

TWO LANGUAGES IN ONE MIND AND THE ONLINE PROCESSING OF CAUSATIVES WITH MANNER-OF-MOTION VERBS¹

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ABSTRACT: This paper reports the results of a self-paced reading experiment measuring reaction times to the presentation of an object noun phrase in sentences containing transitivized verbs of manner-of-motion producing a causative reading. Such constructions are licensed in English, but not in Brazilian Portuguese. In the experiment, comparisons were made across performances of monolingual native speakers of Brazilian Portuguese and monolinguals of English reading in their respective native languages, as well as bilinguals of Brazilian Portuguese and English with limited L2 vocabulary reading in their L2 and bilinguals of the same languages, but with vast L2 vocabulary, reading in their L2 and in their L1. The results provide evidence that the bilingual subjects with higher proficiency were able to form a verb class (manner-of-motion verbs) in their L2 and depart from the restrictions of their L1 grammar. Moreover, the results demonstrate that L2-like behavior is obtained when bilinguals perform in their L1. The findings are interpreted as evidence of multicompetence in bilingual sentence processing.

KEYWORDS: Multicompetence; bilingual sentence processing; cross-linguistic influences; argument structure.

INTRODUCTION

Bilinguals perform certain cognitive tasks that at close scrutiny reveal interesting facets of their linguistic profile. They are capable of moving swiftly and apparently effortlessly from a communicative scenario requiring performance in one of their languages to communicative scenarios requiring the other. They are also capable of translating from one language into the other. Such feats are suggestive of bilinguals' capacity to inhibit one of the languages they possess as they use the other, thus separating them. On the other hand, at least some bilinguals may often code-switch, letting lexical items and even structures of one of their languages (even if it is the second language) emerge as they produce utterances in the other. This, along with certain

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specialized skills such as simultaneous translations, may be suggestive that dual access to the two languages, or even integration of these languages, is part of what it means to be bilingual.

As argued by Hernández, Fernández & Aznar-Besé (2007), bilingual sentence processing studies generally aim at shedding light on the question of how two or more languages are represented, activated and interrelated in an individual's mind. The present study is an attempt at bringing contributions to the realization of such goal, with a specific focus on how knowledge of a second language (L2) may affect performance in the first language (L1). Specifically, the study explores a pattern of argument structure realization of English: the construction referred to by Levin (1993) as the induced movement alternation with verbs of manner-of-motion. In this construction, prototypically intransitive, agentive verbs of manner-of-motion transitivize to express an event where a causer leads an agent to perform the event expressed by the verb. Critically, English and Brazilian Portuguese (BP) differ in respect to the grammaticality status of such a construction, which is licensed in the former language but anomalous in the latter. This study sought to investigate whether bilingualism affects the online parsing of sentences that force the induced movement alternation into the first language of Brazilian Portuguese-English bilinguals. Drawing on the perspective that the state of linguistic knowledge of bilinguals is best described as “multicompetence”, or a “compound state of a mind with two grammars” (Cook, 1991: 112), the experiment reported here sought primarily to test the hypothesis that the second language could affect performance in the first, therefore revealing that access to syntactic representations of the two languages of a bilingual can occur at least among individuals who achieved certain levels of proficiency in the L2.

The present study departs from the study reported in Souza & Oliveira (2011). That study explored similar questions about the same construction; but the methodology employed for the analyses considered verbs separately, assuming that differential statuses might be held by different verbs over the continuum of language learning. In the present study, we probe the hypothesis that the processing procedures for the induced movement alternation achieved by bilinguals proficient in their L2 would be guided by generalizations for all verbs of manner-of-motion that participate in the induced movement alternation. In other words, the present study is also an attempt to explore in the context of bilingualism the psychological reality of Levin's (1993) notion of a verb class, understood as a set of verbs carrying similar core semantic properties that license them as participants in certain syntactic constructions.

The next two sections cover the theoretical foundations for the present study. In the first one the construction studied is described, and in the second one cross-linguistic influences in bilingual competence and performance are discussed. The third section describes the materials and methods employed in the empirical component of the study. The fourth section shows the results and discusses them. The article is concluded with thoughts and considerations about its meaning and implications to the psycholinguistic study of bilingualism.

