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**Cross-linguistic Structural Priming  
of the Dative Alternation in  
English-Italian Heritage Bilinguals**

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## **ABSTRACT**

The aim of this study was to investigate whether English-Italian heritage bilinguals share the abstract representations of certain syntactic structures across languages (Hartsuiker et al., 2004). A Structural Priming experiment with a Spoken Description Task was used to test whether the English dative alternation – Double Object (DO) / Prepositional Dative (PD) – primes dative constructions in Italian, in which only PDs are licensed, even though with a relatively unconstrained word order (e.g., *La ragazza ha dato un fiore alla maestra* or *La ragazza ha dato alla maestra un fiore*). While we predicted an overall higher production of Italian PD descriptions after English PD and DO primes, we also predicted that DO primes in English would influence the production of dative target descriptions in Italian, yielding unexpected target descriptions such as Shifted PDs or unlicensed DOs. Such results led to the hypothesis that priming of dative alternation between English and Italian occurs at different stages of language processing, i.e., at the conceptual or grammatical encoding level (Cai, Pickering, and Branigan, 2012). Furthermore, a comparative analysis of the dative target productions was conducted between English-Italian heritage bilinguals and English Late Learners of Italian as L2, who acted as a control group.

**Keywords:** structural priming, heritage speakers, bilingualism, dative alternation, language production

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## Introduction

The aim of this study was to investigate to what extent English-Italian Heritage Speakers (HSs) integrate structural representations and processing between their heritage and dominant language, and to observe whether age of acquisition or the linguistic environment in which they are immersed have an influence in their grammatical outcome. More specifically, we asked whether their dominant language, i.e., English, would transfer its syntactic processes and constraints onto their heritage or weaker language, i.e., Italian, by presenting in a cross-linguistic priming experiment a structural alternation that is present in their L2 but absent in their L1, namely the dative alternation.

A group of English Late Learners of Italian was also involved in the experiment, acting as control group: the differences in acquisition between their respective L1 and L2 can shed some light on the processing differences between the two languages and on those factors that influence their productions. Findings such as these could contribute to the understanding of the cognitive processes involved in language use and, consequently, to the discovery of those linguistic features that are more susceptible to variation and change.

The present thesis is organized as follows: in Chapter 1 we present a review of the relevant literature on structural priming from a within and a cross-linguistic perspective, and we try to profile Heritage Speakers (HSs) from a psycholinguistic point of view, reporting empirical studies that have focused on investigating their linguistic representations and processing while keeping an eye on possible language influences; Chapter 2 presents the results of our experimental study, that is a cross-linguistic structural priming experiment of the dative alternation in English-Italian heritage bilinguals while Chapter 3 presents the results of the same structural priming experiment done by English late learners of Italian. In Chapter 4 we report the simple ANOVA analysis on the production of dative sentences produced by the two groups. Finally, Chapter 5 draws conclusions based on the new experimental evidence with regards to the processing of the same and different constructions across languages in English-Italian Heritage Speakers and English Late Learners of Italian, two situations in which linguistic input is decisive for their linguistic outcomes.

# 1. Literature Review

## 1.1. The Structural Priming Paradigm

Understanding how language is represented and processed in the human mind has been the core concern of a long tradition of Psycholinguistic studies (Branigan & Pickering, 2017). For decades researchers have investigated how speakers use language in a variety of contexts, both natural and controlled, with the aim of shedding light on its underlying nature and on those fundamental features that constitute language processing.

One methodology that has been extensively and successfully employed to investigate the mental representations and processes of language is *priming*. Priming refers to the speaker's tendency to process the same linguistic aspects of a previously experienced utterance in the processing of subsequent ones (Bock, 1986). For instance, if a person hears a passive sentence, such as "*Il panino è stato mangiato dal cane*", there is a higher probability that they will use the same passive structure to describe an unrelated event in a successive sentence. Levelt & Kelter (1982) found that syntactic priming happens unconsciously in many situations, irrespective of communicative intentions or discourse strategies. In their research, they observed that Dutch shopkeepers were more inclined to use a prepositional phrase (e.g., *At five o'clock*) to reply to a prepositional phrase question (e.g., *At what time does your shop close?*). Conversely, they were more likely to reply with a simple noun phrase (e.g., *Five o'clock*) when asked a noun phrase question (e.g., *What time does your shop close*). While the structural alignment of question-answer exchanges could be attributed to the reproduction of certain lexical elements (i.e., prepositions), these repetitions employed also the same syntactic head of the question.

Observations such as these raised some crucial questions about the mechanisms involved in syntactic processing and, consequently, about the nature of syntactic representation in memory. Bock (1986) interpreted this syntactic persistence in terms of activation or strengthening of those processes responsible for the encoding of syntactic information. Consequently, being those syntactic constructions more activated and thus more prominent than other constructions, they will be more likely to be selected again and employed in successive sentences. She put to test this claim in three priming experiments under the guise of a memory task. This cover task was used so as not to make participants aware of the real purpose of the experiment. Participants first heard and repeated a priming sentence in a particular syntactic condition and had to decide whether they had already heard it before. Once they completed this first part, they had to describe a semantically unrelated target picture. Priming trials included two types of priming conditions: transitive structures (active or full

passive), and dative structures (prepositional-object – PO or double-object – DO). For instance, participants heard and repeated a PO sentence (e.g., *The corrupt inspector offered a deal to the bar owner*) and were asked to describe a picture depicting the event of a boy handing a valentine to a girl. They were found to produce a higher number of PO dative descriptions (e.g., *The boy is handing a valentine to a girl*) than dative sentences with a DO construction (e.g., *The boy is handing the girl a valentine*), and *vice versa* with a DO prime. In other words, experimental results confirmed Bock's predictions and showed a clear pattern of syntactic influence: The proportion of PO dative descriptions increased after a PO prime, while the proportion of DO descriptions increased after DO primes. The same trend was found for the transitive trials, in which passive primes led to a higher production of passive targets, and active primes led to more active descriptions. Bock also observed that this priming effect was not affected by variations on lexical or conceptual features (i.e., use of same open or closed-class elements or variations in animacy). Consequently, in the light of her syntactic priming results, she proposed that syntactic processes can be isolated and abstracted from other linguistic processes.

