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BILINGUAL STRATEGIES FOR APHASIA: EVIDENCE FROM TYPOLOGICALLY CLOSE LANGUAGES

Abstract: Communication deficits may affect the ability of bilingual individuals to select an appropriate linguistic code for a given context (Muñoz, Marquardt & Copeland 1998). This may result in the combination of different languages in an utterance or the insertion of isolated words from another language in otherwise monolingual exchanges (Gloning & Gloning 1965; Mosner & Pilsch 1971). In order to characterize the use of code switching (CS) and code mixing (CM) in Catalan-Spanish individuals with aphasia (IWAs), we analyzed spontaneous speech samples of 300 words in 4 participants, 1 with moderate motor aphasia, 1 with moderate mixed aphasia (predominantly motor) and 2 age-matched non-brain-damaged controls (NBDs). Different patterns were found across IWAs. IWA01 produced more instances of CM: 45.4% of the output he produced in Catalan consisted of isolated words in otherwise Spanish utterances. The other participant, IWA02, produced more instances of CS: 38.5% of the Catalan output consisted of full clauses. For both IWAs, the isolated Catalan words produced were all lexical words; grammatical Catalan words were produced only in the context of other, lexical Catalan words. In line with Abutalebi and Green (2007), our results seem to indicate that moderate aphasias of motor predominance can result in a disruption of the activation/inhibition mechanism at play in bilingual individuals. This may manifest itself in different forms. However, CM is still constrained. While lexical words in the non-target language can appear in isolation, grammatical words are restricted to appearing in the context of lexical words from the non-target language. We attribute these restrictions to differences in prominence and dependency properties between grammatical and lexical words (Boye & Harder 2012).

Key words: bilingualism, aphasia, code-switching, code-mixing, romance languages.

1. A word on bi-/multilingualism & bi-/multilingual aphasia

At the turn of the 20th century, more than half of the world population was considered to be multilingual (Grosjean 1982 1994). Currently, this number is almost 70% (Weisensee 2007). Quantification of the bilingual or multilingual population of the world depends on the way we define these terms, which we use interchangeably in this paper. Traditional definitions vary across authors, and can be arranged in a continuum defined by the underlying concepts of competence vs. performance or command vs. use. The continuum is framed by two distant positions. On the one end we have views such as Haugen's (1953), who claimed that people who could produce complete meaningful utterances in a language other than the native language are to be considered bilingual. On the other end, we have more restrictive views such as Bloomfield's (1933), who claimed that only native-like control of two languages is to be accepted. In between, we have the views of Mackey (1962), who claims that bilingualism is the ability to use more than one language, and Weinriech (1953), claiming that bilingualism consists of the alternating use of two languages.

Nowadays, language use plays a central role in most definitions. Accordingly, the concept of balanced bilinguals, corresponding to Bloomfield's proposal, is abandoned as a definiens. In this paper, we will adopt Grosjean's (1994) proposal and define bilinguals as those individuals who use more than one language or dialect in their everyday lives (Grosjean 1994; Fabbro, 2001). This view is, however, far from unproblematic given that variability across individuals classified as bilinguals is going to be remarkable.

Variability is going to have a direct impact on the individual characteristics of language use and the observed deficits in case of brain damage. In the realm of language pathologies different phenomena will have to be considered. These include differential recovery and generalization patterns, the implementation of differential strategies such as the use of code switching and code mixing (crucial for our discussion here), and emergence of pathological fixations or alternations and translation disorders.

1.1 Brain damage and bilingualism

In 1770, Johann Gesner provided what is probably the first description of dissociation in language performance in different languages in the event of brain damage. After testing the reading skills of an individual in Latin and German, Gesner observed that whereas Latin was preserved, German was not. During the

18th and 19th century, interest increased due to figures such as Jacques Lordat (1773-1870), Théodule-Armand Ribot (1839-1916), and Albert Pitres (1848-1928).

