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The production of dative structures in Italian English-immersed late bilinguals: a comparative study on Language Attrition

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ABSTRACT

While studies have focused on the impact of the first language (L1) on the second language (L2), less is known about dominant language transfer in L1 production. This study investigates L1 attrition in Italian English-immersed late bilinguals who have been immersed in the L2 environment for an extended period of time (e.g., Schmid, 2008). Changes occurring at a cognitive-linguistic level due to L1-L2 interaction patterns in bilingual minds suggest plasticity in the language system(s), even in the case of fully acquired L1s.

This study attempts to answer the following research questions: to what extent can dominance in a non-native language lead to changes in L1 syntactic structures and preferences (i.e., language attrition)? Can cross-linguistic Structural Priming be used to investigate L1 attrition? What role do internal and external factors play in L1 attrition? In other words, to what extent does a speaker's performance vary as a function of L2 proficiency, exposure, and duration of L2 immersion?

Our population consisted of a group of Italian native speakers (n = 47) who at the time of testing had been living abroad for at least 5 years (English-immersed Participants). Data were also collected from a group of Italian L1 - English L2 late bilinguals in Italy (n = 19) with advanced levels of English proficiency (Controls). We used a cross-linguistic Structural Priming task to investigate the production of Datives (8 Double Objects (DOs), 8 Prepositional Datives (PDs)) in both English-immersed Participants and Controls. Participants were presented with a written English prime and asked to read it aloud before describing aloud a target picture in Italian. The same verbs were kept between Prime and Target, and DO- PD-biases were manipulated (Gries & Stefanowitsch, 2004). Whereas English allows two constructions to express ditransitive events, namely DOs (e.g., *The girl gave the teacher a flower*) and PDs (e.g., *The girl gave a flower to the teacher*), in Italian, the DO option is unlicenced and its use would yield an ungrammatical sentence. Italian does allow a dispreferred construction (Shifted PD) where the PD recipient immediately follows the verb (e.g., *La bambina dà alla maestra un fiore*, "The girl gives to the teacher a flower"). We predicted that when primed with DO structures in English, English-immersed participants may resort to this dispreferred construction in Italian. Results aligned with our hypotheses: English-immersed participants showed a priming effect and a sensitivity to the verb bias. Controls produced a high number of shifted PDs but were less sensitive to the verb bias. No correlations were found between L1 attrition and the claimed degree of immersion, L2 proficiency and time spent abroad. Cross-linguistic structural priming is sensitive to attrition, in that English immersed Italian L1 speakers produced grammatically acceptable, but pragmatically marked shifted PD sentences. Analysing intrinsic properties of the language using syntactic structures unshared between languages (i.e., dative alternation), allowed us

to distinguish between different sources of priming. Therefore, this study provides further evidence of cross-linguistic influence and L1 attrition in L2-immersed late bilinguals, supporting and extending previous studies on complex morphosyntactic structures.

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Introduction

As the world becomes more globalised, language users are often exposed to multilingual communicative settings, in which cross-linguistic and cross-cultural interactions are very frequent. This may lead to changes in the multilingual mind, as an effect of the plasticity of the human brain. These changes may yield episodes of code-switching, language transfer, and mutations of processing strategies (Runnqvist, Gollan, Costa & Ferreira, 2013, Alferink & Gullberg, 2014). Therefore, research has been focusing on cross-linguistic interactions and their cognitive consequences, such as contact-induced language changes at different linguistic levels, leading to phenomena such as language attrition.

The study presented in Section 2 aimed to investigate first language (L1) attrition in Italian-English late bilinguals who, at the time of testing, had been living in an English-speaking country for at least 5 years. We used a cross-linguistic Structural Priming task to investigate their production of dative sentences, and we attempted to explore the extent to which the phenomenon of language attrition can be modulated by environmental factors such as the length of residence in in the second language (L2) environment, the levels of L2 proficiency, and L2 exposure in familiar and work settings.

The present work is organised as follows: the first part gives some fundamental historical and practical information about the paradigm that was employed to conduct the study (i.e., Structural Priming). It is worth noting that Structural Priming was first used in monolingual studies, and only later was extended to multilingual settings. Therefore, some between-languages studies conducted using cross-linguistic Structural Priming tasks are reviewed in the second part, together with the presentation of the two major accounts that have been trying to explain the nature of abstract representations in the multilingual mind.

Next, the characteristics of the population of this research (i.e., Italian-English Late Bilinguals) is outlined in Section 1.3. More specifically, the main group of participants had been living in an English-speaking country for at least 5 years when they took part in the experiment. Data from a group of Italian-immersed late-bilinguals was also collected for comparison purposes.

A definition of language attrition can be found in Section 1.4., together with a description of the main theories that have been advanced trying to explain the phenomenon, and a review of some of the most recent studies.

The final part of the literature review will concern the specific syntactic structures analysed in this study, namely Datives and Transitives. More precisely, Section 1.5 outlines the way

ditransitive events can be expressed differently in Italian and English, and how previous studies had already investigated dative constructions, even though with languages sharing the PD-DO alternation.

An in-depth description of the experiment can be found in the second part of this work. To our knowledge, this was the first study investigating the attrition phenomenon using a cross-linguistic structural priming task.

Finally, general conclusions and future research directions are found in Section 3.

Part 1. Literature Review

1.1. Structural Priming

Despite the recursive and creative nature of language, humans tend to repeat themselves. Behavioural and linguistic studies have been taking advantage of this automatic behaviour and defined an experimental paradigm named Structural Priming (SP).

Also known as Syntactic Priming or Structural Repetition, SP reflects the unintentional and pragmatically unmotivated tendency of a speaker to re-use a structure that was previously processed at an abstract level, independently of lexical content (Bock 1986). SP has been proven to be a useful paradigm when it comes to investigating and identifying some of the representations that people employ when producing or comprehending language (Pickering & Ferreira, 2008). Nevertheless, the history of this paradigm is relatively recent. One of the first studies to point out the usefulness of the repetitive nature of language was by Levelt and Kelter (1982), who asked some Dutch shopkeepers a simple question using either one of the following constructions:

(1) a. Om hoe laat gaat uw winkel dicht? ("At what time does your shop close?")

b. Hoe laat gaat uw winkel dicht? ("What time does your shop close?")

With a very simple design, their experimental items either included the preposition 'om' ('at'), as in (1a), or omitted it, as in (1b). They found that in most cases, participants' responses tended to include a preposition when they were asked (1a), whereas they were more likely to omit it after hearing (1b), showing a priming effect.

Following the experiment by Levelt and Kelter, Kathryn Bock originally used this technique in laboratorial settings in 1986, marking the beginning of what has become a broadly used paradigm for linguistic research, for both production and comprehension studies. In Bock's study, participants were asked to repeat a prime sentence and then describe a target picture under the guise of a memory task. The stimuli were lexically unrelated, and the syntactic constructions used by Bock (1986) were Transitives and Datives. The former were presented in either an Active or Passive condition, whereas the latter being either Prepositional Datives (PDs) or Double Objects (DOs). Confirming the researcher's predictions, participants' productions were influenced by the condition of the prime sentence. More precisely, they were more likely to utter an active sentence after an active prime (e.g., '*The lightning is striking the church*' after '*One of the fans punched the referee*'), and a passive sentence after a passive prime (e.g., '*The church is being struck by lightning*' after '*The referee was punched by one of the fans*'). A similar behaviour was found with the pairs of datives. Bock also observed that the priming effect was not affected by variations of lexical or conceptual features (i.e.,

use of same open or closed-class elements or variations of animacy) leading to the assumption that syntactic processes can be abstracted from other linguistic processes.

Over the past decades structural priming has been employed in a variety of studies and priming effect has been shown to occur for a range of constructions, from production to production, from comprehension to production, in isolation (Potter & Longobardi, 1991) and in dialogue (Branigan, Pickering, & Cleland, 2000). Furthermore, effects of priming have been found both in spoken and written language (Bock 1986, Pickering and Branigan 1998), in monolingual settings (Hartsuiker and Kolk 1998, Cai et al. 2011), second-language (L2) speakers (Hawkins et al. 2014, Romano 2016), aphasic patients (Hartsuiker & Kolk, 1998b) children (Tomasello & Brooks, 1999) and across languages (Hartsuiker, Pickering and Veltkamp, 2004).

Even though priming effects can be found independently of lexical repetitions between prime and target, a range of studies (e.g., Pickering & Branigan, 1998; Branigan et al., 2000) proved that their magnitude can be enhanced by such repetition, also known as lexical boost.

Implicit Learning or Transient Activation?

Different theories have been advanced in order to try to describe the processes responsible for the priming effect. The two most influential positions tried to explain it according to its persistence. On the one hand, studies have proven that the priming effect can survive over time (Bock & Griffin, 2000; Bock et al. (2007); Branigan et al. (2000b)). In fact, effects of priming were found beyond adjacent sentences, after up to ten intervening sentences between prime and target, i.e., lag sentences (Hartsuiker & Kolk, 1998b; Bock & Griffin, 2000). According to these results, SP is considered to be a lexically independent form of Implicit Learning, which appears to be tacit, incidental, and automatic. In addition to this, priming would be independent of explicit memory. In fact, in Bock et al. (1992), participants were asked to explicitly remember whether they had already encountered a sentence or not. The results showed that those sentences that were more likely to be remembered were not the same sentences responsible for the priming effect, and vice-versa. Nevertheless, other studies found contrasting results, with structural priming effects decaying after the intervention of lag sentences (Branigan, Pickering, Liversedge, Stewart, & Urbach, 1995; Levelt & Kelter, 1982; Wheeldon & Smith, 2003), confirming the fact that the nature of priming is the subject of considerable debate.

According to some implicit learning accounts (e.g., Chang et al., 2006), some error-based mechanisms would lead to stronger implicit learning effects. An inevitable consequence of learning of syntactic structures is prime surprisal, a phenomenon likely to influence performance in structural

priming tasks. This happens when speakers find a mismatch between the expected next word (based on their previous knowledge) and the actual next word encountered. For instance, when it comes to verbs which allow alternating constructions (e.g., dative alternation), a sentence containing a DO-biased verb presented in a PD condition would yield a mismatch in the speaker's expectation, and so a greater amount of error-driven learning. As a consequence, larger changes would occur in the speaker's linguistic system, leading to stronger priming effects. Therefore, error-based accounts suggest that prime surprisal affects the magnitude of the priming effect, enhancing it. This was confirmed by both computational findings (Chang et al., 2006) and behavioural studies carried out with adults (e.g., Bernolet & Hartsuiker, 2010) and children aged 3-5 (e.g., Buckle et al., 2017), supporting the idea that syntax acquisition and the development of verb-structure links may occur via a process of error-based implicit learning. Moreover, finding surprisal effects in children at early stages of language acquisition suggests that L2 learners may undergo a similar process of re-adjustment of syntactic rules at their earlier stages of learning.

On the other hand, structural priming is claimed to be the result of the effect of a Residual Transient Activation (RTA). According to this account, priming is short-lived, and influenced by lexical content. Branigan et al. (1999) found that when participants were presented with prime and target sentences that shared a lexical item (in their case the verb), priming effects were drastically reduced after the intervention of only one lag sentence, and they completely disappeared after four. Something similar happened in Levelt and Kelter's (1982) study, which revealed that priming disappeared when just one utterance intervened between the experimenters' questions and the shopkeepers' answers.

Pickering and Branigan (1998) proposed a lexicalist model to explain the nature of priming and the so-called 'lexical boost effect'. They did so by drawing from the model of lexical access developed by Roelofs (1992, 1993) and Levelt et al. (1999). According to Levelt et al. (1999), a lexical entry consisted of three separate levels: a *conceptual level* (holding semantic information), a *lemma level* (encoding syntactic information) and a *word-form level* (containing morpho-phonological information). Therefore, in their model, lemmas are associated with syntactic information. Pickering and Branigan (1998) integrated the model assuming the existence of another type of nodes, i.e., combinatorial nodes, which link lemmas and get activation when a particular construction is used. For instance, both verbs *give* and *show*, since they can be used either with a PD or a DO construction, are linked to the combinatorial nodes NP-PP and NP-NP. When one of the two structures is selected, the respective combinatorial node is processed, and activated. This activation would be responsible for making the reselection and re-employment of the just-processed syntactic structure more likely to happen. In accord with this account, priming is the result of residual activation

of lemmas and combinatorial nodes. Priming appears to be stronger when a node is activated at the lemma level, and so a lexical boost occurs. That is to say, when a sentence contains the same verb as the one that has just been processed, structural priming effects are the result not only of the activation of combinatorial nodes, but also of the pre-activated lemma node, whose link with combinatorial node is strengthened. Nevertheless, this account does not exclude the possibility of lexical independent priming, which would still be possible due to the activation of the combinatorial nodes triggered by the syntactic structure of a sentence. In this case, when a lemma node is not activated and priming occurs due to the activation of combinatorial nodes, the yielded priming effect is weaker.
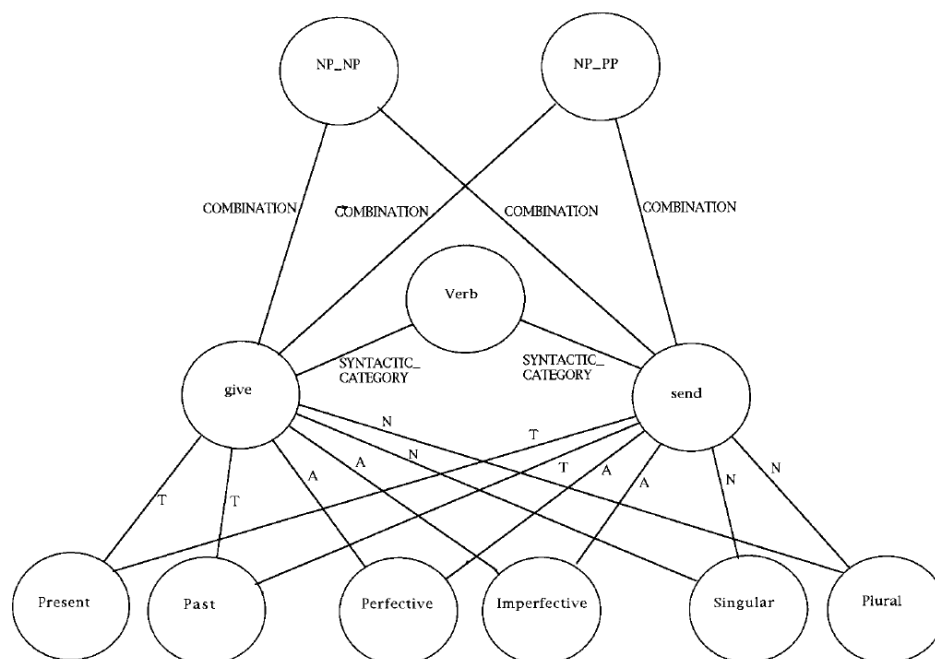

Figure 1. A partial model of the representation of syntactic information associated with verbs in the production lexicon. The labels T, A, and N refer to tense, aspect, and number, respectively.
Pickering and Branigan (1998)

Pickering and Branigan's (1998) model will be extended by Hartsuiker et al. (2004) for purposes concerning bilingual research. This new, extended model will be outlined in Section 1.2. According to it, bilinguals have a single integrated lemma stratum, in which individual lemma nodes are tagged for specific languages.