A few years later, Bock & Loebell (1990) provided further evidence for the isolability of syntactic processes. They wanted to see whether prime structures with different event semantics, but with the same superficial relationships, displayed an equivalent priming trend. If this were the case, then priming mechanisms could be attributed to the syntactic frame alone since the sentence semantics did not matter. In order to investigate such possibility, they conducted a priming experiment using locative and passive sentences as primes. While a passive sentence (e.g., *The 747 was alerted by the airport's control tower*) is composed of a patient that undergoes an action caused by an agent, a locative sentence (e.g., *The 747 was landing by the airport's control tower*) is composed of an intransitive sentence with an agent doing an action, plus an adjunct locative *by*-phrase. Hence, although these two constructions appear equal at least superficially, they hold different semantic information. Therefore, if locative primes primed passive descriptions to the same extent of passive primes, it would mean that only the abstract syntactic frame was primed, devoid of other lexical or conceptual elements. As a matter of fact, they found that locative primes were not more likely to prime passive sentences than passive primes, thus confirming that only syntactic processes trigger syntactic repetitions, excluding an influence from conceptual information.

Nevertheless, Bock & Loebell (1990)'s claim was challenged in more recent years by Ziegler, Bencini, Goldberg, & Snedeker (2019). They reproduced Bock & Loebell (1990)'s experimental findings under suspicion that the priming of passives by locative intransitives was actually due to lexical residual activation of the auxiliary-*be* or of the *by*-phrase. To support their claim, they added

other locative sentences with different prepositions and auxiliary, such as *The 747 has landed near the airport control tower* to the original materials. They found no priming of passive structures after locative sentences without a *by*-element, suggesting that there may be more underlying factors than an abstract, content-less syntactic tree configuration that could lead to priming of structure. Among these factors, we could find the repetition of a shared information structure (i.e., the alternation of given-new content in a sentence) (Fleischer, Pickering, & McLean, 2012) or semantic features (i.e., mappings of the same thematic roles or event structures) (Vernice, Pickering, & Hartsuiker, 2012; Ziegler, Snedeker, & Wittenberg, 2018).

On the one hand, Pickering, Branigan, & McLean (2002) found that Shifted POs in English did not prime PO or DO target responses but acted instead as the intransitive baseline sentences. This is interesting because Shifted POs share the same thematic mappings with POs (direct object-Theme and oblique object-Recipient), and the same word order with DOs (Recipient-Theme).

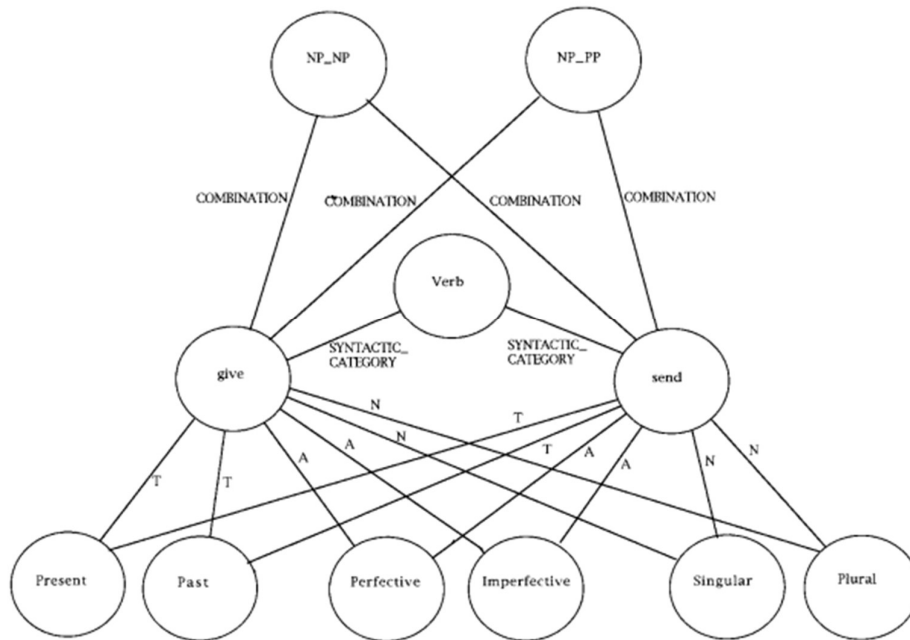
On the other hand, Chang, Dell, & Bock, (2003) tested the possibility offered by the English locative alternation, in which constituents have the same syntactic word order (NP-V-NP-PP), but opposite thematic role assignment (Theme-Location vs. Location-Theme), to see whether participants would be primed by the order of the thematic roles or by that of syntactic mapping. They found that participants were more likely to produce sentences with a Location-Theme word order (e.g., *The farmer heaped [the wagon]NP [with straw]PP*) after reading Location-Theme primes (e.g., *The maid rubbed [the table]NP [with polish]PP*) with respect to after reading primes with a Theme-Location word order (e.g., *The maid rubbed [polish]NP [onto the table]PP*). Consequently, their findings suggested that participants were primed by the order of thematic roles, which perseverated in their target responses in the form of the same constituent word order. Chang et al. (2003) attributed these results to an overlap of semantic mappings. Consequently, from a processing point of view, these productions could have been the consequence of an earlier mapping of conceptual elements with respect to syntactic mappings, claiming that decisions about thematic roles are taken before decisions about syntax, processed during the conceptualization of a ‘preverbal message’ (De Bot, 1992).