In 1895, Pitres published the *Etude sur l'aphasie chez les polyglottes* "Study on aphasia in polyglots". In this early work, he established that more familiar languages are recovered first (Pitres' law) and that comprehension tends to precede production during the recovery process. This contradicts Ribot's (1882) law according to which the native language is the one to be recovered first.[1]

Interestingly, Pitres (1895) also suggested that "cortical centers for language" are to be held responsible for the symptoms observed in bilingual patients. This position, later to be know as a 'dynamic view', would become the most agreed upon position. Deficits are seen as alterations in the system of language control (Pitres 1895; Abutalebi & Green 2007; Green 1986; Green & Price 2001; Paradis 1998; 2004). This stands in opposition to the more traditional 'localizationist' view, according to which bilinguals' languages are represented in different brain areas or even hemispheres (Albert & Obler 1978).

Pitres (1895) also acknowledged the possibility of differential recovery routes varying across individuals. These include parallel, selective and successive recovery. In two seminal works published in 1977 and 2001, Paradis provided an exhaustive list of all possible observable recovery patterns in bilingual aphasia (see Table 1), indicating that parallel recovery is the most commonly attested pattern. Similar evidence was provided by Fabbro (2001): parallel recovery 65%, greater impairment of L2 20%, greater impairment of L1 15%.

These patterns may be influenced by both pre- and post-stroke physical and psychological factors (Kiran 2009). Among the pre-stroke factors, the degree of bilingualism, the context and age of acquisition, the structural distance among languages, and the domain of use of each language have been found to play a role. Post-stroke factors such as neurological damage, aphasia type, and severity are also to be taken into consideration together with psychological factors such as the emotional bond with each language (Gómez-Ruiz 2010; Gitterman et al. 2012). This complexity limits the outcome predictability and calls for individual solutions for each bilingual person with aphasia (see Kuzmina et al. 2019 for a recent meta-analysis).

[1] Note that Ribot's Law derives from his work on retrograde amnesia, where recent memories are more susceptible to be lost than the more remote ones.

Pattern	Definition	Prevalence
Parallel recovery	Both languages impaired & recovered at the same rate	61%
Differential recovery	Languages recover differentially relative to their premorbid levels	18%
Selective recovery	One language is not recovered	5%
(Alternating) antagonistic recovery	One language recovers to a certain extent & starts regressing when the other begins to recover	--
Successive recovery	Recovery of the second language may begin after the first has recovered	--
Mixed/Blended recovery	Mixed patterns or mutual interference between languages	7%

Table 1. Recovery patterns in bilingual aphasia (Paradis 2001)

Although still scarce or unavailable for many languages, different tests have been designed to characterize language deficits in bilingual and multilingual individuals. The most widely know test is the *Bilingual aphasia test* (Paradis & Libben 1987; Paradis 2001). Other aphasia batteries available for bilingual Spanish speakers are the *Multilingual Aphasia Examination* (Rey & Benton 1991; Benton, Hamsher & Sivan 1994), standardized and normed on American Spanish, and monolingual batteries available in a wide variety of languages such as the *Western Aphasia Battery* (Kertesz, Pascual-Leone & Pascual-Leone 1990), the *Psycholinguistic Assessment of Language Processing in Aphasia* (Kay, Lesser & Coltheart 1992), and the *Boston Diagnostic Aphasia Examination* (Goodglass & Kaplan 1986; Spanish norms available in Rosselli, Ardila, Florez & Castro 1990). These tests help identifying the relative degree of impairment or preservation of each individual and language.