1. THE INDUCED MOVEMENT CONSTRUCTION WITH VERBS OF MANNER-OF-MOTION:

The potential for expression of events in which an actor is conceived as triggering another event seems to be a pervasive feature of the grammars of natural languages. In English, a causative reading is allowed by constructions in which a subset of unergative verbs expressing manner-of-motion transitivize. Sentence (1) below exemplifies the use of an unergative verb, and sentence (2) highlights the same verb in a transitive construction, where the reading is causative.

(1) The students ran around the field.

(2) The coach ran the students around the field.

Brousseau & Ritter (1992) refer to these constructions such as sentence (2) above as the “compelled movement alternation” (p. 54), whereas Levin (1993) calls them the induced movement alternation. The authors propose that in such constructions there are two agentive arguments (or “active” arguments, in their terminology). The duplication of agentive arguments in the the induced movement alternation stands in contrast with the intransitive use of the unergative verb. The contrast is illustrated in sentence (1) above, where the argument referred to by the NP “the students” is the agent of “run”, and in sentence (2) where another agent is introduced for the overarching causative event (“the coach”) along with the argument “the students”, which is read as the actual agent of the verb *run*. Brousseau & Ritter analyze the conceptual framework sustaining the dual transitivity of run-like verbs as stemming from a distinction between direct and indirect agentivity. This distinction relies on the perspective that direct responsibility for an event is conceptually represented as a semantic primitive – symbolized by the predicate DO –, and so is indirect responsibility, which is symbolized by the

predicate CAUSE. With respect to sentences (1) and (2) above, such analysis can be represented using the following notation:

(1') $RUN_a : x$ [DO MOVE ...]/run

(2'') $RUN_b : y$ CAUSE [x DO MOVE...]/run

There are a number of linguistic hypotheses that seek to account for the mapping of a conceptual structure configuration like (2'') onto a syntactic structure like the one instantiated in “The coach ran the students around the field”. One example is the proposal by Steveson & Merlo (1997) that VPs headed by unergative such as *run* merge with an abstract CAUSE morpheme in the syntax, thus allowing for transitivity that carries a causative reading. This proposal parallels the assumption of a bi-partite structure for the VP in generative grammar, which postulates a v^0 projection within the VP. This hypothesis postulates that the v^0 head may have semantic content related to the conceptualization of event initiation and causation (Harley, 2007: 52). Within the theoretical framework of construction grammar, Goldberg (1995) defends the existence of a caused-motion syntactic construction (a lexicalized form-meaning pairing) in English, which is realized in active voice by the string [Subj [V Obj Obl]], where V is a non-stative verb and Obl is the complement of a directional preposition (Op. cit.: 152). Goldberg’s proposal allows for a reasonable level of flexibility for the construction, predicting the reading of caused-motion meaning in instances with verbs not typically associated with the expression of motion, such as the following (examples from Goldberg, 1995: 153 and 154):

(3) Frank squeezed the ball through the crack.

(4) Frank sneezed the napkin off the table.

Such structural accounts predict that a number of verbs may produce predicates denoting both induced movement and induced action. Indeed, such is the case for a number of non-canonical causative expressions found in dialects of Brazilian Portuguese spoken in the state of Minas Gerais, and described by Silva (2009) using the bipartite VP hypothesis. One example of such causatives is sentence (5) below:

- (5) O Souza estudou seus filhos até a Faculdade.
Souza studied his children into college.
(Souza made his children study up to college by supporting them)

The availability of lexical causatives with verbs that do not naturally denote causation, such as in (3) and (4) above, does not at all mean that lexical causative constructions are possible with any verb. The induced movement alternation, for instance, is described by Levin (1993) as affecting only a subset of verbs of manner-of-motion. Also, as suggested by Steveson & Merlo (1997), what qualifies a verb as a member of the alternating subclass seems to be somehow codified in the lexical representation of such verbs, similarly to other aspects of verb subcategorization. Furthermore, verbs of different languages that are cross-linguistic synonyms, such as *march* in English and *marchar* in Portuguese, do not necessarily participate in the induced movement alternation. This is demonstrated in a study by Souza (2011) which compared acceptability judgments of instances of five verbs equivalent in English and in Portuguese in the induced movement construction. Judgment data from monolingual native speakers of Brazilian Portuguese revealed that such monolinguals tended to reject sentences in Portuguese that mimicked the English induced motion alternation with verbs of manner-of-motion. Souza's (2011) results support linguistic analysis by Cambrussi (2009), which predicts that Portuguese verbs of manner-of-motion will fail to naturally produce causative alternations.