Two different accounts tried to explain the processes that underlie structural priming: the lexicalist account proposed by Pickering & Branigan (1998), and the implicit learning account proposed by Chang, Dell, & Bock (2006).

Pickering & Branigan (1998) assumed that syntactic priming is determined by residual activation of syntactic information at the lemma level. According to their model of language production, three types of information are represented at the lemma level: specifications of category (i.e., noun, verb, adjective), of features (i.e., number, person, gender, tense), and of combinations (i.e.,



the relationship possibilities between lexical entries). These specifications are depicted as single nodes linked to the lemma node (i.e., the abstract notion of a lexical entry) that they specify. For instance, when the verb *gave* is used, the lemma *give* is activated along with the past tense node. Combinatorial nodes are also activated because they are linked to the verb's lemma. Since the verb *give* can be used with two alternative constructions – the PO and the DO dative constructions – the lemma *give* is also linked to two combinatorial nodes. If *give* is used in a PO construction, then the NP\_PP node is activated and selected. On the contrary, if *give* is used in a DO construction, the NP\_NP node receives activation instead. Hence, when a lemma node receives activation from a message concept, the combinatorial nodes linked to it get activated too. To better understand these dynamics, we can look at Pickering & Branigan's network model in Figure 1:



**Figure 1.** Pickering & Branigan (1998)'s lexicalist network model language production (p.635)

This lexicalist model then assumes that grammatical information is a property of the lemma, and not specific to a particular instantiation of a verb or noun. Consequently, two different verbs or two instances of the same verb can prime each other because they share the same combinatorial nodes, which undergo the same activation processes. The researchers tested this model in five priming experiments with different verb conditions between prime and target: Same or different verb in the first two experiments, and same or different tense, aspect, or number in the latter three experiments. Although their findings showed that syntactic priming occurred in all conditions, they also showed

that priming was stronger in the same verb condition and that it was not affected by featural variations. Thus, such results confirmed their assumption about the nature of syntactic priming, namely that grammatical nodes are to some degree shared between different lemmas, and that their links are also primed when they are concurrently activated. This is the reason why the same abstract structural form, devoid of lexical content or featural specifications, is more likely to be selected and produced in successive utterances. However, their model faces some limitations: Activation is deemed to be a short-lived phenomenon. As such, it cannot justify cumulative priming effects found in other experiments, in which several unrelated sentences intervene between the prime and target items (Bock & Griffin, 2000; Branigan, Pickering, Stewart, & McLean, 2000).

Based on these observations, Bock & Griffin (2000) argued that syntactic priming is not lexically driven, but it is instead a form of implicit learning. When learners experience a new linguistic input, they simultaneously decode these messages in order to comprehend it. During this process, they also make continuous inferences about forthcoming linguistic elements. If their inferences reveal to be erroneous, the learners adjust and replace the wrong information with the newly learned information (Chang et al., 2003). This behavior is the foundation of language acquisition and of language learning. It can be also applied to syntactic priming.

In a connectionist network model of language production, this error-based learning translates into fluctuations of connection weights between the linguistic units involved, which happen because of the differences between the predicted and the target output (Chang, Dell, & Bock, 2006). Therefore, as a consequence of this implicit learning and changes of connection weights, syntactic information is continuously adjusted in comprehension, affecting syntactic outcomes in production. These changes modify permanently the production system, thus explaining the long-lasting effects found by Bock & Griffin (2000). Nevertheless, this connectionist network shows some limitations too: it cannot explain effects of lexical boost, i.e., stronger priming effect when the same item is repeated between prime and target, found in many priming experiments (Pickering & Branigan, 1998). This is because this network does not assume an influence of lexical overlap since the occurrence of the same element would not lead to weight changes.

An incremental experience with language is then fundamental for language acquisition. In fact, a consistent interaction with the target language is necessary to accommodate novel information in the production system. Tomasello (2000) argued that children under the age of 3 are conservative in the production of novel verb structures. It has been found that they rely more on verb-structure associations that they already know than trying to use verbs that they have never encountered before. A reason may be that children do not have enough language experience to abstract contentless

structural representations to novel verbs. From these findings, Tomasello proposed the Lexical Specificity account, according to which children's syntactic knowledge is bound to lexical items and it develops only gradually into abstract structural representation with more language experience.