In conclusion, structural priming exploits the human tendency to repeat previously processed structures with the aim of investigating the nature of linguistic mental representations. Even though different hypotheses have been advanced trying to explain the nature of the priming effect, it remains unclear whether it happens due to implicit learning mechanisms or processes of transient activation.

Error-driven learning accounts found a correlation between the degree of prime surprisal and the magnitude of the effect. Nevertheless, the complex mechanisms underlying human language processing leave the debate open. Early versions of this paradigm have been expanded to investigate mental representations not only in adult monolinguals, but in a broader range of populations, including bilinguals. Further information about cross-linguistic structural priming can be found in the next section.

1.2. Cross-linguistic Structural Priming

As outlined in the previous chapter, the speakers' tendency to re-use previously activated syntactic information (i.e., structural priming) has been providing researchers with a useful tool to investigate abstract mental representations both in laboratorial and real-life settings.

When it comes to the multilingual mind, cross-linguistic structural priming tasks have been largely employed to investigate how syntactic and lexical information interact in speakers of more than one language. More precisely, one of the core questions of psycholinguistic research focusing on bilingualism has been to what extent two (or more) languages are integrated in the multilingual mind. That is to say, research has been trying to understand whether the linguistic information related to the one or the other language is stored separately, or whether multiple languages share a single store for at least some linguistic aspects. It is worth noting that according to formal linguistic theories (Chomsky, 1981), languages share deep structure information and do not vary randomly, even though different languages have different grammars.

Over the past decades, two main theories have been advanced in order to describe how cross-linguistic interactions happen in the human mind. On the one hand, some studies have supported the hypothesis of a separate-syntax account (e.g., De Bot, 1992), whereas other studies suggested a shared-syntax model (e.g., Hartsuiker et al., 2004).

According to the separate-syntax account, languages like Spanish and English would share, to some degree, some syntactic information. For instance, both languages would have mental representations for transitive constructions, but they would be stored as separate entities. This would justify some language-specific differences in some superficially similar constructions. For instance, even though both Spanish and English allow the construction of active structures in a similar fashion, Spanish requires the insertion of the preposition 'a' before the direct object. Consequently, transitives would be stored twice even though they may appear similar at a shallower level. Having separate representations would benefit speakers by allowing them to concentrate only on the relevant language and so limit the number of structures taken into consideration when processing language, yielding faster and more efficient mental processes. Therefore, being the syntactic information of the two languages stored and accessed separately, they should not influence each other. The strongest version of this model excludes the possibility of cross-linguistic priming effects. A weaker version of it predicts that structural priming should decrease as the L2 proficiency increases.

On the other side, according to the shared-syntax account, there is a single mental representation for those structures that are shared between languages. This would benefit the speaker by reducing redundancy and facilitating code-switching. Any differences in the spell-out phase in the

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two languages (e.g., the preposition 'a' required before the direct object in Spanish active sentences) would be possible thanks to additional language-specific information stored as necessary. Moreover, this account suggests that the grammatical rules of one language have an influence on the way in which the other language is processed. As mentioned before, Hartsuiker et al. (2004) expanded Pickering and Branigan's (1998) lexical model, in which lemma nodes are linked to combinatorial nodes (where the syntactic information is stored). Hartsuiker et al. (2004) added that combinatorial nodes are connected to the relevant lemma nodes, irrespectively of language. While shared representations are tagged for both languages, non-shared representations are tagged for just the relevant language. Consequently, the grammar of a L1 can influence L2 processing if a syntactic structure associated with L1 is activated during L2 processing. Hence, the shared syntax account predicts a priming effect between languages, which would increase as the speaker's proficiency increases. Hartsuiker et al.'s (2004) model predicts priming effects within L1, within L2, from L1 to L2 and from L2 to L1. It assumes that translation equivalents share concepts and so, can activate each other's lemmas. For instance, the activation of an active structure in one language would lead to the activation of the same structure in the other language, and vice versa. Consequently, according to the shared-syntax account, stronger priming effect ought to be expected in bilinguals with a higher L2 proficiency.
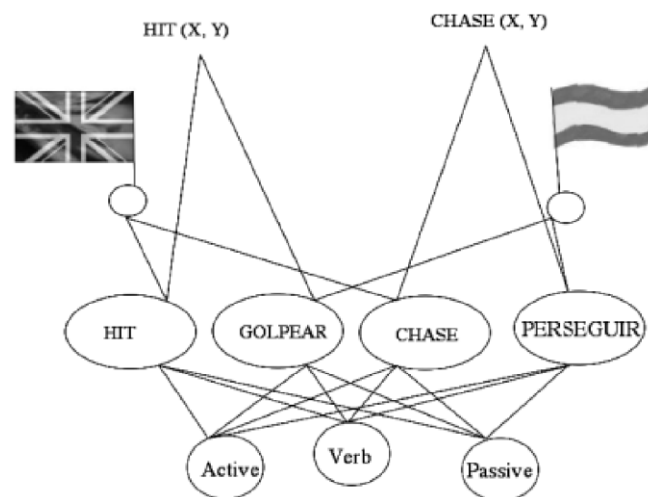

Figure 2. *Example of lexical entries for ''to chase'' and ''to hit'' in an integrated (shared lexicon, shared syntax) account of bilingual language representation. Each lemma node (e.g., HIT, GOLPEAR) is connected to a conceptual node (HIT (X, Y)), a category node (Verb), combinatorial nodes (Active and Passive), and a language node (indicated with a British or Spanish flag). Hartsuiker et al. (2004), page 413.*

Hartsuiker et al. (2004) showed cross-linguistic structural priming in dialogue. Their experiment consisted of a picture description task in which a confederate and a naïve participant were required to describe cards to each other and decide whether a given description matched the picture

on their own card. They both were native speakers of Spanish with a moderate to high English proficiency. The confederate described a card to the participant in Spanish, who had to describe the same picture in English. The actions depicted on the cards involved an entity performing an action (i.e., the agent) and an entity undergoing the action (i.e., the patient). The results they obtained confirmed a cross-linguistic structural priming between production and comprehension in which Spanish-English bilinguals were more likely to utter a passive sentence in English after hearing a passive construction in Spanish, compared to when they heard Spanish intransitives or active sentences. Their results suggested that some syntactic representations may be shared between languages.

Further evidence supporting the shared syntax account come from Desmet and Declercq (2006), whose study showed cross-linguistic structural priming of the attachment of relative clauses to noun phrases in Dutch-English bilinguals. However, these studies have limitations in that cross-linguistic priming is investigated only in one direction, or within the same language. Interestingly, Schoonbaert, Hartsuiker, & Pickering (2007) tested all four Hartsuiker et al.'s (2004) predictions with four cross-linguistic structural priming experiments. The authors used a dialogue game setting similar to Hartsuiker et al.'s (2004), in which a confederate and a naïve participant took turns to describe cards to each other and match those descriptions to pictures. All participants were Dutch-English late bilinguals, unaware that the confederate's descriptions were scripted. Priming effects were found in all their experiments: within L1, within L2, from L1 to L2 and from L2 to L1. Moreover, within-language priming was enhanced when primes and targets used the same verb, confirming a lexical boost effect. When priming occurred from L1 to L2, it was enhanced when Dutch primes and English target shared translation-equivalent verbs. In contrast, priming from L2 to L1 was not boosted by the employment of translation-equivalent verbs. Schoonbaert et al.'s (2007) results aligned with Hartsuiker et al.'s (2004) predictions, hinting at the possibility that abstract representations in bilinguals are shared at least to some extent.

More recently, researchers have hinted at the possibility of a mixed model, in which abstract mental representations in bilinguals would start out as separate entities (with lower proficiency levels) to develop into shared representations as the speakers' language level increases (Hartsuiker et al., 2004; Hartsuiker & Bernolet, 2017). Proficiency seems to play an important role, in fact, Bernolet et al. (2013) found a stronger cross-linguistic priming effect in proficient Dutch-English bilinguals compared to less-proficient bilinguals. Furthermore, cross-linguistic structural priming tended to be as strong as within-language priming as L2 proficiency increased. Thus, Bernolet et al.'s results suggest that a higher L2 proficiency leads to a shift from separate to shared syntactic representations (see Hartsuiker & Bernolet 2017).

Hwang, Shin & Hartsuiker (2018) expanded Bernolet et al. (2013) study using two typologically distant languages, namely English and Korean. They investigated whether Korean-English bilinguals develop shared or separate syntactic mental representations for cross-linguistically similar (transitives) and different (causatives) constructions, according to their proficiency. They used a confederate scripting technique in which the confederate and the participant described pictures to each other and verified each other's descriptions. They found a correlation between the magnitude of the cross-linguistic priming effect and the speakers' English proficiency. Their results provided evidence for the existence of shared mental representations for both types of constructions, suggesting a high integration of the two languages in the bilingual mind. Interestingly, Korean transitives primed the use of English transitives irrespectively of the different word order in the two languages. This could be explained by the fact that they share functional relations: the agent entity is assigned as the subject and the patient entity as the object in both languages. This could also be explained in terms of topicalization reasons (e.g., for pragmatic intentions), shared information structure (Bernolet et al. 2009), or a shared thematic grid (Chang et al. 2003).

Finally, the presence of cross-linguistic structural priming effects strongly suggests that languages in the multilingual mind are not stored in isolation but, to some extent, are able to influence each other. Although a weaker approach to the separate syntax account allows the existence of cross-linguistic priming, research has moved towards an integrated account, in which representations would start out separately in low proficient bilinguals, to converge and align with a shared syntax model as L2 proficiency increases. It is worth noting that proficiency has been found to modulate the effects of cross-linguistic structural priming. In Section 1.4. we outline other factors affecting cross-linguistic phenomena such as language attrition.

1.3. Late bilinguals

The population of the study presented in Section 2 consisted of Italian-English Late Bilinguals. Hence, a preliminary description of the main characteristics of these kinds of bilinguals is aimed at helping to achieve a proper understanding of the effects of language contact which can emerge in these types of bilinguals.

Late bilinguals, as opposed to simultaneous bilinguals (individuals who acquired two languages from birth), have learnt a second language after the acquisition of their L1, and past puberty. These kinds of bilingual speakers have been of interest in psycholinguistic and neurolinguistic studies, given the changes that occur at a cognitive-linguistic level due to L1-L2 interaction patterns in bilingual minds. Results from recent studies suggested high levels of plasticity in the language system(s), even in the case of individuals with fully acquired L1s. In fact, the state of acquisition of L1, and the time of L2 learning are important to define these kinds of bilinguals. Late bilinguals have fully acquired their native language and they have spent their pre-puberty years immersed in the linguistic environment of their L1. Crucially, late bilinguals can be defined as such given the fact that their acquisition of a L2 is subsequent to their L1 acquisition.

When it comes to research involving late bilinguals, a number of factors are difficult to control and can lead to inaccurate results. For instance, lack of control of variables such as the actual exposure to the L1 or L2, or any influences from the immediate environment, together with individual variability of working memory capacity and processing speed can have an impact on speakers' performance. Moreover, information about the participants' linguistic background is often collected through self-reports, which can be influenced by subjective factors.

Language interactions in late bilinguals often lead to phenomena such as code-switching, language transfer, and language attrition. The next section describes the phenomenon of language attrition, its origins, and the state-of-art of research that has been trying to investigate the possible mechanisms responsible for it.

1.4. The phenomenon of Language Attrition

The way language unfolds in the multilingual mind and the phenomena resulting from language contact have been topics of interest in different areas of research, including linguistics, psycholinguistics, neurolinguistics, and sociolinguistics. The variety of fields that have approached the matter have given birth to what Köpke (2004) defines as a 'terminological jungle', where finding a precise definition for phenomena such as language attrition is not straightforward.

A definition

Defining language attrition can become challenging depending on the lens one looks at it through. Attrition can be defined as an individual change occurring at the cognitive/psycholinguistic level, often resulting from a diminished exposure to a language – which is the one undergoing the changes – and increased exposure and use of another language – responsible for influencing the other. We report Köpke and Schmid's (2004) definition of attrition, which has been the most widely accepted up to this day, and that describes language attrition as 'the non-pathological decrease in a language that had previously been acquired by an individual' (page 5). Therefore, language attrition refers to situations where speakers of a language (an L1 or a later learnt L2) can no longer do something they had previously been able to do. It is worth noting that language attrition is not caused by any age-related cognitive impairment, nor due to a deterioration of the brain, but triggered by disuse, and pressure from another language due to a change of the linguistic environment (Schmid, 2008).