If knowledge of which verbs are productive in the induced movement alternation construction is language-specific, and if the very existence of this verb class may diverge cross-linguistically, then it is reasonable to hypothesize that bilinguals of languages where there are such divergences, like BP and English, may experience learning difficulties as they develop knowledge of this construction. More important from the point of view of the study of bilingual language processing, it is also reasonable to hypothesize that cross-linguistic effects may be observed in bilinguals' performance in at least one of their languages. To discuss the second hypothesis further, we now pass over to a review of perspectives on the role of cross-linguistic influences in the psycholinguistic profile of bilinguals.

2. CROSS-LINGUISTIC INFLUENCES AND THE CO-EXISTENCE OF TWO OR MORE LANGUAGES IN ONE MIND

Research in bilingualism and second language acquisition has accumulated a wealth of evidence supporting the claim that knowledge of an L1 may have profound influence on L2 representations. Such influences may be manifest in all dimensions of language use, from overt linguistic form to the conceptualization of meaning (Odlin, 1989; Jarvis & Pavlenko, 2007). Wherever cross-linguistic differences occur there is some likelihood that a second language user will bring his or her first or dominant language to his performance in the L2.

Establishing whether L1 influences on L2 use is evidence that bilinguals possess linguistic representations that diverge from monolinguals' representations has been an important goal for second language researchers. Selinker (1972), for example, claims that "language transfer is one of the constitutive processes that configure "interlanguages". In Selinker's (1972) notion of interlanguage there was the assumption that the ultimate representation the L2 learner forms of his or her second language diverges from both his or her L1 and the input he or she was exposed to in the L2. Therefore, in interlanguage theory knowledge of the L1 may contribute directly to the knowledge of the L2 that might be achieved by a bilingual, and the theory poses that such knowledge will eventually be autonomous with relation to both L1 and the L2 as it is for its native speakers.

In generative second language research, observations of L1 effects on the L2 have played a significant role in hypotheses about accessibility to Universal Grammar (UG) in adult acquisition of languages other than the mother tongue. As reviewed by White (2000, 2003), there are generative second language acquisition theorists who propose that the L1 is the only source of access to UG, but there are others who propose that access to the parameters set for the L1 are just the initial stage of L2 acquisition, with eventual parameter resetting according to both UG and the L2 being a possibility. These hypotheses lead to two views on the ultimate attainment of bilinguals: one that sees native-like competence in a second language as unachievable, and another that admits that native-like L2 competence may at times be achieved. Apparently the line of inquiry that tested matters of ultimate attainment from the point of view of UG has not produced conclusive findings, and the question of whether principles and parameters guide L2 knowledge is not settled. Notwithstanding, it is noteworthy that first language transfer

among L2 learners and users is taken by generative L2 researchers as an important component of bilingualism.

In more recent years studies of L2 effects on the L1 has been growing as an important field in bilingualism studies. Early research about how a primary language could be modified through contact with second language was mostly conducted within studies of first language attrition (Köpke & Schmid, 2004). Much of the conceptualization supporting L1 attrition studies has targeted bilinguals who were immersed in an L2 environment, and in which language dominance inversion (from L1 to L2) took place. Thus, such studies focused on a very specific profile of bilingualism, usually characteristic of immigrant children. Nevertheless, a few studies that examined L2 effects on the L1 among bilinguals who were not L2-dominant have been reported since the 1990s. For example, Olshtain & Barzilay (1991) studied lexical retrieval in English among Americans living in Israel who were very fluent in Hebrew, but who maintained English as a dominant language. Language attrition studies may be regarded as having brought a challenge to the assumption of full stability of the L1 that had guided second language acquisition research for years (Pavlenko, 2000; Pavlenko & Jarvis, 2002; Schmid & Köpke, 2007). Such challenging perspective is heightened by the fact that one of the goals of some attrition researchers is to arrive at explanatory frameworks that account for both L2 language acquisition and L1 attrition. For example, de Bot (2007: 62) claims that “[t]here is no fundamental difference between the processes of [language] growth and decline; they are both governed by the same principles”, therefore setting unified theoretical goals for second language acquisition and L1 attrition research.