Bencini & Valian (2008) contrasted this item-specific view by demonstrating that 3-year-old children can indeed abstract syntactic representations of passive constructions. They recruited 53 English speaking children with a mean age of 3;2, that were subjected to two comprehension tasks, separated by a production priming task with reversible transitive active and passive verbs. The aim of their study was to verify whether (1) children under the age of 3 (Tomasello, 2000) possess abstract knowledge of sentence structures, (2) production and comprehension mutually inform their representations, and (3) children learn during priming. Results showed a significant effect of priming in passive prime-target pairs: children exposed to passive primes produced a higher proportion of passive descriptions with respect to their peers who were exposed only to active primes. Furthermore, children who acted as a control group (i.e., they did not perform the priming task), did not produce any passives at all. Their findings brought evidence for an Early Abstraction account, which claims that children represent syntactic frames abstractly from the very beginning of their language acquisition, confirming the first hypothesis. These findings further confirm the third hypothesis, because strict and lax coded results for priming showed that children produced more passives towards the middle of the priming trial, even if not at a mastery level. This trend has been attributed to an increased exposure to passive constructions over time in the priming task. Only the second hypothesis was not consistent with their results because comprehension of passives, that was tested a second time a few weeks after the priming task, did not improve. Overall, Bencini & Valian (2008) found that young children can abstract representations of syntax in their performances, and that they have shown an innate capability to map relationships between concepts and structures in a flexible fashion.

## 1.2. Cross-linguistic structural priming

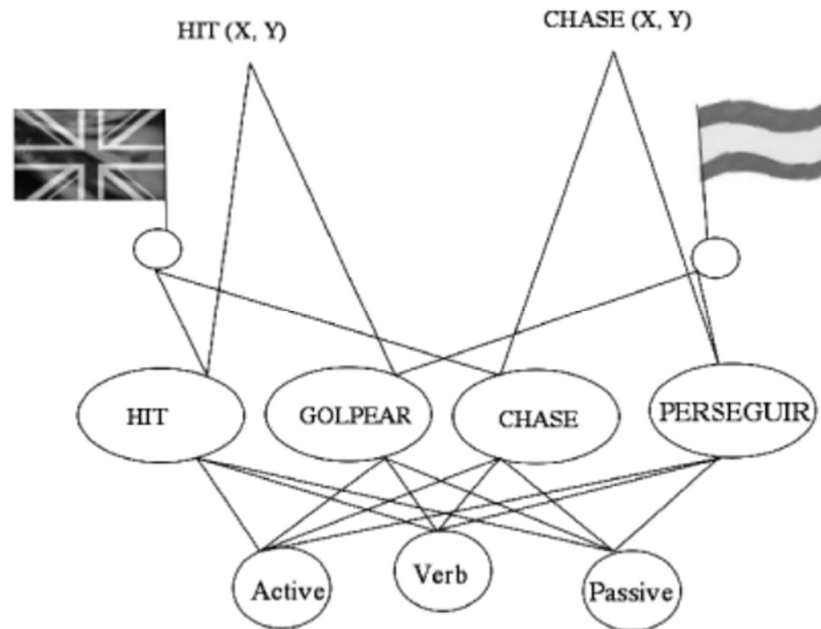
In the previous chapter, we reported several experiments concerning the use of the structural priming paradigm to investigate the mental processes and representations of language in monolinguals. However, this priming tendency has been attested also in bilinguals. A previously experienced structure in one language has been shown to influence the structural representation of subsequent utterances in the other language, leading to the production of the same or similar syntactic construction if the two languages display an analogous word order (Bock & Loebell, 2003).

Psycholinguistic research on bilingualism has focused on the question of whether bilingual speakers share the abstract representations of certain syntactic structures across the two languages (Hartsuiker, Pickering, & Veltkamp, 2004) or whether these representations are language specific, thus kept largely separated (De Bot, 1992; Ullman, 2001). What are the implications for these two opposite accounts?

Hartsuiker et al. (2004) conducted a syntactic priming experiment with Spanish-English bilinguals, in which participants (a confederate and a naïve person) had to alternatively describe pictures to each other in a dialogue game, and then had to decide whether the description they just heard matched the event depicted on their own card. The confederate participant described pictures in Spanish, the first language (L1) of both participants, and the naïve participant responded in English, their second language (L2). Events in the confederate's deck were of four types: active, passive, intransitive, and object-verb-subject (OVS) sentences. Half of them had agent and patient in the same animacy condition, and the other half had the opposite animacy. Nouns and verbs did not display lexical or conceptual overlap, nor translation equivalency. Experimental results showed significant effects of cross-linguistic syntactic priming for passive constructions: Participants showed a tendency to produce more English passive utterances after Spanish passives than after Spanish primes in the other conditions. Since the syntactic processing of a language (i.e., Spanish) influenced the syntactic processing in a different language (i.e., English), there is evidence that syntactic information is shared between the two languages in bilinguals.

On these premises, Hartsuiker et al. (2004) advanced a lexical-syntactic model of bilingual language production, expanding the lexicalist model proposed earlier by Pickering & Branigan (1998). This latter model was based on the evidence that syntactic priming is lexically driven, that is that when a lemma node (i.e., lexical representation of a verb or word) is activated, the combinatorial nodes that are linked to it get activated too. In this way, there is no need for different lemmas to have

separated representations for syntactic information because the rules are the same. Figure 2 illustrates this integrated account:



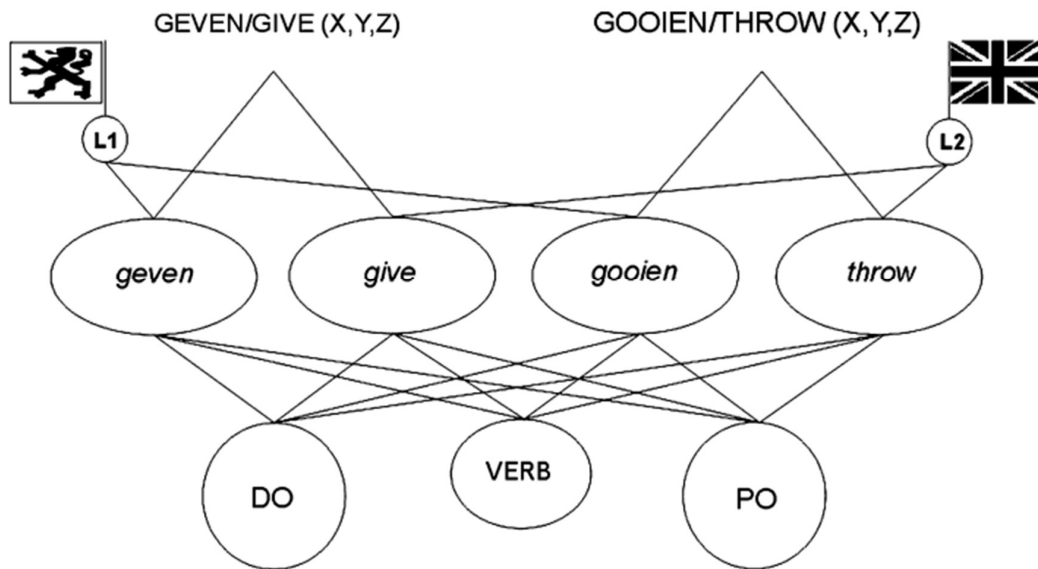
**Figure 2.** Hartsuiker et al. (2004)'s lexical-syntactic model of bilingual language production (p.413)

As can be seen from this figure, lemmas of nouns and verbs of both languages – in their example the English verbs *hit* and *chase*, and their Spanish counterparts *golpear* and *perseguir* – are contained at the lemma level. Therefore, assuming that both languages have an integrated lexicon at the lemma stratum, we can also assume that they share the same categorical (“Verb”), and combinatorial nodes (“Active” and “Passive”) common to both languages. Hence, for example, when the conceptual node HIT (X, Y) activates the English verb *hit* in combination with the Passive node, the utterance results in the following English passive sentence, *The taxi chases the truck*. However, since its Spanish translation equivalent *golpear* is linked both to the same conceptual and same combinatorial nodes, it gets activated too, making the sentence *El taxi persigue el camión* more readily available. It is important to notice though that these nodes are not language-specific, but they reflect the abstract syntactic information that is represented for any language. In fact, language nodes are also present and linked to the lemmas that they specify, as it is the choice of the lexical items that decides the structure and the language of the utterances. Moreover, the concurrent activation of linked nodes could lead to episodes of code switching, i.e., the tendency of proficient bilingual speakers to switch words or phrases of two different languages in the same linguistic string (Kootstra, 2015), or to

episodes of language transfer, in which the wrong lexical, featural, or syntactic information is selected (Hwang, Shin, & Hartsuiker, 2018).

Hartsuiker et al. (2004)'s model, however, does not take into consideration the status of the two languages, that is whether they are the speaker's first or second languages. In fact, they are represented as being on the same level. This configuration also assumes that the magnitude of the priming effect will be as strong between languages as within languages because they share unsparingly the same syntactic information. Schoonbaert, Hartsuiker, & Pickering (2007) tested this claim in four cross-linguistic priming experiments, investigating (in all four priming directions: L1 > L1, L2 > L1, L2 > L2, and L1 > L2) to what extent languages have integrated representations in Dutch-English bilinguals. Priming results provided evidence that their claim was correct since the priming effect was robust in all conditions.

In line with previous within-language syntactic priming experiments, Schoonbaert et al. (2007) also found that not only the repetition of the same verb across prime and target boosted the priming effect in the same language condition (*give-give*), but that the same boost was also found when the verbs in the prime and target utterances were translation equivalent (*give-geven*), although this boost effect was comparatively smaller between languages than within languages. This difference could be linked to the fact that the two languages do not share the same lemma for translation-equivalent lexical items. Interestingly, this boost was seen only in the L1 (Dutch) to L2 (English) condition, and not the opposite condition (from L2 to L1). This asymmetry led the researcher to the assumption that activation is not always equally strong between nodes, and that the links between concepts and L2 lemmas are possibly weaker than between concepts and L1 lemmas. An unbalanced co-activation is then expected in the processing of L1 and L2 utterances. Drawing from these results, Schoonbaert et al. (2007) updated Hartsuiker et al. (2004)'s bilingual model of language production by including this variation in activation weights in the connections between different nodes. The model below in Figure 3 illustrates these differences:



**Figure 3.** Schoonbaert et al. (2007)'s bilingual model of language production (p.157)

As can be seen in the model, translation equivalent verbs are linked to shared concepts (*geven/give*), but it differs from that of Harsuiker et al. (2004) in the strength of the connection with the verbs' lemmas. In fact, the conceptual node has a stronger link and spreads more activation to the L1 lemma (illustrated by a bold line), whereas it has a weaker and spreads less activation to the L2 lemma (illustrated by a dotted line). Consequently, if a L2 lemma is activated and selected, it will not have enough power to co-activate its translation equivalent L1 lemma, lacking that lexical boost effect found in L1 to L2 priming.