The origins of language attrition

A speaker's attitude towards a language is one of the factors that seem to influence the development of attrition. For instance, Schmid (2002) found that German Jewish refugees emigrated to English-speaking countries before WWII who had a negative attitude towards their native language were correlated with a most severe level of attrition. This, together with L2 exposure and L1 use seem to be the most influential factors contributing to the attrition phenomenon. Despite this, the mechanisms causing attrition are still uncertain. Research has been trying to investigate if attrition depends on cross-linguistic influence, language-internal reorganisation, or lack of exposure. Crucially, if it was the case that attrition was the result of L1 disuse, signs of the phenomenon ought to be expected even in the absence of a newly acquired L2. To out knowledge, only one study tried

to explore this hypothesis. Baladzhaeva and Laufer (2018) investigated whether a group of Russian speakers emigrated to Israel were subject to language attrition, with no knowledge of Hebrew. The results were compared against a group of Hebrew-immersed Russian bilinguals, as well as a Russian monolingual group living in Russia. Evidence for L1 attrition was found in both groups living in Israel, with the first group performing worse than the monolingual group in grammaticality judgments. This suggested that attrition can happen as a 'second-hand phenomenon', through influences from the contact with bilingual attriters, and so without direct knowledge of the L2.

Kasparian, Vespignani and Steinhauer (2016) found neurophysiological evidence of processing changes in adult attriters' morphosyntax, proving that attriters with an increased exposure to the L2 and a limited use of the L1 were influenced by the grammar of their L2. Their study was conducted with Italian-English late bilinguals using event-related-potentials (ERPs) and testing their real-time processing of Italian relative-clauses with an acceptability judgment task. The results were then compared against the performance of a control group of 30 monolingual native speakers in Italy. The authors found that attriters provided significantly lower acceptability ratings for relative clauses that were ungrammatical in English, compared to the control group.

According to a second hypothesis, attrition would be the result of L1-internal organisation factors. That is to say, processes of simplification or generalisation due to the analytic nature of the L2 (often English) may have been misinterpreted as L2-to-L1 transfer (Schmid, 2002; Köpke and Schmid, 2004). The tendency of human brains to prefer cost-efficient processes would lead the bilingual speaker to employ a simpler construction common to both languages, even if atypical or uncommon in the L1. Isurin's (2005) findings support this theory, providing evidence from a group of Russian-English bilinguals, that showed a strong preference for the SVO English word-order even when performing storytelling in Russian, a specific context in which VSO order would be more frequently used.

Nevertheless, even though the literature has been inconsistent regarding the possible sources of attrition, a mixed approach should not be excluded, where both underlying mechanisms (i.e., cross-linguistic influence and L1-internal processes) would contribute together to the magnitude of the phenomenon, instead of being mutually exclusive factors. As defined by De Bot (2002): 'L1 attrition is both a decline of retrievability of declarative linguistic knowledge and deproceduralization of linguistic knowledge in L1, and an increase of competition with L2 knowledge'.

Different studies have indicated that the degree of attrition can be modulated by factors such as L1 exposure, length of residence in the L2 environment and L2 proficiency levels (e.g., Kasparian and Steinhauen, 2017). However, it is worth noting that when it comes to L1 exposure, both quantity and quality of exposure are involved in the severity of the attrition phenomenon. Higher levels of

attrition were found in participants whose exposure to their L1 had been quantitatively reduced (Köpke, 1999; Insurin, 2007; Kasparian et al., 2017; Schmid, 2019). Moreover, Schmid (2007) and Schmid and Dusseldorp (2010), among others, found stronger signs of attrition in individuals whose L1 use was mainly limited to informal environments (e.g., with family and friends), compared to those participants who claimed to use their L1 in professional contexts. Furthermore, most frequent instances of code-switching have been found to positively correlate with higher levels of attrition. Code-switching refers to the situations in which speakers interleave two languages in the course of a single utterance, adapting words from one language to contexts of the other (Green and Abutalebi, 2013). According to Grosjean and Py (1991), code-switching would facilitate and accelerate the attrition process.

Language attrition by a neurolinguistic point of view

Even though the present work aims to keep a psycholinguistic approach to language attrition, some basic information from neurolinguistic studies is included to provide a broader view of the phenomenon. More specifically, it is worth mentioning the Activation Threshold Hypothesis (ATH) advanced by Michael Paradis (1993, 2004), and the way it can be related to language attrition. The author assumed that the amount of contact maintained with the L1 plays a role in the magnitude of the attrition phenomenon. Thus, the frequency of use of the L1 would influence the level of activation of that language. According to the ATH, a critical threshold (i.e., level of activation) must be reached for a linguistic item or linguistic subsystem to be activated. This threshold level depends on the impulses that are necessary to activate it. According to Paradis (2004) activation is possible 'when a sufficient amount of positive neural impulses has reached its neural substrate' (page 28). Lower activation thresholds require less impulses to activate the respective item, and vice versa for higher threshold levels. The threshold is lowered after each activation, and it gradually rises again until it gets activated again. In other words, when an item or subsystem is no longer stimulated, its threshold level rises, making it more difficult to re-activate. We can infer that activation levels are not stable and highly dependent on the frequency of use.

In bilingual and multilingual speakers, increased use and exposure to a language lowers the activation threshold levels of that language, making it more easily accessible for use. At the same time, the other language is inhibited and so are the items of that language every time that a translation equivalent is selected. A long-term disuse of a language leads to a raising of the activation level in that language and, according to Paradis, this would affect declarative items first, and procedural ones

later. This would ultimately lead to cross-linguistic interference and so to the phenomenon of language attrition.

Attrition at different linguistic levels

Language operates at different levels of representation, i.e., phonology, morphology, lexicon, syntax, and pragmatics. Signs of language attrition can be present at different levels with different magnitudes. For instance, L1 phonology can be more resistant to attrition and show less influences from the L2. On the other hand, studies showed that the lexical system is more susceptible to attrition (Schmid, 2011). In fact, lexico-semantic attrition often yields episodes of delayed lexical retrieval, pauses, repetitions, self-corrections (e.g., Schmid and Fagersten, 2010) and tip-of-the-tongue experiences (Kreiner and Degani, 2015). At the morphosyntactic level, attrition can be present in the form of intrusion effects of the L2 on the L1 syntactic structures, and simplifications in the L1 system (e.g., Kasparian et al. 2017). Common behaviours resulting from language attrition have led researchers to believe that uninterpretable features (i.e., features at the formal syntax level) are less likely to be influenced by attrition, compared to syntactic/pragmatic features, also referred to as interpretable features (Tsimpli, Sorace, Heycock, Filiaci, 2009). Sorace and Filiaci (2006) described the role of interfaces proposing the Interface Hypothesis (IH) as an attempt to account for trends of residual optionality and lack of convergence found in proficient L2 speakers. More precisely, according to the IH 'language structures involving an interface between syntax and other cognitive domains are less likely to be acquired completely than structures that do not involve this interface' (Sorace, 2011, p. 1). Tsimpli et al. (2009) reported that late bilinguals of Italian and Greek with a near-native proficiency of English were unaffected by language attrition for purely formal features, whereas they did find attrition in both experimental groups in syntactic/pragmatic aspects.

In conclusion, language attrition is a type of change happening at a cognitive level. Language is a complex, dynamic system, built on inputs from biology and society and so, sensitive to alterations coming from the environment. Bilingual acquisition and the consequences deriving from language contact have been challenging various fields of research to explore and reconsider the way language systems may interact in the multilingual mind. Language attrition has been defined in terms of non-pathological decreasing of a language that a speaker had previously fully acquired. From a neurolinguistic point of view, attrition would be the result of lack of stimulation (Paradis, 2004) and so factors such as maintained contacts with the L1 seem to be crucial for the attrition phenomenon to happen. Nevertheless, even though a range of studies have found signs of language attrition at all linguistic levels, in both production and comprehension, the reasons underlying the phenomenon remain unclear. Elements such as speakers' attitude toward a language, the quantity and quality of L1 exposure and the cross-linguistic influence from the L2 have been taken into consideration as

modulators of the magnitude of the phenomenon. The study presented in Section 2 aims at contributing to the research on this phenomenon by a psycholinguistic perspective.

1.5. Ditransitives in English and Italian

When it comes to ditransitive events, English allows them to be expressed with two alternative constructions, namely Double Objects (DOs – e.g., *The girl gave the teacher a flower*) and Prepositional Datives (PDs – e.g., *The girl gave a flower to the teacher*). On the other hand, in Italian, the DO option is unlicenced and its use would yield an ungrammatical sentence.

Let us consider the English so-called *dative alternation*. In the following examples, the meaning of the same event is expressed using two different structures, i.e., a DO and a PD, respectively:

(1) a.   John gave Mary the book

b.   John gave the book to Mary

The verb *give* is one of those dative verbs which can subcategorise either for an NP-NP construction (1a), and an NP-PP construction (1b). However, this is not the case of all English verbs. In fact, verbs that allow the DO construction tend to be non-Latinate verbs. For instance, the Latinate verb *donate*, semantically close to *give*, can only occur in the PD structure:

(2) a.   *John donated the library a book

b.   John donated a book to the library

It is worth noting that when speakers produce one or the other structure, they go through different processing stages. At the conceptual stage, the speaker assigns a thematic role to each of the entities undergoing the event she wants to express. That is to say, when considering the verb *give*, the speaker will have to identify an Agent (e.g., John), a Patient (e.g., Mary) and a Theme (e.g., the book), and assign these thematic roles to the respective lemmas. At the formulation stage, the information is encoded in linguistic form, thus, for ditransitive verbs allowing the dative alternation, the information can be encoded in different sub-categorisation frames (Bock & Levelt, 1994). When the double object frame is chosen, the agent NP is found in the direct object position and the patient NP is found in the so-called second object position (as in 1a), whereas in the case of a prepositional frame, the information is mapped so that the subject NP be in the direct object position and the patient PP in the oblique object position (as in 1b). Lastly, at the articulation stage, the encoded information is spelled out into sounds, signs, or marks.

On the other hand, Italian does not allow a DO construction, but only PD constructions:

(3) a.   *La ragazza dà la maestra un fiore

   b.   La ragazza dà un fiore alla maestra

Nevertheless, the morphologically rich nature of Italian allows syntactic constituents to appear in orders that are different from the prototypical SVO. This linear-order alteration is often used for topicalisation purposes when the speaker wants to emphasise a specific part of the discourse. Thus, the following sentence is grammatical in Italian, even though its production would be dispreferred in neutral contexts:

(4) a.   La ragazza dà alla maestra un fiore

In (4a) the constituent [alla maestra] is topicalised and, according to Samek-Lodovici (2015), that would happen for reasons related to a speaker's pragmatic interpretation of the described event. Therefore, (4a) as opposed to (3b) reflects a shifted (marked) linear construction even though the constituents of both sentences share the same thematic roles.

The English equivalent (5a) is not ungrammatical *per se*:

(5) a.   The girl gives to the teacher a flower

According to a corpus analysis performed by Wasow (1997), found in Pickering et al. (2002), this marked construction accounted for the 5.6% of the occurrences in the Brown corpus, showing that it is rare in natural discourse in English, but possible.

The following table, found in Perini (2022), exhaustively summarises the representations of dative structures in English and Italian in terms of thematic roles, grammatical functions, and linear syntactic mapping:

English	Italian
PO ($NP_{Agt/Sub} - V - NP_{Thm/Dobj} - PP_{Rcpt/OObj}$)	PO ($NP_{Agt/Sub} - V - NP_{Thm/Dobj} - PP_{Rcpt/OObj}$)
Shifted PO ($NP_{Agt/Sub} - V - PP_{Rcpt/OObj} - NP_{Thm/Dobj}$)	Shifted PO ($NP_{Agt/Sub} - V - PP_{Rcpt/OObj} - NP_{Thm/Dobj}$)
DO ($NP_{Agt/Sub} - V - NP_{Rcpt/IObj} - NP_{Thm/DObj}$)	*DO ($NP_{Agt/Sub} - V - NP_{Rcpt/IObj} - NP_{Thm/DObj}$)

Table 1. Representations of dative structures in English and Italian in terms of thematic roles, grammatical functions, and linear syntactic mapping. Perini (2022)

To conclude, English and Italian allow different constructions to represent ditransitive events. While both DOs and PDs are licensed in English, only PDs yield grammatical sentences in Italian. Moreover, English verbs that allow the dative alternation can be subcategorised either as DOs or PDs and the realisation of one or the other construction not only bears a different linear word order, but it also differs in the way thematic roles are mapped and arguments are structured. Furthermore, both

languages allow shifted constructions (i.e., shifted PDs) but, while a marked order can be used in Italian for topicalization reasons, the same pragmatic intentions would not trigger the same mechanism in English, in which shifted PDs are more rarely found.

1.6. Verb bias in the dative alternation

The work by Gries and Stefanowitsch (2004) is reviewed to provide an insight into verb biases in English dative constructions.

As outlined in Section 1.5., two different structures are licensed in English to express the meaning of a ditransitive event, i.e., DOs and PDs. This constituent-order alternation has been widely discussed, and different theories have been advanced trying to identify the reasons that would lead a speaker to employ one or the other structure. According to Thompson and Koide (1987), the structural choice is influenced by some semantic information. The authors claim that a DO construction is more likely to be preferred when the distance between the agent and the patient (or recipient) is small, as opposed to a PD construction, which, according to their view, is preferred when this distance is large. Under another view (e.g., Goldberg, 1995), causal reasons would underlie the dative alternation. That is to say, the selection of a DO construction would be preferred when the intended meaning is 'Agent causes Recipient to receive Theme', and the PD when 'Agent causes Theme to move to Recipient'. We can infer that DOs should be preferred with verbs of direct face-to-face transfer, whereas PDs should be preferred with verbs of transfer over distance. Gries and Stefanowitsch (2004) tested this prediction with a distinctive-collexeme analysis and, as reported in Table 2, their result strongly confirmed the fact that there are collexemes distinguishing between the two dative constructions, and the meaning of those verbs align with the abovementioned semantic theories.