A theoretical framework that unifies cross-linguistic influences from L1 to L2 and from L2 to L1 is the concept of multicompetence (Cook, 1991; 1992; 1996; 2003). Multicompetence is defined as the “compound state of a mind with two grammars” (Cook, 1991: 112), and it is argued that “[t]here is no assumption that this knowledge corresponds to a monolingual native speaker’s in either L1 or L2” (Cook, 1996: 64). The construct serves as a descriptor of bilingualism that does not view a bilingual as language user whose state of linguistic knowledge should be characterized as two monolinguals in just one person. As argued by Cook (2003), the concept of multicompetence complements the notion of interlanguage. Whereas interlanguage has been the concept traditionally employed by second language researchers to cover the specific state of L2 knowledge of second language users, multicompetence is a construct that covers the

state of both L1 and L2 knowledge in individuals who use two or more languages. The framework of multicompetence actually outreaches matters of cross-linguistic influences, as it is proposed that the state of knowledge of language of bilinguals and multilinguals may result in linguistic representations that reflect neither the L1 nor the L2².

Therefore, within the framework of multicompetence the task for psycholinguistic studies of bilingualism is to understand the operations of both L1 and L2 of bilinguals. Such framework is completely compatible with the now well established tradition of research demonstrating effects of L1 knowledge on L2 acquisition and use. But the conceptualization of multicompetence also accommodates predictions of L2 influences on the L1.

Such predictions have converged with a growing body of supporting empirical evidence. Pavlenko & Jarvis (2002), for example, demonstrate both Russian L1 transfer to English L2 and English L2 transfer to English of a number of morphosyntactic and lexical selection elements in narratives elicited from 22 subjects, all of whom had arrived in the USA after the onset of puberty. Balcom (2003) reports modified grammaticality judgments in L1 by francophone speakers of English L2 (fluent late bilinguals who remained L1 dominant) in a number of grammatical features of the French middle voice constructions, and relates such changes to the L2 grammar. Bylund & Jarvis (2011) report a study that provides evidence of altered conceptualization of aspect markers in near-native Spanish L1 speakers of Swedish L2. Amengual (2012) reports cognate status effects in the production of English-like voice onset times (VOTs) after /t/, suggesting that exemplar-based categorization of sounds may expand to the organization of the bilingual lexicon. Such findings are compatible with the notion of multicompetence and also aligned to neurolinguistic evidence that the brain areas involved in both L1 and L2 processing may be convergent in bilinguals, especially those that achieved higher levels of proficiency in the L2 (Abutalebi, 2008).

Multicompetence is also the construct that frames the present study, which we now pass over to describe.

² Cook (1996: 65) reports data that suggests that bilinguals in English (L1) and French (L2) were more tolerant of sentences that forced the pro-drop parameter into English, therefore departing from the grammar of both L1 and L2, as both are non-pro-drop languages.

3. MATERIALS AND METHODS

To address the question of whether bilingualism affects the online parsing of sentences that force the induced movement alternation into the first language of Brazilian Portuguese-English bilinguals, which motivates the present study, an experiment was designed to probe the cognitive cost of integration of the direct object NP that complements verbs of manner-of-motion in the induced movement alternation. The experimental design involved a moving window self-paced reading task. In other words, the main experimental task required readers to move through successively appearing fragments of sentential stimuli as they pressed a key of a control pad. The presentation of fragments was not cumulative, i.e. a fragment on display disappeared as soon as the next fragment was activated.

45 individuals participated in the study, and they were distributed across five groups of subjects. The groups were defined in terms of participants' linguistic profiles and the language of the stimuli they were presented to. The only individual difference controlled for was educational level: participants had to be at least in the last year of high school. This was a measure to ascertain a high probability of well-established literacy skills, which is an obvious requirement for satisfactory completion of the self-paced reading task.

The first group was composed of native speaking monolinguals of Brazilian Portuguese, who read sentences in Portuguese. The second group was composed of bilinguals of Portuguese and English with limited knowledge of vocabulary in their L2, who read sentences in English. The third group was composed of bilinguals of Portuguese and English with vast knowledge of vocabulary in their L2, who read sentences in English. In the fourth group there were also bilinguals of Portuguese and English with vast knowledge of vocabulary in their L2, but they read sentences in their L1 (Brazilian Portuguese). Finally, the fifth group gathered native speakers of American English, who read sentences in their native language. Table 1 below summarizes how the five groups were configured.

