequent occurrences among Spanish speakers (Ardila *et al.* 1989, Ardila 1991). In addition, deep alexia is not expected to occur in Spanish language reading, unless some logographic reading component were present (for example, when reading highly frequent logograms) (Ardila 1991).

Recently, however, several cases of semantic paralexias and deep alexia have been reported in Spanish-speaking aphasics (Dalmas, personal communication 1991, Ruiz *et al.* 1994, Diaz 1995, Ferreres and Miravalles 1995). Their analysis may increase the understanding about normal and abnormal processes involved in reading.

Spanish-speaking patients with semantic paralexias

Tabulating the available cases of semantic paralexias and deep alexia reported to the present in Spanish language (table 4), some common characteristics are found:

(1) All the patients suffered the onset of brain damage a significant amount of time prior to the observation of semantic paralexia. In other words, no semantic paralexias were found during the following months or (in some cases) years after the onset of brain damage. In Ruiz *et al.* (1994) Case 1, it is reported that 10 months after his CVA, 'total alexia existed with regard to the patient's capacity to read aloud...', and only 'after 6 months of intensive therapy' (p. 248) semantic paralexias were observed. In Case 2, it is noted that soon after the patient's CVA, he presented 'maximal production and comprehension deficits both for spoken and written language... Patient's improvement thereafter took place as he was submitted to an intensive programme of speech therapy.' (p. 248). Obviously, patients could have developed new reading strategies, that were not existing during the premorbid period.

(2) All the patients present a high level of education. One of the patients was a scientific researcher (Diaz 1995). For at least two patients, reading was one of their major premorbid activities (Ruiz *et al.* 1994, Case 1 and Case 2). One patient was the author of several articles and books (Ruiz *et al.* 1994, Case 1). Another patient (Ruiz *et al.* 1994, Case 2) studied Latin and Greek, and of course, it is unfair to state that he was an unilingual Hispanophone, As Ruiz *et al.* claim. Ferreres and Miravalles' (1995) patient was fluent in five different languages. In a certain way, these patients would not be considered average standard Spanish readers. Most probably, they were not only Spanish language readers. That is, they could have been trained to use some other reading strategies in addition to usual Spanish reading strategies. In Ferreres and Miravalles' patient, the Diaz patient, and in Ruiz *et al.* Case 2, this is clearly evident.

(3) All the patients presented either a Broca or a conduction aphasia. Hence, a motor-type aphasia (conduction aphasia can obviously be interpreted as an afferent *motor* aphasia; Luria 1966). Therefore, these patients suffered from a verbal production defect. Evidently, the question at this point is: 'Are the semantic paralexias a result of a visual-perceptual (or a cognitive-processing) impairment?' Or, rather, 'Are they the result of some motor-production deficits?' Diaz (1995) assumes that the semantic paralexias in her conduction aphasia patient were equivalent to the semantic paraphasias in oral language. According to her interpretation, semantic paralexias may result from the inability of the patient to produce the series of phonemes corresponding to the written word; and the patient prefers to replace the target word for another—semantically equivalent word—existing in the patient's active lexicon. it is important to note, that most frequently, deep alexia has been reported to be associated with Broca's aphasia (Kaplan and Goodglass 1981). Evidently, in Broca's aphasia those brain areas involved in visual information processing are unaffected, whereas brain areas involved in language production are impaired. The type of alexia usually associated with Broca's aphasia (frontal alexia, Benson 1977, 1979, Benson and Ardila 1996)

Table 4. General characteristics of the patients presenting semantic paralexias in Spanish language

Author	Age	Gender	Handedness	Schooling	Profession	Time post-onset	Aetiology	Location	Type of aphasia	Language therapy
Diaz (1995)	75	M	Right	University	Scientific researcher	18 months	Infarct	Parietal	Conduction	Yes
Ferreres and Miravalles (1995)	50	M	Right	12 years	Unknown	5 years	Infarct	Fronto-parieto-temporal	Broca	Yes
Ruiz *et al.* (1994)										
Case 1	63	M	Right	University	Lawyer	16 months	Infarct	Fronto-parietal	Broca	Yes
Case 2	57	M	Right	University	Informatic system programmer	15 months	Infarct	Fronto-temporo-parietal	Conduction	Yes

shares basically the same clinical characteristics described for deep alexia (except semantic paralexias). That is, deep alexia might be considered simply as a frontal alexia with semantic paralexias.