DITRANSITIVE (N=1035)	*To*-DATIVE (N=1919)		
Collexeme	Distinctiveness	Collexeme	Distinctiveness
Give (461:146)	1.84E-120	bring (7:82)	1.47E-09
tell (128:2)	8.77E-58	play (1:37)	1.46E-06
show (49:15)	8.32E-12	take (12:63)	0.0002
offer (43:15)	9.95E-10	pass (2:29)	0.0002
cost (20:1)	9.71E-09	make (3:23)	0.0068
teach (15:1)	1.49E-06	sell (1:14)	0.0139
wish (9:1)	0.0005	do (10:40)	0.0151
ask (12:4)	0.0013	supply (1:12)	0.0291
promise (7:1)	0.0036	read (1:10)	0.0599
deny (8:3)	0.0122	hand (5:21)	0.0636
award (7:3)	0.0260	feed (1:9)	0.0852
grant (5:2)	0.0556	leave (6:20)	0.1397
cause (8:9)	0.2131	keep (1:7)	0.1682
drop (3:2)	0.2356	pay (13:34)	0.1809
charge (4:4)	0.2942	assign (3:8)	0.4243

get (20:32)	0.3493	set (2:6)	0.4267
allocate (4:5)	0.3920	write (4:9)	0.4993
send (64:113)	0.4022	cut (2:5)	0.5314
owe (6:9)	0.4369	lend (7:13)	0.5999
lose (2:3)	0.5724		

Table 2. *Collexemes distinguishing between the distrantitive and to-dative. Gries and Stefanowitsch (2004), p. 106*

As we can see from Table 2, the verb *give* is on the top of the ranking, encoding the meaning of causing someone to receive something. Similarly, verbs such as *tell*, *teach* and *ask* metaphorically involve a direct contact between agent and recipient. More precisely, Gries and Stefanowitsch (2004) define them as verbs of 'communication as transfer', encoding interpersonal communication with no intervening media. The contact between agent and recipient of the verb *show* is direct in that there is visibility between the two parts. The authors defined it as a verb of 'perceiving as receiving'. Next, *offer* and *promise* are considered as instantiating the 'satisfaction condition', and *deny* as instantiating the 'cause not to receive' extension.

On the other hand, PD-biased verbs such as *bring*, *take,* and *pass*, again confirm the semantic theories discussed above, involving some distance between the agent and the recipient that needs to be overcome for the action expressed by the verb to be completed.

Despite the top-ranked verbs firmly matching constructional meaning theories, some verbs such as *sell, supply*, and *pay*, appear to be PD biased, even though the action they describe seems to be semantically closer to the ones preferring a DO construction. For instance, the verb *sell* involves a change of possession and one could argue that it typically involves a movement of a sold item from the seller to the buyer. However, some sales do not involve any movements and the distance between the two entities can greatly vary. Further research will be needed to establish to what extent semantic theories can explain the ways verbs are biased for dative constructions, and what other possible reasons may underlie these kinds of syntactic choices.

Finally, when we talk about verb bias, we refer to the tendency of a speaker to prefer a specific structure in alternating pairs of constructions. This section aimed at giving some basic information about the state of art of current research on the semantic reasons that would lead a speaker to employ a specific dative structure. Hence, some verbs such as *give, tell, show,* and *offer* appear to be DO-biased, that is to say, a DO construction is preferred when they are employed, whereas verbs such as *bring, take,* and *pass* tend to prefer a PD construction, and so to be PD-biased. The corpus analysis performed by Gries and Stefanowitsch (2004) was considered for the selection of the verbs used in the study presented in the next section.

Part 2. The production of dative structures in Italian English-immersed late bilinguals: a comparative study on Language Attrition.

2.1. Introduction

The aim of this study was to investigate the phenomenon of language attrition in Italian L1 – English L2 late bilinguals who, at the time of testing, had been immersed in their L2 environment for at least 5 years. A cross-linguistic structural priming task was used to investigate dative structures where DO- and PD-biases were manipulated. Results were compared against a control group of L1-immersed Italian-English late bilinguals, with varying degrees of English language proficiency. It is worth noting that we decided to investigate the attrition phenomenon using a syntactic structure that is not shared between the two languages (i.e., dative alternation). This decision was made with the purpose of shading light on the extent to which interference from L2 syntactic structures can affect L1 production in terms of constructions normally employed only in pragmatically justified contexts (i.e., Shifted PDs). Therefore, this study aimed at contributing to a better understanding of the way linguistic systems may coexist in the multilingual mind, and abstract mental representations may be shared across languages.

2.2. Research questions

This study attempts to answer the following research questions:

- To what extent can dominance in a non-native language lead to changes in L1 syntactic structures and preferences (i.e., language attrition)?
- Can cross-linguistic Structural Priming be used to investigate L1 attrition?
- What role do internal linguistic factors (L2 proficiency) and external linguistic factors (exposure, duration of L2 immersion) play in L1 attrition?

2.2.1. Hypotheses

Signs of language attrition are expected to be found in L1 productions as a result of a cross-linguistic priming effect from English DOs. That is, participants who are sensitive to the phenomenon are expected to utter sentences such as (1) '*La bambina dà alla maestra un fiore*' ('The girl is giving

to the teacher a flower') after being primed by (2) '*The man is giving the girl a pencil'*. As mentioned before, the DO option is unlicenced in Italian and its use would yield an ungrammatical sentence (3) **'La bambina dà la maestra un fiore'*. Despite this, scrambling the constituents using a marked order allows the speaker to align the mapping of thematic roles and grammatical categories in a way that reflects the thematic order of an English DO. Therefore, English DOs are expected to prime unpreferred constructions we will refer to as Shifted PDs.

Higher levels of syntactic attrition will be likely to correlate positively with more extended periods of L2 immersion, and with a stronger L1 contact, especially in informal contexts (Schmid, 2007; Schmid and Dusseldorp, 2010). Moreover, different magnitudes of attrition are expected to be found between the two groups, i.e., English-immersed participants and Controls.

2.3. Method

A cross-linguistic Structural Priming task was used to investigate dative productions in our populations, employing a 2x1 factorial design.
A questionnaire built upon Birdsong's Bilingual Language Profile (BLP) model collected information about the participants' linguistic background, immigration history and claimed degree of L2 exposure.

Before designing our experiment, two norming tasks were submitted via Qualtrics to 10 English and 10 Italian native speakers in order to confirm the intelligibility of our images, and find the most natural way to describe the events of our items. The relevant information was collected using a grammaticality judgment task and a picture description task, which allowed us to fine-tune our materials.

2.3.1. Participants

English-immersed participants

This group of participants (n = 47) expatriated in an English-speaking country after the age of 16, and at the time of data collection they had been living abroad for at least 5 years. Data was collected from speakers in the United States, Australia, New Zealand, and the United Kingdom. The age of the participants ranged from 22 to 73 (mean = 39.6; sd = 11.7). The time spent abroad varied

from a minimum of 5 years to 43 years (mean = 10.2; sd = 7.3) and the age of move spanned from 17 to 50 (mean = 28.9; sd = 7.6).

The amount of contact maintained with their L1 (i.e., Italian) was scored considering the amount of time the participants claimed to use their L1 in informal (i.e., with family) and formal (i.e., at work) contexts. Participants were asked to rate how often they use Italian in the above mentioned situations, using percentages.

Their English proficiency was measured through a self-evaluation questionnaire, in which they were asked to judge their L2 competence in the 4 language skills (i.e., writing, speaking, reading, and listening) using a Likert scale from 0 to 6, where 0 corresponded to 'not well at all' and 6 corresponded to 'very well'. The results ranged from 3.25 to 6.00, with a mean of 5.31 and standard deviation of 0.65.

Controls

Our control group consisted of 19 late bilinguals living in Italy who, at the time this study was performed, had not spent more than 5 years in an English-speaking country over the last 10 years. All of them had a medium-to-high L2 proficiency. Information about their linguistic background and exposure was collected using an adapted version of Birdsong's BLP questionnaire. The average age of this group of participants was 29 (range = 21-42; sd = 4.4), and their claimed proficiency ranged from 3.75 to 6 (mean = 5; sd = 0.7).

2.3.2. Materials

The same experiment and the same experimental items were presented to both group members. The materials consisted of 16 sets including a prime English sentence, the Italian translation-equivalent verb of the sentence (i.e., verb hint) and a target picture. The images presented to the participants depicted simple actions which could be described using one single sentence. Primes were dative, transitive, unaccusative, and locative sentences, and the subsequent images depicted events that could be described using the same construction as the prime. Nevertheless, for the scope of this study, only dative sentences were coded and analysed, whereas the other three were considered as fillers.

Datives

Dative primes were presented to the participants in either a PD or DO condition. PDs had a NP-V-NP-PP order, corresponding to Subject-Agent-Theme-Recipient in terms of thematic role mappings and to subject-direct object-oblique object functional mappings. On the other hand, DOs appeared with a NP-V-NP-NP order, mapped as Agent-Recipient-Theme and as subject-indirect object-direct object. Subjects, indirect and oblique objects were always animate, whereas direct objects were always inanimate.

Verb Bias

The same verb was kept between prime and target and DO- PD-biases were manipulated following the collexeme analysis by Gries & Stefanowitsch (2004). In fact, the English verbs employed were selected from the work on alternative structure biases performed by the authors. Therefore, participants saw four sentences containing verbs considered to be DO-biased (i.e., *give, offer, show, serve*), and four verbs considered to be biased towards a PD construction (i.e., *sell, hand, throw, send*). Each participant saw the same verb in both conditions, in two different sentences.

On the other hand, the verb hints (i.e., Italian translation-equivalent verbs) were: *dare, offrire, mostrare, servire, vendere, passare, lanciare, mandare*.

The complete list of materials can be found in Appendix A.

Target Images

Target images were created using the online platform Pixton and eventually improved with Clip Studio. The action depicted involved two animate entities acting as the Agent and the Recipient, and an inanimate object, acting as the Theme. They were all in black and white and reflected the left-to-right reading order to reduce any possible bias.

All experimental target images can be found in Appendix B.

2.3.3. Design

We employed a 2x1 factorial structure defined by the following factors:

- Sentence Condition (DO or PD prime);
- Verb condition (translation-equivalent verb between prime and target).

Each participant was shown 64 trials in the following conditions:

- 16 datives (8 DO, 8 PD)
- 16 transitives
- 16 unaccusatives
- 16 locatives

Datives were presented to each participant in either a DO or a PD condition. Our dependent variables were the ratio of target descriptions in one or the other construction after a PD prime, and a DO prime.

Participants saw either one of two counterbalanced lists, each containing the 64 trials in the opposite condition and order. That is, where Item 1 of List 1 was a sentence describing a transitive event in the active condition, Item 64 of List 2 corresponded to the same event (i.e., same verb) described using the passive condition.

Items appeared in a pseudorandomized order, with 3 fillers intervening between each experimental sentence. Moreover, dative sentences with the same verb were shown to the participants with at least ten intervening trials.

2.3.4. Procedure

Our group of English-immersed bilinguals was recruited through Italian embassies, consulates, cultural institutes, universities, radio and magazine advertising, and Facebook groups. Controls were recruited through friends, and Facebook groups.

Three tasks were submitted to the participants:

1. A preliminary informed consent form in which participants agreed to taking part of our study, and through which they were assigned a unique ID code
2. A Language Profile Questionnaire using Birdsong's BLP model, via Qualtrics
3. A 20-minute experimental task, submitted via Pavlovia

Each task was submitted upon completion of the previous one. 304 participants completed the second phase and finally, data from 47 participants was properly collected, coded, and analysed. The experiment was created locally using PsychoPy version 3.0 (Peirce et al., 2019) and uploaded online on Pavlovia.

Structural Priming with Sentence Repetition Task

Participants were presented with a short video tutorial on how to perform the task, and three practice sets to get accustomed with the experimental procedures. They were given exhaustive instructions on how to set up their device in order to successfully complete the task. A computer with internet access, a microphone, and a browser were required. Participants were asked to be in a quiet room throughout the entire duration of the experiment, limiting any possible distractions.

Each trial comprised an English prime sentence – to be repeated aloud – a target picture, and the Italian verb hint underneath it.

Participants were asked to describe the image using one sentence, mentioning all the depicted entities, without focusing on how specifically they could name them. For instance, *la dottoressa* ('the doctor' [f.s.]) could be described more generically as *la donna* ('the woman') or *la ragazza* ('the girl'). When the image appeared on their screen, the microphone would automatically turn on and start recording. Each trial allowed 5 seconds to read the prime sentence aloud, and 10 seconds to describe the target picture. Once the experiment started, participants did not have the possibility to pause or stop it without aborting the whole session.

Figure 3 illustrates a sample trial:

The steward is serving the passenger a drink

servire

Figure 3. *Sample trial.*

2.3.5. Scoring

Participants' recordings were manually transcribed and coded by the researcher. The following table summarises the coding guidelines that were followed:

Code	Description
StrictPD	Complete sentence consisting of subject-verb-object. Mapping of arguments as NP-V-NP-PP
ShiftedPD	Complete sentence consisting of subject-verb-object. Mapping of arguments as NP-V-PP-NP
LaxPD	Incomplete sentence where at least the verb and another element between subject and object were present.
Clitics	Sentence containing a dative clitic.
Other	Other kinds of constructions.

Table 3. *Guidelines for coding.*

A binary code was given to each sentence for each condition, where 1 corresponded to a positive scoring, and 0 to a negative one.

For the purpose of this study, prosodic, morphologic, and phonological aspects were not considered.

2.4. Results

The collected data from both groups was scored and analysed according to the Scoring guidelines outlined above.

English-immersed participants

English-immersed participants produced predominantly a higher number of Strict PDs than Shifted PDs. Ungrammatical sentences with a DO construction were not found. Some Lax PDs were produced, and the majority of them were truncated PDs. In fact, sentences such as (1), (9), (11), (12), reported in Table 4 suggest that the speakers' intention was to describe the target picture employing a PD construction, which was not successfully completed in the spell-out phase. This was due to a failure in uttering the sentence within the given recording time. On the other hand, other lax PDs such as (2-4) reflect what was likely to be a different interpretation of the depicted event, described as a transitive. In fact, verbs such as *vendere* ('sell'), and *servire* ('serve') bear both transitive and ditransitive constructions. No significant correlations were found between the production of these lax prepositional datives, and any other indicators of L2 exposure and immersion, being more likely to reflect a mere misinterpretation, or a delay in decoding and describing the target image.