Group	Linguistic profile	Language of stimuli	N
1	Native speakers of American English	English	9
2	Monolingual native speakers of BP	Portuguese	9
3	Bilinguals of BP-English with limited vocabulary in English	English	9
4	Bilinguals of BP-English with vast vocabulary in English	English	9
5	Bilinguals of BP-English with vast vocabulary in English	Portuguese	9

Table 1: Linguistic profile and language of reading stimuli for each group.

All the monolingual speakers of BP and all bilinguals were recruited in the city of Belo Horizonte, Brazil. Two of the native speakers of American English were also recruited in that city, where they were students of a beginning level course in Portuguese as an additional language; two of the native speakers of American English were recruited in Doylestown, Pennsylvania (USA), and the remainder native speakers of English were recruited in New York City (USA).

Screening of bilingual subjects for the sake of group allocation was done by way of two measures: a language biodata questionnaire containing items about L2 learning history and items for self-assessment of skills in English as an L2 in the areas of speaking, listening comprehension and writing; and the Vocabulary Levels Test (VLT) (Nation, 1990). The VLT is five-level test measuring access to English vocabulary items of increasingly reduced frequency of occurrence, thus functioning as an indirect estimator of experience with the language. To be considered bilinguals with limited vocabulary in the L2, subjects had to pass levels one and two, but not level three and beyond. To be considered bilinguals with vast vocabulary in the L2, participants had to be at either level four or five. A few subjects had been practicing teachers of English as a foreign language for more than 10 years and self-assessed their skills in the L2 as highly fluent across all the four areas. Such subjects were not asked to take the VLT. Subjects whose score placed them in level one of the VLT, or who declared having only minimal notions of English but not being regular users of the L2 for any communicative task, were screened as “monolinguals” of BP. No specific psychometric or screening measures beyond preliminary interview questions were employed with the native speakers of American English.

The self-paced reading task implemented for this study encompassed two sets of 32 sentences each, one of the sets in English, and the other set with translations of the same sentences into Portuguese. The sentences instantiated mostly structures of the type NP₁-V-NP₂-PP. Eight of such sentences instantiated the induced movement alternation with verbs of manner-

of-motion. Such sentences contained the verbs *run, race, walk, swim, leap, fly, jump, and dance*, and their Portuguese counterparts. These eight verbs are described in Levin (1993) as participating in the induced movement alternation, and they formed the target stimuli of the present study. The remaining 24 sentences were distractors and contained a number of different verbs.

The materials were controlled in four dimensions. First, all lexical vocabulary was controlled for frequency, with no word in any of the 32 sentences appearing less than 10 times in the Brown Corpus of American English (1,000,000 words). Second, all sentences were in the simple past tense and in the active voice. Third, no sentence had proper nouns in any of the noun phrases, and subject and object noun phrases had the definite article as a determiner. Finally, all direct objects of the induced movement alternation sentences were a noun phrase whose head noun was at most two syllables long in the English version or three syllables long in the Portuguese version; thus all object noun phrases of the target sentences were three- or four-syllable units of determiner and head noun. Such measures of control aimed at safeguarding that all materials were sentences with amply used vocabulary, and also that the critical region (NP₂ of the induced movement alternation sentences) never differed significantly with respect to orthographic or phonological length.

The productivity of the induced movement alternation with the selected verbs of manner-of-motion was verified in the Corpus of Contemporary American English. The goal of this measure was to probe the plausibility that especially the bilingual subjects might have had exposure to such constructions in their experience as users of English as a second language. Also, this verification supplemented Levin's (1993) description by adding empirical support from usage data. Instances of induced alternation sentences were found with all eight verbs. Examples of occurrences of two induced movement constructions from the Corpus of Contemporary American English are given below.

(6) He danced the woman out onto the sidewalk, past Ariendo Vincent, toward the big river and back again, sweeping her in wide turns through the night [...].

(7) Some of Kristi's friends tried to jump their ponies across, but Kristi's father had been very firm about teaching his horses to walk calmly through streams.

All sentences in the stimuli sets were segmented into four fragments, followed by a comprehension YES-NO question whose function was to maintain optimal level of attention to

the task. Participants were informed that they were going to participate in a task involving sentence reading comprehension. The succession of fragments for an induced movement alternation sentence and the ensuing YES-NO question in the moving window display employed for this study is illustrated in the figure below.