(4) Observing the whole sample of errors presented by all the reported patients, it is evident that a significant percentage of errors (sometimes, most of the errors) correspond to verbal morphological paralexias. A high frequency of morphological (derivational) paralexias in Spanish-speaking aphasics has been pointed out in literature (Ardila *et al.* 1989, Ardila 1991, Ardila and Rosselli 1993). This notoriously high number of morphological (derivational) paralexias might depend on the scanning strategy used when reading. However, to the best of this author's knowledge, no systematic cross-language comparisons of the relative number of different types of paralexias has been published to date.

It might be proposed that; (a) semantic paralexias are more likely to occur after speech therapy; the probability of developing new reading strategies, non-existing during the premorbid period, may be raised, and (b) considering that in all the reported cases the patients could speak (and read) two or several languages, it might be suggested that these patients may have been more prone to rely on other reading strategies, than those patients not previously exposed to other reading systems.

English-speaking patients with semantic paralexias

Comparing deep alexia cases reported in available English literature, it is interesting to note that some general characteristics are found (table 5):

(1) Most of the patients are males (12 out of 14), and this also holds true for the Spanish-speaking sample (four out of four);
(2) All the subjects have a minimum of 10 years of formal education. Nonetheless, the average education level is lower than in the Spanish-speaking sample;
(3) In the majority of the cases, the lesions are quite extensive. Landis *et al.* (1983) have pointed out that those aphasic patients who produce semantic paralexias have significantly larger lesions than those without semantic paralexias;
(4) The majority of the patients presented a Broca (or global) aphasia associated with frontal-parietal, frontal-temporal, or frontal-temporal-parietal pathology. However, some of them presented with atypical cerebral lesions (see table 5); and
(5) All the patients received language therapy. Apparently, this is indeed the only common factor. Of course, this could be an artificial result, given that usually, speech therapy patients are generally available for research purposes. However, it is also possible that language therapy reinforced certain logographic reading strategies.

As a whole, the sample appears quite heterogenous with regard to all other considered variables (age, gender, handedness, schooling, time post-onset, etiology, location, and type of aphasia).

Landis *et al.* (1983) found in an unselected sample of English-speaking aphasics, that over 50% (11 out of 20) presented one or several semantic paralexias in

Table 5. General characteristics of the English speaking deep alexics

Author	Age	Gender	Handedness	Schooling	Profession	Time post-onset	Aetiology	Location	Type of aphasia	Language therapy
Berninger *et al.* (1991)	18	M	Right?	GED	Roofer	2 years	Trauma	Fronto-parieto-temporal	Global?	yes
Caramazza and Hillis (1990)	62	F	Right	14 years	Sales	4 years	Vascular	Occipital	Anomia?	yes
Caramazza and Hillis (1990)	62	M	Right	12 years	Personnel manager	4 years	Vascular	Fronto-parietal	?	yes
Friedman and Perlman (1982)	54	M	Right	16 years	Accountant	7 years	Vascular	Fronto-parieto-temporal	Broca	yes
Glosser and Friedman (1990)	23	M	Right	16 years	Accountant	6 weeks	Trauma	Right frontal	Unknown	yes
Glosser *et al.* (1990)	33	M	Right	13 years	Carpenter	2 months	Trauma	Fronto-temporo-parietal	Global	yes
Katz and Lanzoni (1992)	59	M	Right	10 years	Postal worker	3 months	Vascular	Fronto-temporo-parietal	Broca	yes
Klein *et al.* (1994)	27	M	Right	University	Electronics engineer	6 months	Trauma	Fronto-parietal	Broca?	yes
Laine *et al.* (1990)	38	M	Right	16 years	Technician	4 years	Vascular	left perisylvian	Nonfluent	yes
Matthews (1991)	37	M	Right	12 years	Unknown	3 years	Vascular	Fronto-temporal	Broca	yes
Nickels (1992)	43	M	Right	16 years	Military officer	5 months	Vascular	Temporal parietal	Wernicke	yes
Roeltgen, (1987)	54	M	Right	Unknown	Unknown	2 years	Vascular	Parietal	Broca	yes
Saffran and Marin (1977)	51	M	Right?	12 years	Legal secretary	3 years	Vascular	Fronto-temporal	Broca	yes
Schweiger *et al.* (1989)	38	F	Ambi-dextral	12 years	Unknown	9 months	Vascular	Fronto-parietal	Broca	yes

reading 36 words. It is interesting to note that among their 11 patients with semantic paralexias, four presented with a fluent aphasia, and seven were of the non-fluent type. Moreover, five patients presented with a right visual field defect. Without doubt, semantic paralexias in the English language can be observed in a quite heterogenous group of aphasics, despite the fact that they are more frequently found in nonfluent than in fluent aphasics (Coltheart *et al.* 1980, Kaplan and Goodglass 1981). Landis *et al.* concluded that although semantic paralexias are produced in a lower rate by 'common aphasics' than by 'deep alexics', the fact that about half of unselected aphasics presented with at least one paralexia indicates that semantic paralexias are actually a common phenomenon in English-speaking aphasics.