	Transcription
1	la signora della mensa sta servendo della pasta al
2	la panettiera sta vendendo del pane
3	il cameriere serve il caffè
4	il panettiere vende del pane
5	la panettiera sta vendendo il pane fresco
6	l'uomo sta mandando un pacco per via posta
7	il gelataio sta vendendo un gelato
8	la signora della mensa sta servendo un piatto di pasta
9	la bambina sta dando
10	la cuoca serve la pasta
11	il musicista sta ricevendo no sta passando una chitarra
12	l'uomo invia un pacco per posta alla

Table 4. Lax PDs

Table 5 summarises the number of Shifted PDs, Strict PDs, Lax PDs, and Other constructions after each prime condition (i.e., PD, DO). Mean proportions and standard deviations (SD) are also reported.

Condition	Shifted PDs			Strict PDs			Lax PDs			Other		
	n	(%)	sd	n	(%)	sd	n	(%)	sd	n	(%)	sd
DO	16	0,043	0,116	335	0,932	0,134	5	0,014	0,047	4	0,011	0,044
PD	1	0,003	0,019	345	0,964	0,078	7	0,019	0,053	5	0,014	0,061

Table 5. *Productions per condition (English-immersed participants), with respective mean proportions and standard deviations (SD).*

As shown in Table 5 English-immersed participants produced a total of 16 Shifted PDs after DOs (0,043%) and 1 after PDs (0,003%). Moreover, they produced 335 Strict PDs after DOs (0,932%) and 345 after PDs (0,964%). Lax constructions accounted for the 0,014% of the total productions after primes in the DO condition, and the 0,019% after primes in the PD condition. Others accounted for the 0,011% (DO) and 0,014 (PD). Nevertheless, both Others and Lax productions did not reflect a specific behaviour relevant in terms of priming effect and language attrition, therefore they were excluded from the analysis. A graphical representation of the data is reported in Figure 4:
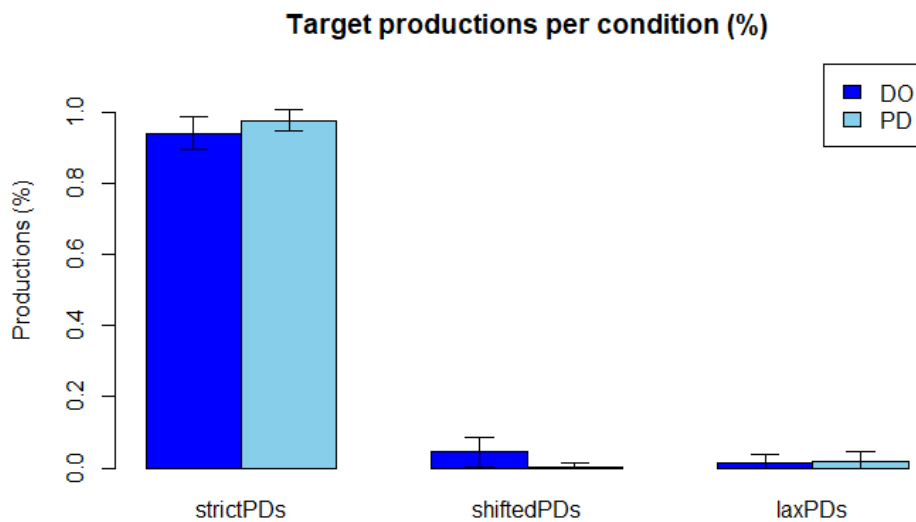
Figure 4. *Target productions per condition (i.e., DO, PD) - English-immersed participants*

Furthermore, the graph below illustrates the production of strict PDs for each prime condition. As we can see, the majority of PDs were produced after PD primes, and PDs were employed in most target descriptions.
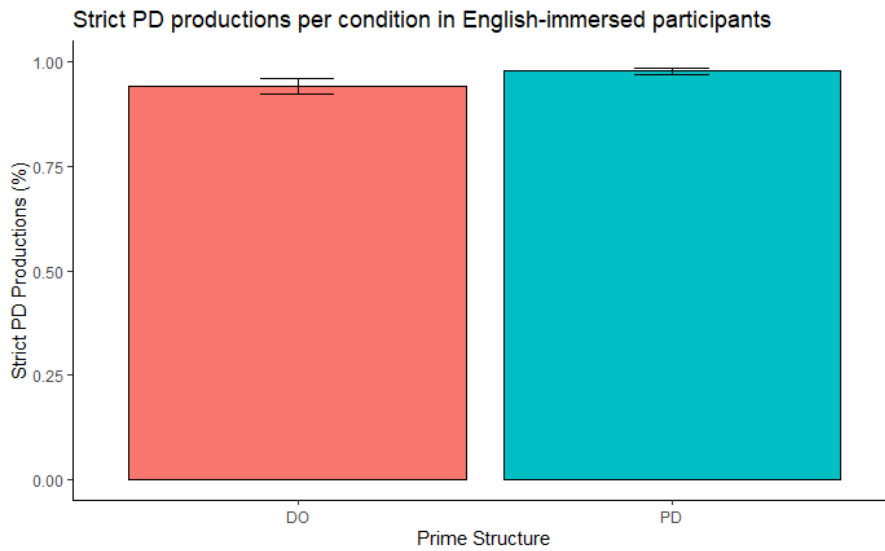
Figure 5. *Strict PDs per condition (English-immersed group)*

In contrast, Figure 5 shows the production of shifted PDs per condition. It is worth noting that the majority of shifted PDs was produced after DO primes, reflecting a cross-linguistic priming effect, and confirming previous studies claiming that priming effects are possible not only in monolingual settings but also across languages. In addition to that, these results provide evidence for a cross-linguistic structural priming effect even for structures that are unshared between languages.
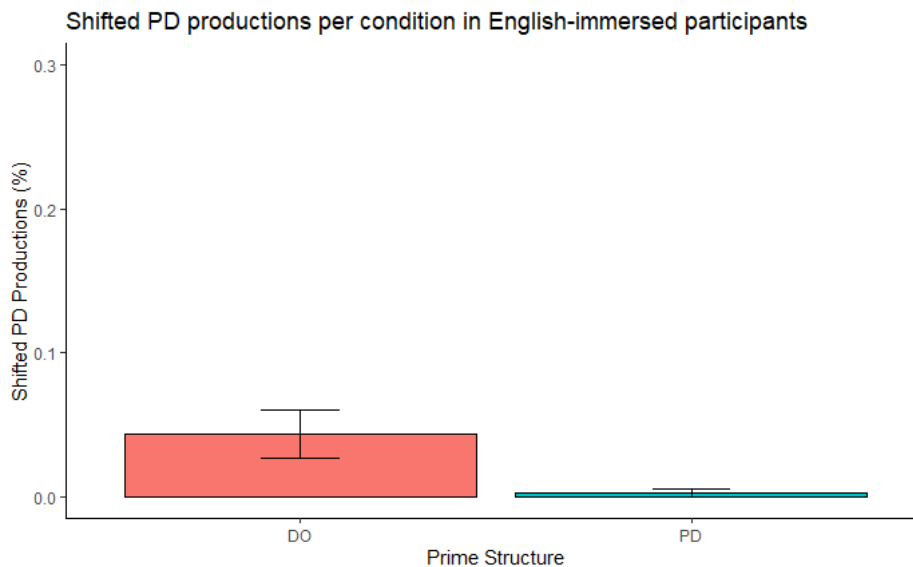
Figure 6. *Shifted PDs per condition (English-immersed group)*

Only 1 sentence was produced using a marked order after a PD prime:

La ragazza sta offrendo al ragazzo un ombrello ("The girl is offering to the boy an umbrella")

Where the PD prime sentence was:

The man is offering a tissue to the woman.

This finding is likely to reflect a case of attrition which overcame the priming effect. It is worth noting that according to Gries and Stefanowitsch (2004), the translation-equivalent verb *offer* is DO-biased. A more detailed discussion about this will be given in Section 2.5.

As we can notice from the graph below, the person who produced the above-mentioned sentence has been immersed in an L2 environment for an extended period of time, at least more than 15 years.
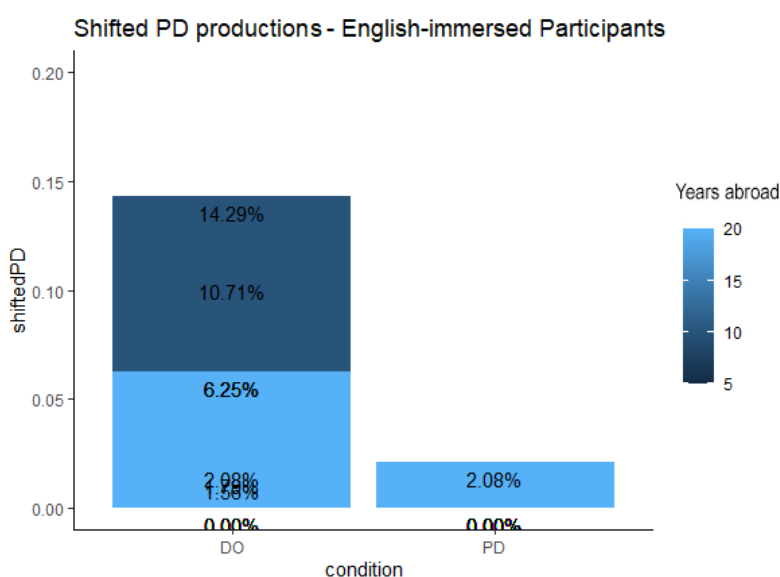
Figure 7. Shifted PD production according to prime condition and years spent abroad.

Interestingly, a verb-bias effect was found in the selection of the employed structure:
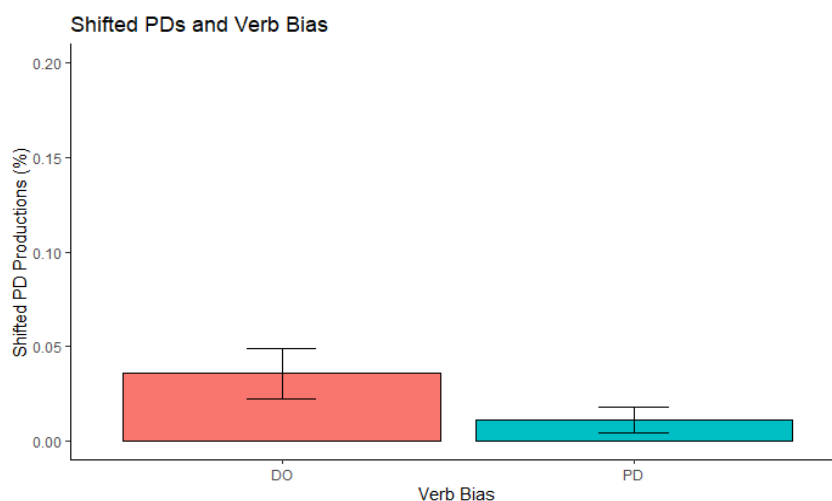
Figure 8. Shifted PDs and verb bias condition.

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Figure 8 illustrates how the majority of shifted PDs was produced after the participants were primed with a DO-biased verb (Gries and Stefanowitsch, 2004).

Next, possible relations between the degree of attrition and environmental factors were investigated. A first attempt to investigate possible correlations between L2 immersion and degree of attrition was made by looking at the time spent in an English-speaking country. As we can see from Figure 9, the trend seems to be very unstable and does not provide significant information about the phenomenon.
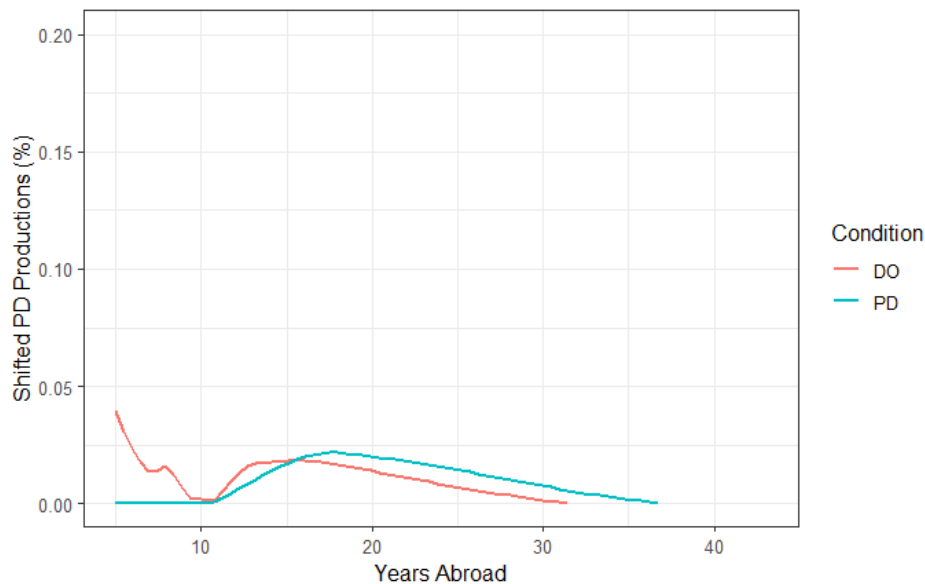
Figure 9. Shifted PD production according to time spent abroad.