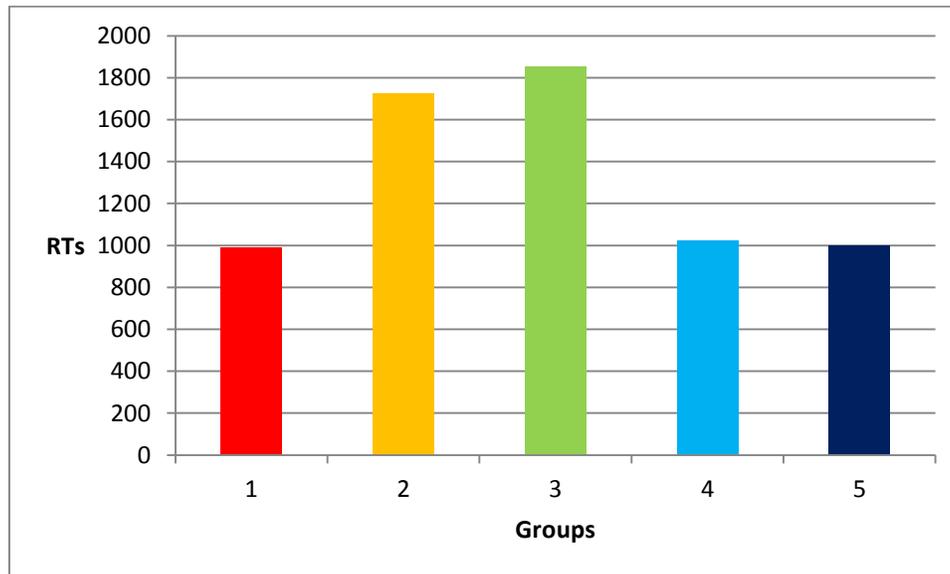
Figure 1: Sample moving window presentation of stimulus

Materials were randomized and displayed by DMDX, and reaction times were recorded by the same software. Subjects controlled the self-paced reading task by way of a gamepad, and the task was delivered either by way of a desktop or by way of a laptop, both IBM-compatible PCs. Each experimental trial began with the researcher accompanying participants through the instructions for the task, which appeared on the computer screen, and then accompanying them as they rehearsed with example sentences. Once the rehearsal phase was over and occasional questions and doubts from the participants clarified, the researcher left the room where trials were taking place, so that participants would be alone as they performed the task proper. Trials took about twelve minutes to be completed, one participant at a time.

We now pass over to the data analyses.

4. RESULTS AND DISCUSSION

Reaction times (RTs) in the critical region were extracted and analyzed. Therefore, the dataset was composed of RTs after presentation of the second noun phrase following each of the eight manner-of-motion verbs. Mean RTs were calculated for each group of subjects, and compared within a between-subjects design. For the induced movement sentences, the mean RTs (in milliseconds – ms) for the critical region (NP₂) for each of the five groups are shown in the following graph.



Graph 1: RTs for NP₂ in induced movement sentences

As can be seen in Graph 1, two distinct patterns were obtained across the five groups. Group 1 – the monolingual native speakers of English (mean RT = 988.7ms, sd = 104.6ms), group 4 – the bilinguals of BP-English with vast vocabulary in English who read in their L2 (mean RT = 996.5ms, sd = 96.9ms), and group 5 – the bilinguals of BP-English with vast vocabulary in English who read in their L1 (mean RT = 1021.7ms, sd = 292.3ms) represent fast readers. Group 2 – the monolinguals of BP (mean RT = 1722ms, sd = 301.9 ms), and group 3 – the and the bilinguals of BP-English with limited vocabulary in English who read in their L2 (mean RT = 1850.5ms, sd = 304.2ms) represented the slow readers.

The linguistic profile of participants had a significant effect on their reaction times to the presentation of the second noun phrase in sentences expressing induced movement with verbs of manner-of-motion ($F(4,28) = 49.24, p < .001, \text{partial } \eta^2 = .876$). Post hoc tests using the Bonferroni correction revealed that groups 2 and 3 did not differ significantly from each other concerning RTs to NP₂ presentation ($p > .05$). Groups 1, 4, and 5 also did not differ significantly from one another in the mean RTs to NP₂ presentation ($p > .05$). On the other hand, the RTs at the critical region of both groups 2 and 3 differed significantly from the RTs of groups 1, 4, and 5 ($p < .01$).