Opposite to this shared-syntax account is the claim made by De Bot (1992) and Ullman (2001), according to whom the two languages are separate in the bilingual mind. Working on top of Levelt (1989)'s model of language production for monolinguals, which consisted of a conceptualizer, a formulator, and an articulator level of processing, De Bot (1992) extended it to fit bilingual productions. He assumed that bilinguals do not need to store two different representations for the same concept, but that instead they represent concepts as single, language-independent units. Processes at the lexical level are also overlapped between L1 and L2 when similar enough. However, formulation processes are distinct and language specific, although they interact with the other modules. This interaction depends on crucial factors such as linguistic typology or proficiency in the L2. L2 proficiency modulates the extent to which the two languages are represented, with more proficient bilinguals having a higher degree of separation between the two languages, contrary to less

proficient bilinguals which are more vulnerable to cross-linguistic influence. These claims have important implications in language processes and priming: highly proficient L2 users are more capable to keep their language separated; less proficient L2 users, instead, tend to rely more on L1 processes, and are more likely to be influenced by it while processing the L2.

Crucially, Ullman (2001) argued instead that the integration between two languages is determined by the kind of memory employed in their production. In fact, L1 and L2 syntactic processing is carried out by two different systems: In the L1 procedural memory (i.e., how-to knowledge) is responsible for structural processing, while declarative memory (i.e., know-that knowledge) for lexical processing (De Bot, 1992). In L2 processing, the declarative memory does all the work, storing full syntactic representations for constructions that they have already experienced in the mental lexicon. Nevertheless, the two languages can employ the same procedural processes if they are acquired early enough for them to be simultaneous. Finally, L2 proficiency is a key element also for Ullman, who believes that also late bilinguals can reach native-like processing as a function of increasing proficiency.

Many experiments have investigated the correlation between syntactic priming and proficiency. Are syntactic structures fully shared since the beginning or do they start separated and, as experience and proficiency increase, they converge to a single integrated representation of syntax? In other words, do syntactic structures start as item- and language- specific and then become gradually more abstract and shared as a function of proficiency? Bernolet, Hartsuiker, & Pickering (2013) tried to give an answer to these questions investigating the genitive productions of late Dutch-English bilinguals with different self-rated levels of proficiency in their L2 (English). In order to do so, they employed the syntactic priming paradigm in two directions: in Experiment 1 they investigated syntactic priming between Dutch (L1) and English (L2), while in Experiment 2 within English (L2). A confederate participant took turns with a naïve participant in a dialogue game, in which the confederate would describe some pictures in Dutch – thus functioning as prime sentence – and the participant would describe their pictures in English. As found previously by Hartsuiker et al. (2004) and Schoonbaert et al. (2007), Bernolet et al. (2013)'s responses showed the same pattern of syntactic priming from L2 to L1, with a significantly larger effect when the head noun in the prime and target were translation equivalent. Furthermore, they also find a significant interaction between the production of genitives and higher proficiency in the L2: the priming effect increased as increased the level of proficiency. Higher proficient bilinguals were more likely to produce *of*-genitives after a *of*-genitives, and with a higher probability when these utterances shared the same translation equivalent noun phrases. Syntactic priming in less proficient bilinguals was, instead, absent. Findings



such as these provided a first piece of evidence for a separated syntactic storage in low proficient bilinguals, and that the collapsing of syntactic representations in the L2 happens gradually when the speaker becomes more proficient. To further confirm this assumption, Bernolet et al. (2013) submitted the same experiment with the same conditions to Dutch-English bilinguals but changed the direction of priming running a within-language syntactic priming (L2>L2). Procedures were identical to Experiment 1, with the obvious exception of the language of the primes, that switched to English. Results of Experiment 2 yielded the same results as the first experiment: they obtained a larger priming effect with the repetition of the same noun phrase between the prime and target. In addition, Bernolet et al. (2013) found a negative correlation between the strength of priming and the level of proficiency in the L2, that is less proficient bilinguals showed stronger priming effects and stronger lexical boost with respect to more proficient bilinguals. This can be explained by the fact that this tendency was found only in the overlap condition between prime and target, whereas the absence of a same structure between prime and target did not show any priming effect, thus suggesting that less proficient bilinguals struggle to generalize structural processing to new sentences, and instead “copy” the structural aspect of the prime just encountered and “paste” it in successive utterances. Thence, these results provide a further piece of evidence that proficiency modulates L2 representations in the bilingual mind, with less proficient users having at first two separated and lexically bounded representations for both languages, which then develop in to a single, highly integrated, abstract representation of syntactic information.

To summarize, many variables come into play when producing language. Speakers are influenced by the linguistic inputs received or produced earlier in speech, which can induce them to apply the same structural processing to successive productions. In fact, it has been shown that structural priming is influenced by the strength of activation processes within and/or between the two languages, and, therefore, enhanced by the repetition of the same or translation equivalent elements between utterances. But speakers are also influenced by their level of proficiency in the languages they know.

### 1.3. Heritage Speakers and Heritage Language

Psycholinguistic research on bilingualism has focused much of its attention on understanding how the bilingual mind behave when processing a first (L1) and a second language (L2), assuming that the L1 is the native language and the L2 is a language acquired later in life. This assumption poses language acquisition in a progressive spectrum, in which speakers are born into a “native” language, in that they naturally acquire the first language to which they have been consistently exposed to since birth, and only in a second moment they gradually start to learn a second language, which will be more difficult to master in a “native-like” way as a consequence of various limitations, among which poor L2 input (Benmamoun, Montrul, & Polinsky, 2013). Moreover, it is more likely that these speakers have learned their L2 in a formal environment, such as in school or in language courses, and thus they have been exposed to a standardized version of the language and possess explicit knowledge of L2 grammar. Therefore, the status of their second language is that of a weaker language with respect to the stronger language, the L1/native language.