1.2 Code Switching and Code Mixing

Communication deficits may affect the ability of bilingual individuals to use appropriate linguistic codes in a given context (Muñoz, Marquardt & Copeland 1998). This may result in: a) the combination of different languages in an utterance, generally referred to as code switching (CS), or b) the insertion of

isolated words from another language in otherwise monolingual exchanges, known as code-mixing (CM) (Gloning & Gloning 1965; Mosner & Pilsch 1971).[2]

These two phenomena appear frequently in the speech output of non-brain-damaged bilinguals; note for instance the existance of varieties such as Spanglish, a combination of Spanish and English which is used in some cases as an identity signature among minorities in the United States. Hence, it is important to establish a distinction between CS and CM on the one hand and pathological CS and CM on the other. We refer to pathological CS and CM in the event of improper combinations of elements from two or more languages in the same word or sentence. Combinations may appear at different levels (phonological, morphological, lexical, syntactic, semantic). In example (1a), the lexical word *store* appears in an otherwise Spanish sentence. In (2a), different phrases are produced in different languages; for comparison, the Spanish version is provided in (1b) and (2b).

(1) Code mixing:
   a. Vamos a la *store* = Spanish sentence + English N
   b. Vamos a la tienda 'We go to the store'

(2) Code switching:
   a. Fue *la meva dona* = Spanish V + Catalan NP
   b. Fue mi mujer 'It was my wife'

According to Albert and Obler (1978), CS and CM are observable in around 7% of bilingual individuals with aphasia. In a study of a patient with a frontal lesion, Fabbro, Skrap and Aglioti (2000) found that CS in L1 was less prevalent than in L2 (71 vs. 94) in the bilingual aphasia test. CM was almost nonexistent (2 in L1; 0 in L2). In the same test, the examiner produced 0 instances of CS and CM in L1 and L2.

In addition to CS and CM, bilingual individuals with aphasia may also display cases of pathological fixation, pathological alternations and translation disorders. Pathological fixation prevents the speaker from switching to another language present in his/her repertoire. Pathological alternations consist of the use of uncontrollable and frequently alternating complete sentences in different

[2] Definitions vary among scholars and disciplines. For instance, code mixing is sometimes linked to the language system ('competence'), whereas code switching is used to refer to observable changes in language use.

languages. Translation skills may also be altered in the event of brain damage. Among translation disorders, we find the inability to translate in any direction, the compulsive need to translate everything (spontaneous translation), translation without understanding (patients do not understand but they can translate), and paradoxical translation (ability to translate into a language that is inaccessible, linked to the inability to translate the language that can be used). Code-switching/mixing and translation disorders are not mutually exclusive.

1.3 Theoretical background and aim of the study

As noted in sections 1.1. and 1.2, there are two main topics in the study of bilingual aphasia: 1) recovery and generalization patterns, including the organization of languages in the brain, cognitive control, the role of acquisition, and the factors affecting recovery; and 2) pathological code switching and code mixing (Gitterman Goral & Obler 2012). In this paper we deal with the second topic. More specifically, we aim at determining whether there are different constraints on the use of grammatical than on lexical words from the non-target language.

Our distinction between lexical and grammatical words is based on the theory of the grammatical vs. lexical distinction in Boye and Harder (2012). In this theory, lexical words are defined in terms of the potential to express the discursively primary (or foreground) point of a linguistic message and in terms of the possibility of constituting the only word in an utterance (as in *Car!* or *Fire!*). In contrast, grammatical words are defined as conventionalized carriers of discursively secondary (or background) information, and thus as dependent on combination with a lexical 'host' word for expression (cf. the fact that the auxiliary *gonna* cannot constitute an utterance on its own).

These definitions entail a diagnostics for identifying and distinguishing lexical and grammatical words. Since only lexical words have the potential to express the discursively primary point of an utterance, only lexical words can be pointed out as discursively primary by means of focalization or addressation, and only lexical words can be modified (since modification entails elaboration, and elaboration has a foregrounding effect) (see Boye & Harder 2012, on focalization and addressation, and Messerschmidt et al. 2018 on modification). In contrast, grammatical words, being coded as discursively secondary, resist focalization, addressation and modification (outside metalinguistic and corrective contexts, where the code (i.e. the concevention) is overridden; see Boye & Harder 2012: 8-9,

17-18 for further discussion). In addition, only lexical words can be the sole element in an utterance; grammatical words cannot.