Comments

It has been proposed that, if one could find a brain dysfunction with a single clinical manifestation of surface alexia, that dysfunction would likely remain subclinical in unilingual school-educated hispanophone. Furthermore, such a dysfunction might turn out to be clinically detectable if testing for reading abilities included subtests of items such as 'jeep' or 'souvenir' (Lecours 1992, Ruiz *et al.* 1994). Obviously, Lecours and colleagues had in mind a subject with a relatively high level of education; most Spanish speakers when presented with the word 'jeep' will read: '/Xeep/, oh! it must be /jip/!'). Of course, 'jeep' and 'souvenir' are not Spanish words.

If a Spanish-speaking subject when presented with the word 'jeep' reads /jip/ (correct English reading) instead of /xeep/ (Spanish graphophonemic reading) this only means that the individual is *not* reading in Spanish. That is, the subject has learned to partially read using another writing system (English). Evidently, any unilingual Spanish (or English, or whatever language) speaker could also learn to read (or recognize) words written in Chinese (logographic system), or Korean (feature-based system), and most likely this would be the case if Chinese or Korean words were frequently found in everyday life. It must be noted, however, that he/she would not be reading Spanish (or English, or whatever); rather, he/she would be simply reading in Chinese or Korean.

Coltheart (1982) analysed a bilingual (Spanish-English) *developmental* surface dyslexic subject. He proposed that homophonic confusions could be found in this surface dyslexic individual when reading in Spanish. Phonological spelling errors were also common in the patient's writing under dictation in Spanish. However, two observations should be taken into account: (1) despite the existence of homophones, these word elements are notoriously less common in Spanish than in English; and (2) phonological spelling errors (simply, 'orthographic errors' for Spanish speakers) are extremely common among normal Spanish speakers. As an example, in a sample of 106 subjects (third grade children and university students), and using a 95-word dictation task, it was found that all children and over 90% of the university students presented some orthographic errors (Ardila *et al.* 1996). It is understandable that, as a result of the graphophonemic writing system, orthography (note that Spanish orthography cannot be simply equated with English spelling; see above) is not as important in Spanish as it is in English. According to Coltheart (1982), if a language lacked homophones and if alternative spellings of a single sound were impossible, surface dyslexia *could not* exist. An example of this regularity can be found in the Italian language, and therefore, 'None of the symptoms of surface dyslexia can be observed in Italian dyslexics' (p. 160). No doubt, differences in reading strategy have to be taken into consideration.

It is interesting to note that when appropriate opportunities are provided (i.e. when frequently exposed to written language), illiterate individuals usually learn to correctly recognize ('read') a great deal of written words, particularly logograms. Illiterates learn to recognize 'Coke', 'Marlboro', store names, many different products, their own name, the name of their country and city, 'entrance' and 'exit', 'men' and 'women', and many other different words frequently found in their everyday environment. Goldblum and Matute (1986) studied the impairments in this ability to read common words in a sample of brain damaged illiterate subjects. In cases of left- but not right-hemisphere pathology, this ability to 'read' common words was impaired. Furthermore, in cases of 'alexia' in illiterate individuals, a significant number of semantic paralexias was observed. However, semantic paralexias (semantic errors when recognizing words; e.g. instead of 'reading' a particular beer brand, they 'read' a different beer brand) are also frequently observed in normal non brain-damaged illiterates. This type of semantic 'paralexias' is also observed in literate Spanish speaking aphasic (Ardila 1991). It therefore seems reasonable to assume that reading in the Spanish language proceeds using a graphophonemic strategy. This, however, does not prelude the possibility that eventually some other additional strategies can also be developed. For instance, when reading high frequency logograms, or when special reading training is provided.

In summary, even though semantic paralexias are actually a common phenomenon in English speaking aphasics (Landis *et al.* 1983), they represent a quite rare and unusual phenomenon among Spanish speakers. Most probably it is restricted to a very limited subsample of aphasic individuals: highly-educated (and even eventually multilingual) patients, with a motor type of aphasia, and occurs following a lengthy language therapy process. Semantic paralexias may be found to occur in quite diverse and heterogenous groups of English-speaking aphasics. Without doubt, many more cross-linguistic comparisons of alexias and agraphias in different languages are strongly required.

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