Given the multiple variables that can influence attrition, we turned to investigate the degree of L2 immersion differently. When explicitly asked about their language dominance, only 2 participants claimed to be English-dominant. Nevertheless, given the nature of the question, open to subjective interpretation, we preferred to consider L1 contact as the indicator to assess the participants' dominance. Contacts kept with the L1 were analysed asking the participants to rate how often they used their L1 in informal (i.e., with friends) and formal (i.e., at work) contexts. The production of marked constructions (i.e., Shifted PDs) in relation with these variables yielded the following results:
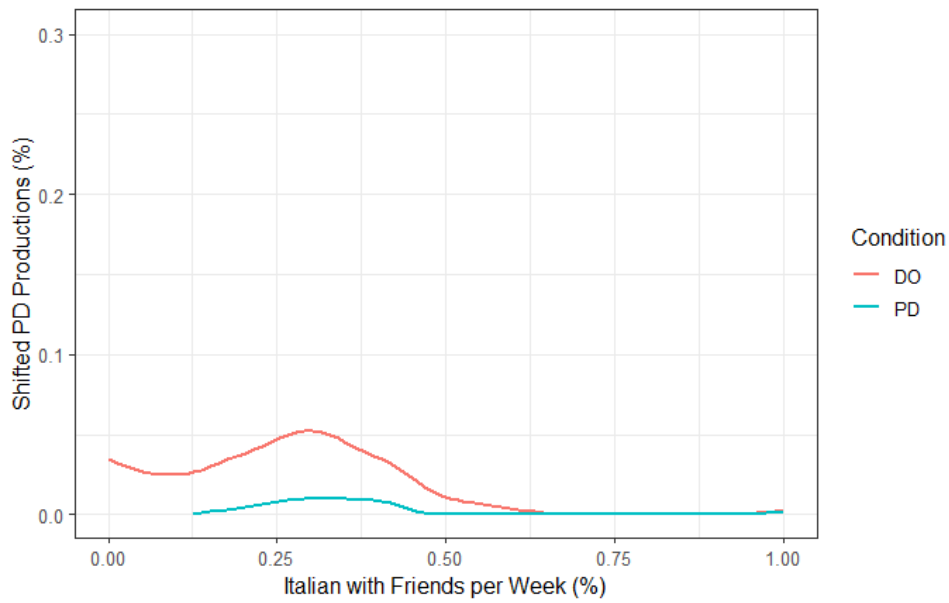
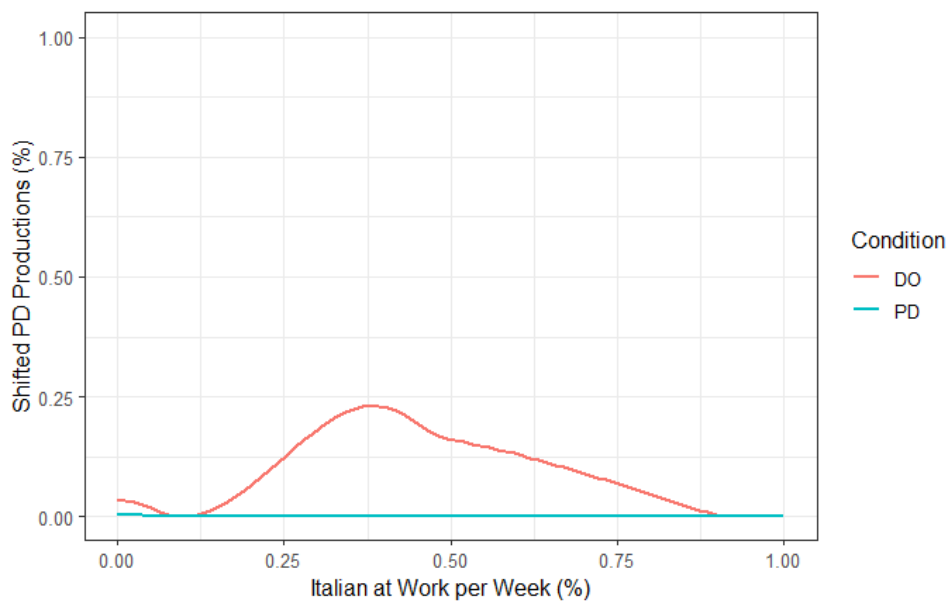*Figure 10. Shifted PDs and degree of L1 informal contact.*

Figure 11. Shifted PDs and degree of L1 formal contact

As shown by the graphs, those participants who claimed to have kept less contact with their L1 in informal environments, showed a stronger tendency to undergo language attrition, compared to the ones who claimed to use Italian with friends for more than 50% of the time, as can be seen by the rapid decrease of the attrition effect.

On the other hand, we can see how the use of the L1 in formal environments seems to have a less neat influence on the production of marked constructions. These results align with previous

studies claiming that keeping L1 contacts in informal environments has a stronger influence on the magnitude of attrition (Schmid, 2007; Schmid and Dusseldorp, 2010).

Control group

Table 6 summarises the productions of the Italian-immersed group. As we can see, Controls produced an unexpected high number of shifted PDs.

Condition	Shifted PDs			Strict PDs			Lax PDs			Clitics			Other		
	n	(%)	sd	n	(%)	sd	n	(%)	sd	n	(%)	sd	n	(%)	sd
DO	22	0,148	0,213	123	0,817	0,216	3	0,022	0,070	2	0,014098	0,042333	1	0,011	0,044
PD	5	0,034	0,093	140	0,927	0,121	5	0,033	0,057	1	0,006579	0,028677	1	0,014	0,061

Table 6. *Productions per condition (control group), with respective mean proportions and standard deviations (SD).*

Most unpreferred constructions were produced after a DO prime, showing a cross-linguistic priming effect.
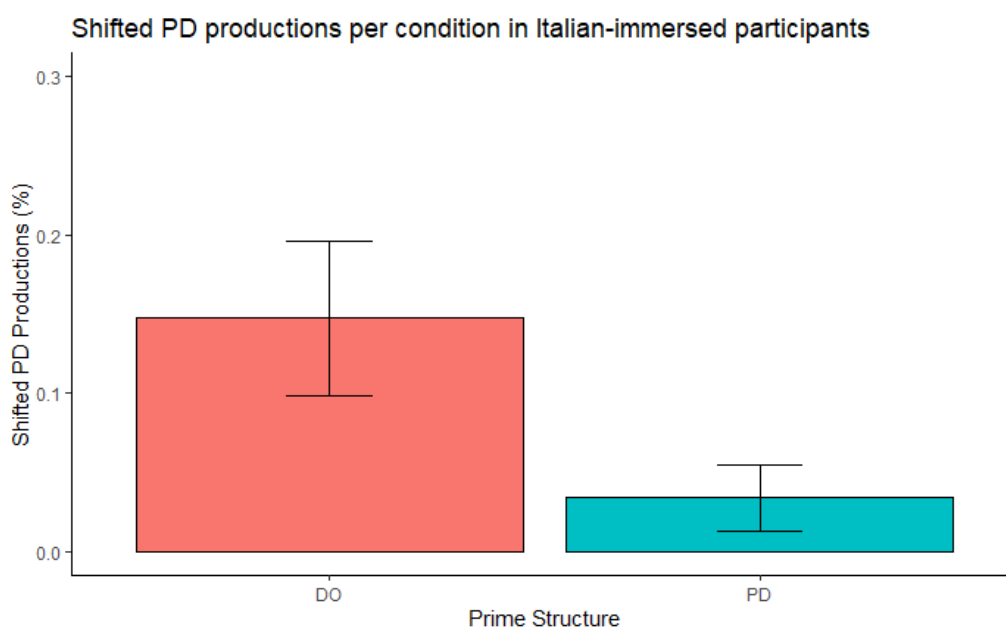

Figure 12. *Shifted PDs per condition (control group)*

Influences from the verb bias were present but were not as strong as for the English-immersed group (Figure 13).
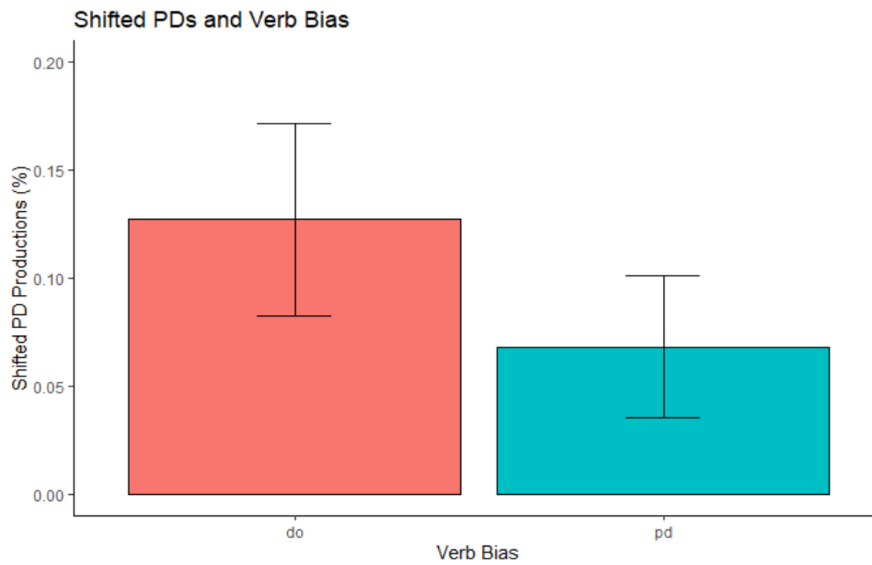
Figure 13. Shifted PDs and verb bias condition.

This suggests that the priming effect found in this group of participants may not be related to language attrition, but it could be an accessibility effect, or the result of prime surprisal. Surprisal effects were found to be stronger at earlier stages of language acquisition (Buckle, 2017). Hence, we turned to analyse the production of dispreferred constructions in relation to the participants' claimed L2 proficiency.
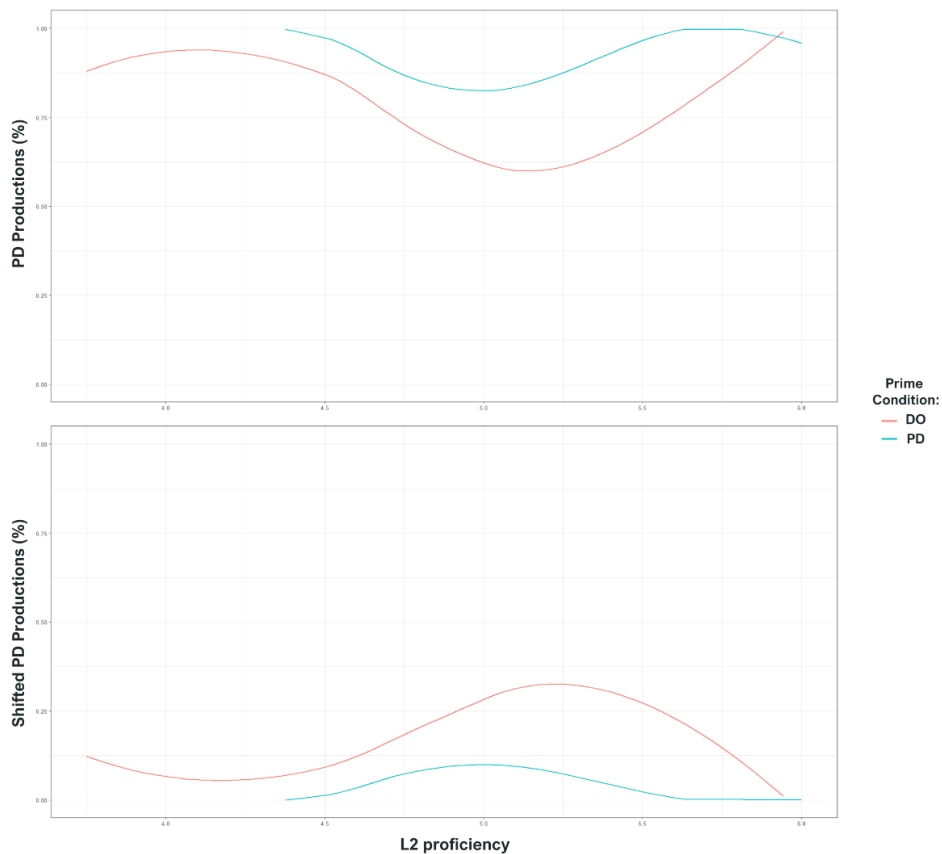

Figure 14. Shifted PD and PD production according to L2 proficiency and prime condition (control group).

As we can see, participants with a higher L2 proficiency produced more strict PDs after both DO and PD primes, showing a weaker prime surprisal effect. Moreover, the production of shifted PDs followed a U-shaped trend: few shifted PDs were produced at the lowest proficiency levels, which rapidly increased as the proficiency increased but then rapidly decreased until there were almost no unpreferred productions by those speakers with a highest L2 proficiency.

2.5. Model analysis

A model analysis was performed using a generalized linear mixed model fit by maximum likelihood (Laplace Approximation) (Brown, V., 2021) on R.

We predicted the probability (log-odds) of shifted PD productions (binary coded) as an effect of *prime condition,* participants' *L1 contact in informal environments* and *prime verb bias*. Random slopes were allowed for *items* and *participants.*

The effect of DO primes compared to PD primes was significant (β = 2.19, SE = 0.74, p = 0.003), whereas the effect of the prime verb bias was marginally significant (β = 1.16, SE = 0.61, p = 0.059). On the other hand, according to the model, the effect of L1 contact in informal environments was not significant and negative (β = -2.71, SE = 2.60, p = 0.296), even though a visual trend was present:
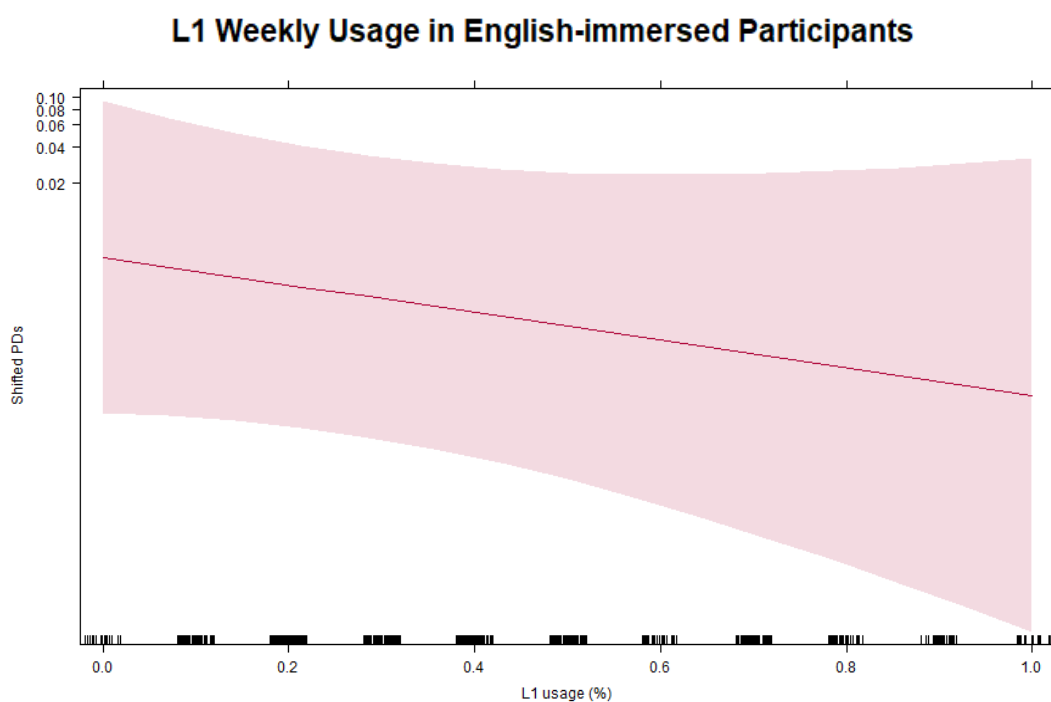

Figure 15. *Shifted PDs according to L1 contacts.*

As shown by Figure 16, the production of shifted PDs in the English-immersed group was sensitive to verb bias.