Based on these diagnostics, we compare the production of lexical non-target-language-words with the production of grammatical non-target-language-words in bilingual Catalan-Spanish individuals with stroke-induced aphasia and in matched non-brain-damaged individuals. Based on the definitions of lexical and grammatical words in Boye and Harder (2012), we hypothesize a specific difference between the use of grammatical and lexical non-target-language-words: since grammatical words depend on a lexical host, we expect that non-target-language-words appearing in isolation in the target language will not be grammatical, but lexical. This hypothesis entails that the contrast between grammatical and lexical words plays an important role in shaping the language patterns of bilinguals with aphasia – side by side with factors such as premorbid proficiency and language use (Kuzmina et al. 2019).

2. Methodology

2.1 Participants

Four Spanish-Catalan bilingual informants participated in the study: 2 participants with moderate chronic non-fluent aphasias (PWAs; male, mean age 60.5) and 2 age-matched non-brain-damaged controls (NBDs; male, mean age 57.5). The 2 PWAs were proficient in Spanish premorbidly. Background information about participants is found in Appendix 1.

2.2 Data collection

Data were collected by means of a semi-standardized interview fully conducted in Spanish in order to control for language mode (in line with Grosjean 2000). The interview included questions about the informants' last job and holidays (Rosell 2005). 300 word samples were analyzed. Quantitative and qualitative analyses were conducted. All instances of CS and CM were annotated. CM and CS were identified and distinguished in accordance with the definition given in Section 1.2: insertions of isolated words from another language in otherwise monolingual passages were identified as cases of CM; combination of different languages not limited to single-word instances were identified as cases of CS. Spanish-Catalan cognates were treated as Spanish words and therefore not considered cases of CS or CM.

3. Results

No instances of CS or CM were detected in the speech output of the 2 informants in the NBD group. Hence, we will focus on the results of the PWA group alone.

Out of the total of 300 words analyzed per participant, PWA 01 produced 10.33% in Catalan, while PWA 02 produced 16%. Substitutions were found both at the word and at the sentence level as illustrated in Figure 1 below:

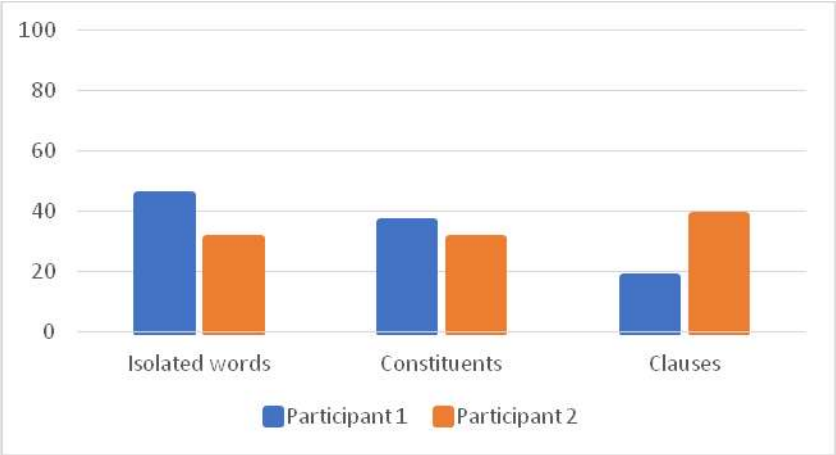

Figure 1. Catalan elements in Spanish discourse per participant

However, different patterns were found across informants. PWA 01 produced more instances of CM: 45.4% of the output he produced in Catalan consisted of isolated words in otherwise Spanish utterances. PWA 02 produced more instances of CS: 38.5% of the Catalan output consisted of full clauses (see Appendix 2).