The processing data from monolingual participants of the present study confirm that verbs of manner-of-motion in the induced movement alternation are not a usual part of the

linguistic repertoire of monolingual Brazilian Portuguese speakers. The behavior of monolinguals of BP (Group 2) contrasted sharply with the behavior of monolinguals of English (Group 1). The latter clearly experienced a significantly reduced processing cost to parse the second NP of the induced movement alternation as it appeared in the moving window self-paced reading task. This contrast supports the acceptability judgments reported in Souza (2011), as such judgments suggest that manner-of-motion verbs do not tend to be represented as transitive predicators in causative constructions in BP. This also supports the linguistic analysis in Cambrussi (2009), which predicts that BP verbs of manner-of-motion will not appear in lexical causative sentences. Lack of prompt access to a grammatical representation of the verb class and of the argument structure alternation that would permit ease of processing with the stimuli of the present study is a plausible explanation for the fact that monolinguals of BP experienced a strikingly higher processing cost – measured by the RTs – than the monolingual of English did when reading sentences that instantiated verbs of manner-of-motion in lexical causative sentences.

The bilingual data analyzed in the present study reveal scenarios that suggest both L1 influences on L2, and L2 influence on the L1. The behavior of the limited vocabulary bilinguals participants of this study (Group 3), who read induced movement sentences in their L2 (English), parallels the behavior of the readers who were monolinguals of BP (Group 2). Both experienced a high processing cost of the second NP of those sentences, as given by their longer RTs in the critical region. This result is not surprising, and it can be interpreted as indicating that the bilinguals had a Brazilian Portuguese-like behavior when they had to parse the induced movement alternation. Such L1 influence effect could be accounted for in terms of the facts that those were Brazilian Portuguese dominant bilinguals, and they also were not highly proficient in their L2.

The RTs in the critical region of the higher proficiency bilinguals who read in English (Group 4) pairs up with the equivalent RTs of the monolinguals of English (Group 1). This implies that the induced movement alternation with verbs of manner-of-motion is ultimately learned by speakers of English as an L2 whose primary language does not produce such construction. Also, the RTs of the high proficiency bilinguals suggest that they were able to inhibit the prohibition imposed by their L1 grammar.

Of critical importance for the present study are the results of the higher proficiency bilinguals who read sentences in Portuguese (Group 5). This group's RTs converge with the RTs obtained by both the group of monolinguals of English (Group 1) and the group of other equally proficient bilinguals reading in English (Group 4). In other words, these bilinguals obtained strikingly faster processing of the critical region of the sentences that forced the induced movement alternation into Portuguese than did group 2, which gathered the monolinguals of Brazilian Portuguese who read the same sentences. The behavior of the bilinguals in group 5 is interpreted as a sign that they had access to a representation that such constructions are possible, thus making them easily parsable. Such representation may plausibly have been available for those bilinguals because of their knowledge of English.

CONCLUSION

Soon after the term "multicompetence" first appeared (Cook, 1991), a set of possible directions for empirical research was proposed. Cook (1992) suggests that evidence for multicompetence could be found in a number of domains in the study of bilinguals, such as aspects of general cognition, metalinguistic awareness and language processing. With respect to specifically linguistic issues, identification of possible changes in L1 knowledge and processing that can be attributed to bilingualism play a significant role in the empirical validation of multicompetence. As emphasized by Pavlenko (2000), evidence that shows L2 effects on L1 at all levels of linguistic and discourse organization is relevant for the probing of hypotheses that the languages of bilinguals are integrated at some level of representation.

We understand the results reported here as facts demonstrating that knowledge of the interface between lexical semantics and syntax in the L2 may affect the processing of sentences in the L1 of bilinguals who are proficient in their second language. This conclusion represents behavioral evidence that contributes directly to the quest for empirical support to the notion of multicompetence, and to the ensuing view that two languages in one mind are not completely separated even when a bilingual maintains the first language as a dominant language and is in a linguistic environment that favors use of the L1. After all, it must be emphasized that all the bilingual participants of the present study lived their everyday lives in a Portuguese language environment.