However, there are cases of bilingualism which challenge these assumptions and call into question the notion of linguistic “nativeness” or “innatism” when pertaining to language processing and competence. These cases are embodied by Heritage Speakers (HSs), who “constitute an outcome often assumed to be impossible outside of pathology or trauma: children exposed to a language from birth who nevertheless appear to deviate from the expected native-like mastery in pronounced and principled ways” (Polinsky & Scontras, 2020, p. 2), and whose second language displays different, if not opposite patterns of development and dominance compared to L2 learners.

Defining heritage speakers is not an easy task. Among the many definitions that have tried to describe the multiple dimensions of these speakers, we report that of Rothman (2009; in Polinsky, 2018a):

*A language qualifies as a heritage language if it is a language spoken at home or otherwise readily available to young children, and crucially this language is not a dominant language of the larger (national) society . . . [A]n individual qualifies as a heritage speaker if and only if he or she has some command of the heritage language acquired naturalistically . . . although it is equally expected that such competence will differ from that of native monolinguals of comparable age. (Rothman, 2009, p.156)*

From this definition we can gather that heritage speakers are early bilinguals who have been exposed to a minority language at home since birth and to the majority language of the society in which they

grew up in any other social context, either simultaneously or sequentially in early childhood (Montrul, 2015). Oftentimes they were born and raised in a family where the home language is different from that of the national or official language; they could be also the children of first-generation immigrants, who immigrated early in life in a country in which a different language from that of their parents is used. Hence, common to all heritage speakers is the developmental trajectory of their bilingual knowledge: Heritage children acquire naturally their heritage language as first language (L1), and the majority language as L2, both at the same time or one after the other in a short time span. At a certain point in their childhood, approximately at the age of schooling, the amount of input from and use of their majority language begins to increase, overcoming that of the heritage language. Consequently, their competence in the majority language improves rapidly, reaching full maturation in early adulthood, and thus shifting to a position of dominance. At the same time, however, exposure to their heritage language starts to decrease as it remains limited to their household. Therefore, we face an unbalanced bilingual situation, in which the L1 is weaker than the L2, which is instead stronger and more widely used in everyday social life. As a result of this impoverished situation, the development of the heritage language is affected, showing striking patterns of structural and functional divergence from the native language baseline (Benmamoun et al. 2013; Montrul, 2015; Lohndal, 2019).

For instance, Montrul (2002) found that heritage Spanish speakers were not only less accurate in the comprehension and production of certain tense aspects in Spanish with respect to adult monolinguals and L2 learners, but also that simultaneous bilinguals were the most affected. She also found that these speakers had more difficulties in producing and judging pragmatically marked verbs and nouns (Montrul, 2010), despite showing implicit knowledge of the grammatical mechanisms operating behind their syntactic realizations. These observations suggest that the age of onset alone does not predetermine a solid acquisition of the linguistic system, although it provides some processing benefits, but that the linguistic competence of heritage bilinguals is subjected to the quality and quantity of linguistic input that they receive from their speech community.

Many other experiments have been conducted since Montrul's seminal works, testing the robustness of the different linguistic domains (morphology, phonology, semantics, pragmatics, and syntax) in heritage speakers of other languages (Serratrice, 2004; Polinsky, 2011, Bolger & Zapata, 2011). A common tendency in the reported data seems to point to a general weakness in the interaction between syntax and the other domains, especially at the interfaces with semantics and pragmatics (Sorace, 2011). In fact, while heritage bilinguals seem to process syntactic properties of their heritage language in ways similar to native speakers (Romano, 2020; 2021), they tend to diverge from the monolingual norms once semantic and/or discourse-pragmatic features/aspects enter into play.

Researchers have tried to account for this “divergent attainment” (Polinsky, 2018b; previously controversially regarded as “incomplete acquisition”, Montrul, 2008) by looking at those factors that could influence their speech outcomes, such as language attrition, transfer, and cross-linguistic interaction (Benmamoun et al. 2013).

Crucially, Polinsky & Kagan (2007) argued that the baseline to which compare heritage language should not be the monolingual norm, but the language of their parents and/or caretakers. Imagine a child who lives immersed in an English-speaking context, but who has also been exposed to a variety of Italian or to a dialect at home: they would acquire only those features present in the input received, which is in turn different from the Italian taught to L2 learners of Italian in school. Furthermore, the input received by their parents could have undergone L1 attrition caused by a longer exposure to or intensive use of the L2 over the years (Montrul, 2008), resulting in a dried linguistic input. Thus, since those language-specific features are absent or modified by attrition in the first place, their absence or modification is consequently transferred to the heritage children’s grammatical knowledge. Therefore, it is plausible to expect heritage children to acquire only those linguistic features that are present in the input received, and not the corresponding standardized version of their heritage language.