As for the distinction between lexical and grammatical non-target-language-words, both PWAs show the same pattern: all non-target-language-words appearing in isolation in the target language are lexical. No instances of isolated grammatical non-target-language-words were detected. Consider (3), where italics indicate Catalan words/clauses in an otherwise Spanish discourse. (3a) contains an isolated lexical non-target-language-word: the lexical (i.e. focalizable and modifiable) Catalan adverb *ara* ('now') appears in isolation in a Spanish utterance. (3b) contains grammatical non-target-language-words (*i* 'and' and possibly *al* 'to the', the latter of which is however identical for Spanish and Catalan); in contrast to *ara* in (3a), these grammatical Catalan words are found in the context of other

Catalan words. Specifically, they co-occur with a lexical host: the lexical pronoun *nostre* which constitutes the prepositional complement of *al*.

(3) a. o sea *ara* últimamente # el vino quince días # (PWA 01)
that is *now* lately # he came 15 days #
b. *anem al nostre i* # por la tarde # no (PWA 02)
we go to-the ours and # in the afternoon # no

In contrast to PWA 01, PWA 02 also produced 2 examples of translation.

(4) a. Por la *manana # *demana # *demà* # (PWA 02)
In the morning # morning # tomorrow #
b. <*em*> <e*m*> me dejé
I… I… I

In (4b), PWA 02 starts producing the Catalan reflexive pronoun *em*. This is a grammatical word and thus cannot be produced in isolation. Rather than producing the accompanying lexical word in Catalan, however, the speaker switches back to Spanish, translating the pronoun into Spanish *me* and producing the accompanying lexical verb *dejé*: *me dejé* 'I go'.

4. Discussion

Moderate aphasias of motor predominance can result in a disruption of the activation/inhibition mechanism at play in bilingual individuals (cf. Abutalebi and Green 2007). In the present case, similarities between the target language (Spanish) and the other language spoken by the informants (Catalan) may favor the change of code. However, CM is still constrained by the lexical-grammatical distinction. CM, consisting in the insertion of isolated words, is only possible with lexical elements.

Bi-/multilinguals may allow for one language to influence the lexicon and/or the grammar of another language(s) by means of 'interferences' or 'transfers' (Weinreich 1953). But we found that while lexical words in the non-target language can appear in isolation, grammatical words are restricted to appearing in a context where they co-occur with a lexical 'host' word from the same language.

As discussed in Section 1.3, we hypothesized this difference between lexical and grammatical non-target-language-words based on the difference in dependency claimed by Boye and Harder (2012): grammatical words depend on

the co-occurrence with a lexical host, whereas lexical words can sometimes stand alone; because of this, we argued, grammatical non-target-language-words are unlikely to be found in isolation in the target language.

This line of reasoning is not entirely accurate, however. Nothing in Boye and Harder (2012) precludes that a grammatical element from one language would co-occur with a lexical host from another language. Such co-occurrences are in fact found in non-brain-damaged speech, as witnessed by example (1), where the grammatical Spanish article *la* co-occurs with the lexical English word *store*. In order to explain our main finding, then, we need to supplement the dependency account with an assumption that the language of a selected lexical element will define the language of the grammatical elements that depend on it. This in turn entails that the activation/inhibition mechanism at play in bilingual individuals may not be completely inoperative in aphasia (although of course dependent on the degree of severity of the agrammatic deficit).

This discussion must of course be seen in light of the fact that our data are limited.

5. Conclusion

Bilingual individuals with aphasia may resort to another language to overcome difficulties in their speech output. However, although the use of CM and CS differs across individuals, CM is restricted by the lexical-grammatical contrast. Specifically, our data suggest that bilingual individuals with aphasia may produce lexical words in isolation when they switch to the non-target language, but not grammatical words.

This has implications for the clinical practice. According to Junque, Vendrell, Vendrell-Beret and Tobena (1989), a.o., language mixing is frequently observed during the course of recovery of bilingual individuals with aphasia. Our results seem to indicate that bilingualism can be used to enhance the communicative effectiveness of individuals with aphasia, in typologically close languages in bilingual societies.

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