As stated earlier, a second goal of the present study was to probe the psychological reality of verb classes in the context of bilingualism. In this study we observed differences in processing behavior related to sentences that were remarkably similar from both the point of view of overt structure and from the point of view of the kind of main predicator instantiated. As seen in the data reported, there are reasons to assume that representation of verbs of manner-of-motion as a class participating of the induced movement alternation was available to the bilinguals of BP and English in this study who arrived at a high level of proficiency in their L2, as measured by their lexical knowledge in that language. Such data strongly suggests that high proficiency bilinguals are able to establish a class of verbs that share semantic properties and syntactic behavior, and that this representation is likely to guide them during online sentence processing.

Therefore, the findings reported here supplement the work reported in Souza & Oliveira (2011) in two ways. First, they shed light on the omnibus effect of a whole set of sentences with verbs from a class, thus providing a solid generalization for the verb-by-verb examination reported by the authors in that study. Second, by relying on overt comparisons with monolinguals of both languages of the bilinguals, the present study provides a background against which the changes in L1 performance observed with high proficiency bilinguals can be construed as an L2 effect on the L1.

There are nevertheless questions that remain to be answered after the results from the present study. One of such questions concerns the reason why the high proficiency bilinguals manifested behavior that suggests L2 effects on L1 processing, but not L1 effects on L2 processing. As we suggested above, it seems that the high proficiency bilinguals were apparently capable of inhibiting the prohibition imposed by their L1 grammar on manner-of-motion verbs in lexical causative constructions. If this is a correct analysis, then the equally highly proficient bilingual subjects failed to inhibit access to their L2 as they processed their L1. An explanatory hypothesis worth considering is the possibility that the grammar of English stands as a superset in relation to the grammar of Portuguese (which is the subset) in what concerns the target construction. In other words, whereas Portuguese licenses only periphrastic causatives for verbs of manner-of-motion (e.g.: The coach made the students run around the field), English licenses both the periphrastic causative and the induced movement alternation. In second language acquisition research, it has been suggested that departure from a subset grammar to a superset grammar is less costly than the other way around. Thus, amplifying the repertoire of grammatical

choices is easier than constraining it. It could be the case that activation of the broader grammatical configuration that makes lexical causative sentences with verbs of manner-of-motion possible and parsable is a more natural process for bilinguals of Brazilian Portuguese and English than activation of a restrictive rule. Of course, this is a hypothesis that could only be probed in a study with a different design.

Another question that stems from the present study is whether the L2 effect on L1 sentence processing observed would hold beyond the brief period of time it took subjects to process integration of the object noun phrase into the induced movement sentence being parsed. In other words, was what we observed a temporary reliance on L2 knowledge from which a modified parsing strategy was derived, or could it represent a more sustained change in representations about the behavior of verbs in the L1? Answers to this question could lead to further steps towards models of how L1 and L2 knowledge are managed in the inhibitory control of languages exerted by bilinguals, as well as towards further clarification of the possible relationship between the findings here reported and the broader picture of language change induced by language contact.

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RESUMO: Este artigo relata os resultados de um experimento de leitura auto-cadenciada no qual foram mensurados tempos de reação à apresentação de um sintagma nominal em posição de objeto de orações contendo verbos de modo de movimento transitivizados e produzindo sentido causativo. Tais construções são licenciadas no inglês mas não no português do Brasil. No experimento, comparações foram feitas entre o desempenho de falantes monolíngues do português do Brasil e falantes monolíngues do inglês lendo em suas respectivas línguas maternas, assim como bilíngues do português do Brasil e do inglês com vocabulário na L2 limitado lendo em sua L2 e bilíngues das mesmas línguas, mas com vasto vocabulário na L2, lendo em sua L2 e em sua L1. Os resultados fornecem evidência de que os sujeitos bilíngues com maior proficiência foram capazes de formar uma classe de verbos (modo de

movimento) em sua L2 e superar as restrições da gramática de sua L1. Além disso, eles demonstraram que comportamentos semelhantes à L2 foram obtidos quando o desempenho dos bilíngues ocorreu na L1. Estes resultados são interpretados como evidência de multicompetência no processamento sentencial bilíngue.

PALAVRAS-CHAVE: Multicompetência; processamento sentencial bilíngue; influências translinguísticas; estrutura argumental.