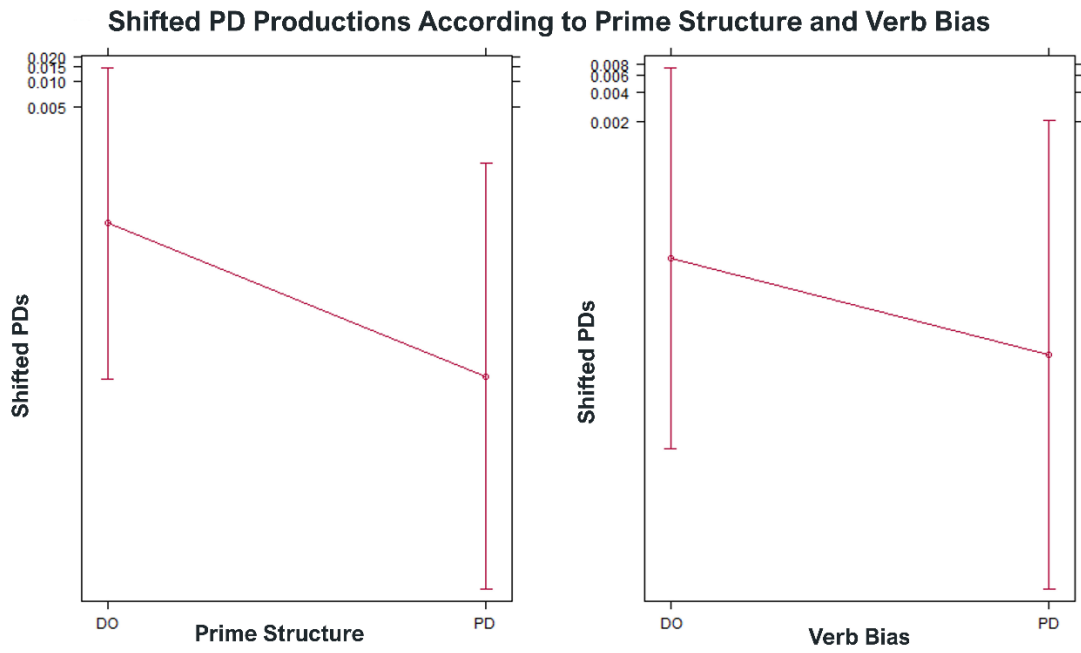**Shifted PD Productions According to Prime Structure and Verb Bias**

Figure 16. Shifted PDs according to prime type and verb bias.

In fact, participants produced more dispreferred constructions after prime sentences containing a DO-biased verb, regardless of the prime structure.

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2.6. Discussion

The results from the two groups provided evidence of a cross-linguistic priming effect, even in the case of structures that are unshared between the two languages. However, data from the control group suggest that the priming effect in the two populations may be attributable to different sources.

From an error-driven learning point of view, Controls' large production of dispreferred constructions after DO primes may be an effect of prime surprisal. In fact, speakers of Italian with a low English proficiency tend not to produce DOs when speaking in English (Baicchi, 2015, p. 108), but to employ mainly PDs. So, when participants encountered a DO prime, they were more likely to undergo a larger surprisal effect resulting in an enhanced priming. We can conclude that a stronger priming effect does not necessarily result from a bigger magnitude of attrition, but it can be related to a speaker's unmet expectations. The U-shaped trend of Shifted PDs described above aligns with the predictions advanced by the mixed model of cross-linguistic interactions described in Section 1.2. (Hartsuiker et al., 2004; Bernolet et al., 2013; Hartsuiker & Bernolet, 2017). According to this view, abstract mental representations in bilinguals would start out as separate entities (with lower proficiency levels) to develop into shared representations as the speakers' language level increases. This is confirmed by the fact that as proficiency in the L2 increased, the representation of the DO seemed to be better integrated and led participants to produce more strict PDs even after DO primes, and so to be less sensitive to prime surprisal.

On the other hand, the production of marked constructions in the English-immersed group was more likely to reflect L1 attrition. In fact, English-immersed participants were found to be sensitive to the bias of the English verb contained in the prime. This suggested that syntactic structures of one language may be influenced by the preferred syntactic structure of another language, even though this influence can lead the speaker to select a structure usually dispreferred.

Answering our research questions, assessing the extent to which dominance in a non-native language may lead to changes in L1 syntactic structures and preferences was not straightforward. In fact, dominance can depend on a variety of factors which are difficult to measure without incurring subjective judgments. Nevertheless, dominance defined as language immersion (i.e., amount of language contact with L1 and L2) demonstrated a correlation between more frequent L1 contacts and weaker signs of attrition. These results are in line with Paradis' ATH (1993, 2004): participants who kept less contacts with their L1 – and so the threshold level of activation for that language raised – showed stronger signs of attrition, and so a stronger interference from the L2.

It is worth noting that a study conducted by Perini (2022) found that the production of PDs after PD and DO primes in Heritage Speakers of Italian were correlated with their level of language

proficiency. A higher Italian proficiency led her participants to produce more PDs, even with English DO-biased verbs. In our case, a high number of strict PDs after primes in both conditions, and lack of ungrammatical Italian DOs were expected given the participants' native level of proficiency.

When it comes to defining whether cross-linguistic Structural Priming can be used to investigate L1 attrition, the results from our control group suggested that priming can be triggered by different phenomena, and so employing this paradigm could give misleading results. However, in our case, analysing intrinsic properties of the language using syntactic structures unshared between languages, allowed us to distinguish between prime effects resulting from L1 attrition from those resulting from prime surprisal. Therefore, cross-linguistic Structural Priming may be a useful paradigm to investigate language attrition, but the syntactic structures to be primed need to be carefully selected.

Lastly, internal linguistic factors such as L2 proficiency, and external linguistic factors like exposure and duration of L2 immersion did not show a correlation with the attrition phenomenon. This was likely to be a consequence of the method used to collect these kinds of data, as self-reports may be influenced by subjective factors.

3. Conclusions

The way multiple languages unfold in the multilingual mind has been of interest of research over the past decades. While different fields have been investigating language attrition using different approaches, we set out to analyse the phenomenon through the lens of psycholinguistics.

Overall, despite the difficulties that can be encountered when assessing a speaker's language dominance, results from this study suggest that strong contacts with a non-native language can lead to changes in L1 syntactic preferences, even in the case of constructions which are not present in both languages. Moreover, cross-linguistic structural priming can be used to investigate L1 attrition, even though some syntactic structures may lend themselves better to a cross-linguistic use of this paradigm and provide more accurate results than others. In our case, analysing intrinsic properties of the language using syntactic structures unshared between languages allowed us to distinguish between prime effects resulting from L1 attrition from those resulting from prime surprisal. In addition to that, including a control group allowed us to compare the performance of expatriates against the one of people immersed in their native language, and so to infer the possible effects of L2-immersion, which is likely to influence the attrition phenomenon.

3.1. Future research directions

This study was presented at the 12th International Workshop on Language Production (IWoLP) in Pittsburgh, Pennsylvania. Among the precious feedback received by other colleagues, a very much appreciated suggestion from Rob Hartsuiker advised us to extend our study by collecting some within-language data. This could be done with a picture naming task, in which L2-immersed participants would have to describe ditransitive events in Italian, with Italian verb-hints for whose English translation-equivalent verbs hold the verb bias condition. Alternatively, participants could be asked to complete a structural priming task with Italian primes including a shifted PD condition, or a clitic left dislocated PD condition (e.g., *Alla maestra le dà un fiore*).

In addition to that, a comparative analysis could be performed by analysing our data against the one collected by Perini (2022) from Heritage Speakers of Italians. This would be possible thanks to the fact that the populations of our studies saw the same experiment and the same experimental items. Therefore, a comparison of the performance of the two groups could provide information regarding the way different kinds of bilinguals (i.e., late bilinguals and heritage speakers) would be more or less sensitive to cross-linguistic priming and to the employment of dispreferred structures.

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Appendix A

List A and B

Datives

1a. The doctor is giving the nurse a box

1b. The doctor is giving a box to the nurse

2a. The man is giving a pencil to the girl

2b. The man is giving the girl a pencil

3a. The model is handing the painter a brush

3b. The model is handing a brush to the painter

4a. The vet is handing a puppy to the boy

4b. The vet is handing the boy a puppy

5a. The coach is offering the boy an apple

5b. The coach is offering an apple to the boy

6a. The man is offering a tissue to the woman

6b. The man is offering the woman a tissue

7a. The engineer is selling the man a car

7b. The engineer is selling a car to the man

8a. The woman is selling a ring to the man

8b. The woman is selling the man a ring

9a. The teacher is showing the student a book

9b. The teacher is showing a book to the student

10a. The writer is showing a manuscript to the editor

10b. The writer is showing the editor a manuscript

11a. The man is throwing the dog a bone

11b. The man is throwing a bone to the dog

12a. The actor is throwing a hat to the girl

12b. The actor is throwing the girl a hat

13a. The bartender is serving the customer a drink

13b. The bartender is serving a drink to the customer

14a. The steward is serving a sandwich to the passenger

14b. The steward is serving the passenger a sandwich

15a. The scientist is sending the colleague an email

15b. The scientist is sending an email to the colleague

16a. The man is sending a rose to the bride

16b. The man is sending the bride a rose

Transitives

1a. The hurricane is hitting the tree

1b. The tree is hit by the hurricane

2a. The bottles are hit by the ball

2b. The ball is hitting the bottles

3a. The bulldozer is destroying the house

3b. The house is destroyed by the bulldozer

4a. The window is destroyed by the rock

4b. The rock is destroying the window

5a. The villain is killing the hero

5b. The hero is killed by the villain

6a. The man is killed by the shark

6b. The shark is killing the man

7a. The guard is chasing the prisoner

7b. The prisoner is chased by the guard

8a. The alien is chased by the astronaut

8b. The astronaut is chasing the alien

9a. The blade is cutting the finger

9b. The finger is cut by the blade

10a. The logs are cut by the axe

10b. The axe is cutting the logs

11a. The bats are scaring the people

11b. The people are scared by the bats

12a. The landlady is scared by the ghost

12b. The ghost is scaring the landlady

13a. The child is pushing the cat

13b. The cat is pushed by the child

14a. The donkey is pushed by the farmer

14b. The farmer is pushing the donkey

15a. The train is carrying the cargo

15b. The cargo is carried by the train

16a. The tree trunks are carried by the river

16b. The river is carrying the tree trunks

Fillers

Filler sentences (locatives and unaccusatives) are the same for both List A and List B. Therefore, they are reported as a-b.

Locatives

1a – b. The car is coming down the mountain

2a – b. The student is sleeping on the desk

3a – b. The pear is falling off the tree

4a – b. The frogs are jumping in the river

5a – b. The woman is putting the sweater in the drawer

6a – b. The dog is hiding under the bed

7a – b. The crowd is stuck in the elevator

8a – b. The architect is walking into the studio

9a – b. The brush is removing the dust from the table

10a – b. The banker is filling the bag with gold

11a – b. The boy is loading the truck with hay

12a – b. The shop assistant is spraying the perfume on the dress

13a – b. The babysitter is pouring milk into the cup

14a – b. The woman is hanging the bathrobe on the hook

15a – b. The trekker is sitting on the rock

16a – b. The family is going to the amusement park

Unaccusatives

1a – b. The professor is talking

2a – b. The kite is flying

3a – b. The ducks are swimming

4a – b. The girls are dancing

5a – b. The manager is smiling

6a – b. The zombie is running

7a – b. The widow is crying

8a – b. The birds are singing

9a – b. The bishop is praying

10a – b. The lions are playing

11a – b. The boxers are fighting

12a – b. The workers are protesting

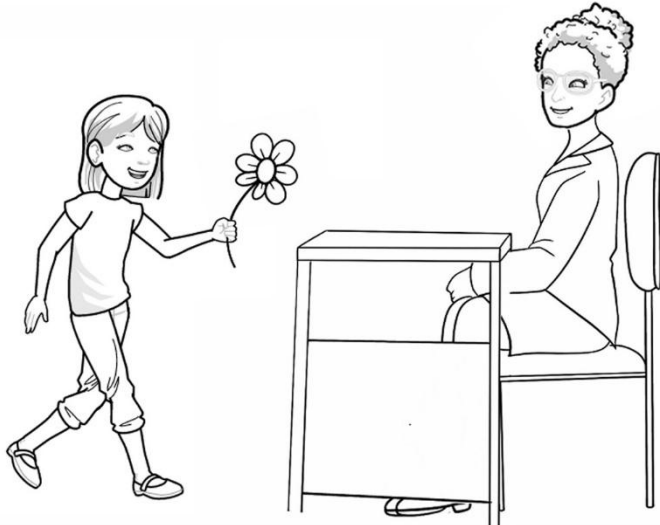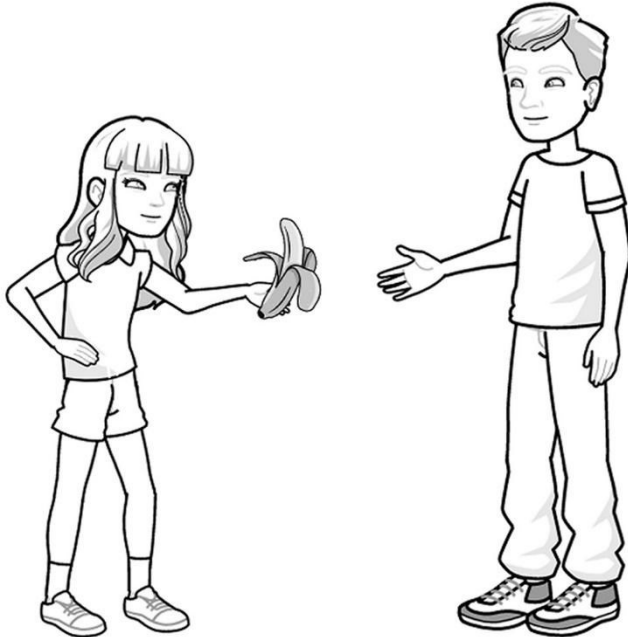13a – b. The philosopher is thinking

14a – b. The cream is boiling

15a – b. The fox is screaming
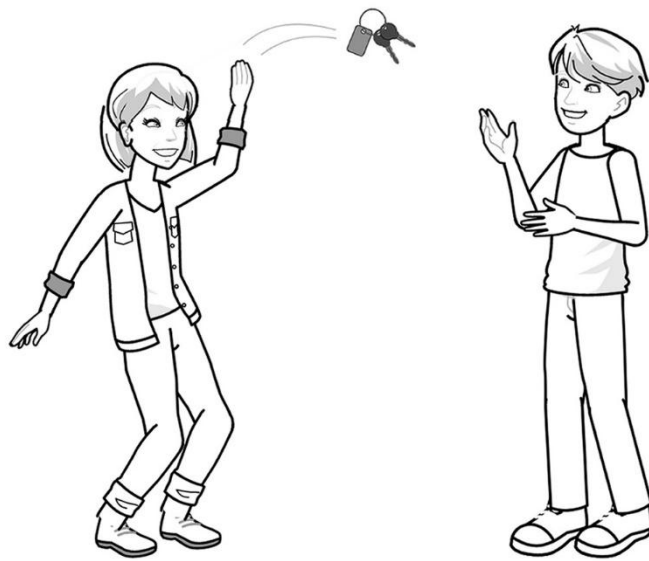
16a – b. The grass is burning

Appendix B

Target pictures
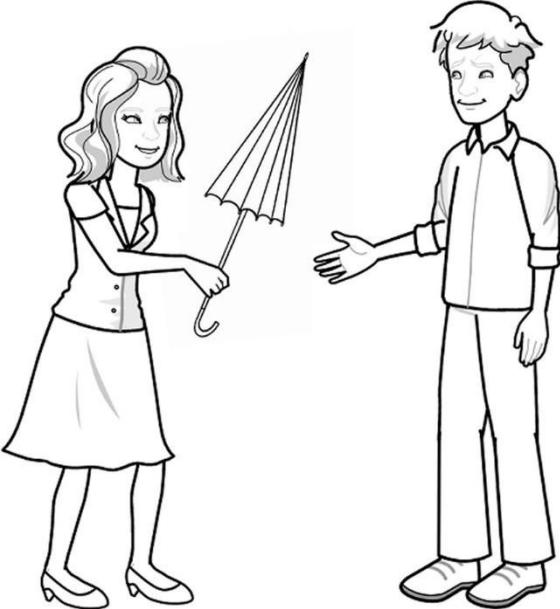
Verb Hint: dare

Verb Hint: lanciare

Verb Hint: mandare
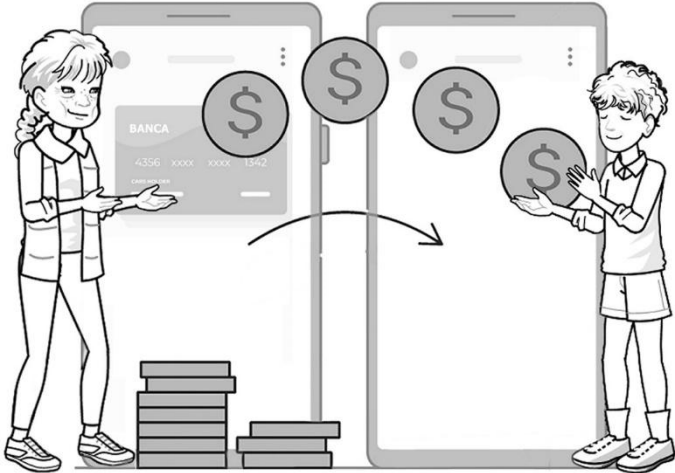
Verb Hint: mostrare
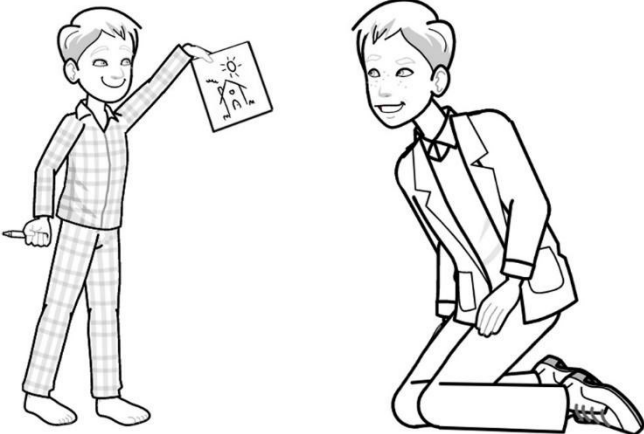
Verb Hint: offrire

Verb Hint: passare

Verb Hint: servire

Verb Hint: vendere

Appendix C

Consent Form

Informed Consent Form

Cross-linguistic investigation in English-Italian bilingual speakers

The present study is conducted by Federica Perini and Giada Leone, MA students in Language Sciences at the Department of Linguistics and Comparative Cultural Studies of Ca' Foscari University of Venice, under the supervision of Professor Giulia Bencini and co-supervision of PhD Michaela Mae Vann. By agreeing to this document, you express your informed consent to participate in this research and to its related activities. You must be 18 or older to participate.

This Language Profile Questionnaire is aimed at collecting information about the linguistic background of English-Italian heritage speakers, English learners of Italian as a second language, and of Italian learners of English as a second language. You will be asked questions about your linguistic education, experiences and habits with English and Italian.

After completing this survey, you will be contacted in the following days by the researchers for the second part of the study, consisting in reading aloud some sentences in English and then describing orally a picture in Italian. You will find all the instructions before the actual session. This part will last approx. 20 minutes.

Your decision to take part in this research study is entirely voluntary and you may withdraw from it at any time for any reasons and without penalty. By expressing your consent, you authorize the researchers to store your personal records in a digital format and to keep them confidential for the entire duration of the research project. In order to protect your privacy, the collected data will never be traceable back to you or to your personal information, in line with the Code of Ethics and Conduct of the Ca' Foscari University - Venice, the Deontology Code of Ethics and Conduct regarding the processing of personal data for statistical and scientific purposes, and the Personal Data Protection Code (as amended by Law no 196 of 30 June 2003). The results of the data analysis can be published in aggregate form in thesis or book format, or in journal articles.

The present study and the required consent forms have been approved by the University's Research Ethics Committee on 05.02.2020, verbal n. 1/2020 (for further information: commissione.etica@unive.it).

If you have any questions about the research, now or during the study, please contact:

Researcher / MA Student, Giada Leone, 888224@stud.unive.it

Researcher / MA Student, Federica Perini, 842211@stud.unive.it

Supervisor, Professor Giulia Bencini, giulia.bencini@unive.it

Co-supervisor, PhD Michaela Mae Vann, 833317@stud.unive.it

BemboLab, bembolab@unive.it.   Tel. 041/2345738 - 041/2345748

PRIVACY NOTICE FOR RESEARCH PARTICIPANTS

"CROSS-LINGUISTIC INVESTIGATION IN ENGLISH-ITALIAN BILINGUAL SPEAKERS"

in accordance with art. 13 of EU Regulation 2016/679 ("Regulation")

 In this privacy notice, Ca' Foscari - University of Venice will provide you with information on the collection of your personal data from the "Cross-linguistic Investigation in English-Italian Bilingual Speakers" research project. The project aims at investigating the production of Italian sentences by English late learners of Italian and Italian late learners of English. The research project is carried out by MA student Federica Perini and MA student Giada Leone under the supervision of Professor Giulia Bencini and PhD student Michaela Mae Vann. For further information about the research project, please do not hesitate to contact the Principal Investigators by writing to the email addresses: 888224@stud.unive.it, or 842211@stud.unive.it.

The research project has been developed in accordance with the sector's research standards and policies and it is stored at the Department of Linguistics and Comparative Cultural Studies of Ca' Foscari University of Venice where it will be retained for 5 years after the conclusion of the research.

1. **Data controller**

The data controller is Ca' Foscari University of Venice, with headquarters in Dorsoduro n. 3246, 30123 Venice (VE), legally represented by the Rector.

2. Data protection officer

The University has appointed a "Data Protection Officer" ('DPO'), who can be contacted by writing to the email address: dpo@unive.it or to the following address: Ca' Foscari University, Venice, Data Protection Officer, Dorsoduro n. 3246, 30123 Venice (VE).

3. Personal data categories, purposes, and legal basis of data processing

The University collects a range of personal data in order to carry out the research project activities. This may include personal data such as the participants' anagraphic data (name, surname, e-mail contact, age, place of residence, formal education).

The University collects this information in a variety of ways, such as through a form in the online platform Google Form.

The processing of personal data will be carried out with the use of computerized procedures, adopting appropriate technical and organizational measures to protect it from unauthorized or illegal access, destruction, loss of integrity and confidentiality, even if accidental in nature.

In order to protect the confidentiality of the participants, the information collected will be de-identified, which means that all direct identifiers (such as name, surname, email, etc.) will be removed and replaced by a number instead. Therefore, the participants will no longer be directly identifiable from the data. De-identified data will only be used to carry out the research activities.

The research activities are conducted by the University in the public interest as part of its official functions, therefore the legal basis for the processing of personal data is represented by art. 6.1.e) of the Regulation ("performance of a task carried out in the public interest").

You can object to the processing of your personal data at any time by writing to the DPO at the above-mentioned contact details. The University will stop the processing of your personal data unless there are compelling legitimate grounds to carry on with the processing.

4. Data retention

Personal data will be retained for the duration of the research project and, after the project has ended, personal data will be retained for 3 years and then anonymized. The anonymised data might be used in further research projects.

5. Recipients and categories of recipients of personal data

Personal data will be processed by the University's researchers and by other researchers involved in the project, who act on the basis of specific instructions on the purposes and means of the data processing. Moreover, personal data may also be processed by third parties who carry out tasks on the University's behalf in their capacity as 'data processors'. Their updated list is available at: https://www.unive.it/pag/36643/.

Aggregated and anonymous data (which means that you are no longer identifiable by it) may be shared with other Universities and/or research centers in order to carry out the activities of the research project and it may be included in publications, research reports, databases and quoted during classes, congresses and lectures.

The documents related to the research project (which may include your personal data) may be accessed by national and international bodies, by Italian and international journals committees in order to evaluate the lawfulness and fairness of the research conducted. Personal data may also be accessed by auditors.

6. Data subjects' rights and how to exercise them

You have the right to obtain from the University, in the cases provided for by the Regulation, access to personal data, rectification, integration, their cancellation or processing limitation or to object to the data processing itself (articles 15 and following of the Regulation). The request can be submitted, without any particular formal procedures, by contacting the supervisor at giulia.bencini@unive.it and/or the co-supervisor at michaelamae.vann@unive.it and/or the Data Protection Officer directly at dpo@unive.it or by sending a communication to the following address: Ca' Foscari University Venice - Data Protection Officer, Dorsoduro 3246, 30123 Venice. Alternatively, you can contact the Data Controller, by writing a PEC (certified email) to protocollo@pec.unive.it.

Data subjects, who believe that the processing of their personal data is in violation of the provisions of the Regulation, have the right to file a complaint to the Data Protection Authority, as provided for by art. 77 of the Regulation itself, or to take appropriate legal action (Article 79 of the Regulation).

The undersigned declares to have carefully read and understood the information contained in the present document. He/she declares to give his/her consent to participate in the study hereby described and to authorize the researchers to process, manage and store all the personal data with above-mentioned modalities. The consent may be modified/revoked at any moment.

- I ACCEPT and give my consent to participate in the study and authorize the treatment of my data
- I DO NOT ACCEPT and don't give my consent to participate in the study and authorize the treatment of my data

Appendix D

Consent Form showed at the beginning of the Priming Experiment

Informed Consent Form

Cross-linguistic investigation in English-Italian bilingual speakers

Dear participant,

The present study is conducted by the MA students Federica Perini and Giada Leone under the supervision of Professor Giulia Bencini and co-supervision of PhD Michaela Mae Vann.

The study will be conducted using the online platform, Pavlovia. During this session, we would like to have the opportunity collect the recordings of your voice. In order to protect your privacy, the audio recordings and their relative transcriptions will never be traceable back to you or to your personal information, but they will be treated as indicated in the consent form presented before the language profile questionnaire. By clicking on the consent button in the next page, you authorize the researchers to store your personal recordings in a digital format and to keep them confidential for the entire duration of the research project. The results of the data analysis can be published in aggregate form in thesis or book format, or in journal articles.

The study has been approved by the Ethics Committee of Ca' Foscari University of Venice on February 5th, 2020 (verbale n. 1/2020). For more information, please send an email to commissione.etica@unive.it. If you have any questions regarding the study or the task, please send an email to 842211@stud.unive.it, 888224@stud.unive.it or giulia.bencini@unive.it.

Click on "Consent" to start the trials, if

-        you consent to the recording of your voice during the experimental session,

-        you allow the researcher(s) to store, listen, transcribe, and analyze the recordings for the entire duration of the research project,

otherwise press the ESC key on your keyboard if you don't want to participate in the experiment anymore.