Another critical component to be considered in heritage language studies is proficiency. Heritage speakers displays a wide range of intra- and inter-speaker variability in their heritage language proficiency caused by the situational context in which they were raised. This variability is reflected in their linguistic abilities (speaking, listening, reading, and writing), which can range from very low aural comprehension to native-like mastery in reception and production. Given the circumstances of their language development, however, heritage speakers perform generally better in oral tasks, contrarily to L2 learners, who instead perform better in written tasks (Polinsky & Kagan, 2007; Montrul, Foote, & Perpinán, 2008). This is expected because they have experienced language through different modalities and in different contexts across their learning path: mainly spoken at home for heritage bilinguals and written in formal settings for L2 learners. This preference is reflected also on the different processing strategies that they employ when parsing language: Heritage speakers rely on their implicit knowledge and automatic processing acquired naturally while growing up, whereas L2 learners depend more on the declarative, explicit memory of the language that they are learning (although at advanced, near native levels of proficiency L2 speakers can benefit from the same implicit processing due to a higher degree of integration between the two languages) (Bernolet et al., 2013, Borger and Zapata, 2011).

Taken together, age of acquisition, language dominance, proficiency, and cross-language influences are crucial factors for the outcome of their linguistic systems, inasmuch as they influence the way in which heritage bilinguals develop and process both languages (Scontras, Fuchs, Polinsky, 2015).

One way to test dominant language transfer effects is to employ structures that are both present in a language but one of which is absent in the other language. Phillips (2018) tested the effect of exposure to the dominant language in English-Spanish heritage bilinguals, asking whether they can process illicit structures in their heritage language (Spanish) but that are licensed in their dominant one (i.e., English). For this purpose, he tested in a cross-linguistic structural priming experiment the comprehension of preposition stranding from English to Spanish, finding a significant priming effect of parallel but unlicensed structures in terms of response times. However, the results could not give any significant indication about a possible interplay between the priming effect and amount of exposure to English and Spanish (contrarily to Martohardjono et al., 2017, in Phillips, 2018). Nevertheless, Phillips noticed that heritage speakers showed marginally less difference in response times in the control condition (e.g., English prime *This is the plant that David bought in the flower shop* vs. Spanish target e.g., *Esta es la tienda que Gonzalo compró el pollo en para cocinar la cena*) between subjects who experienced less Spanish in their everyday life, suggesting an interruption of comprehension.

### **1.3.1. Review of priming studies with Heritage Italian Speakers**

To our knowledge, only two within-language priming experiments have been carried out with heritage Italian speakers. Romano (2020, 2021) compared comprehension and production in three groups of Italian speakers: Swedish-Italian heritage speakers dominant in Swedish, Swedish late bilinguals of Italian as L2, and native Italian speakers. He had two aims in his studies, that is testing whether a) the age of onset and syntactic complexity influenced the ultimate attainment (i.e., native-like grammar knowledge) of morphosyntactic features (Italian accusative clitics) reflected in the strength of structural priming effects (stronger priming means an higher degree of integration of cross-linguistic syntactic system – Romano, 2020), and whether b) language dominance (Swedish) is a predictive factor for a “divergent attainment” (Polinsky, 2018b) in the weaker language (Italian), meaning that the processing of a dominant language can be transferred to the processing of the heritage language, thus accounting for their different linguistic outcomes from the native language baseline (Romano, 2021).

In the first study Romano (2020) found that HSs display similar syntactic processing to native Italian speakers but similar morphological processing to L2s, a pattern consistent with findings in the heritage language literature, which hint to an advantage from early language exposure in the parsing of syntactic information. The latter study (Romano, 2021), however, is of particular interest for our research because he included in the primes two syntactic structures that are licit in Italian but absent in Swedish, that is causative and clitic constructions, thus suggesting that if heritage speakers fail consistently to produce Italian *si*-passives after being primed with an unrelated Italian *si*-passive, this failure can be interpreted as a difference in language processing by means of language dominance. However, he did not find significant evidence of transfer effects in his priming experiment, and the priming effects were, once again, comparable between HSs and L1s.

A preliminary study conducted by Sfriso (2020), who tested the dative productions of Italian Late Learners of English in a structural priming experiment, included in her research 4 English-Italian bilinguals who produced unexpected structures in Italian after being primed with an English dative (DO/PO) structure. They produced POs with an inversed constituent order (PP-NP instead of NP-PP) (e.g., *La signora mostra al ragazzo un vestito*), dative clitics (e.g., *Lui le dà un martello*), transitive sentences (e.g., *Il ragazzo sta lanciando una palla*), and no Italian DOs – as expected since Italian does not allow them. She further included 1 English Late Learner of Italian, who produced only target POs and no DOs in Italian. Of her experimental group, only 2 out of 20 native Italian speakers (L2 English) produced a sentence with a shifted constituent order, while no one produced DOs. Sfriso (2020) proposed that the shifted dative sentences found in English-Italian HSs may have been the consequence of an attempt to replicate the English DO word order (NP-NP) onto the Italian system, thus suggesting a syntactic priming experiment.

However, not only DOs and POs are realized in a different linear word order, but they also differ in the mapping of argument structure and thematic roles (Pickering, Branigan, & McLean, 2002). As a consequence, we might hypothesize that heritage speakers, due to their particular sociolinguistic status (Polinsky, 2018b), process their heritage language in ways different from English L2 learners of Italian, even though they are both dominant in English and immersed in an English-speaking context.

For this reason, a cross-linguistic structural priming of the dative alternation was conducted with a higher number of English-Italian Heritage Speakers. Their results were then compared to the priming results of a group of English Late Learners of Italian as L2. Chapters 2 and 3 report these results and their relative results, respectively.

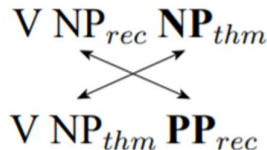
Before illustrating the questions that animated this thesis and present the results of our cross-linguistic priming experiments, a short outline concerning the structural possibilities of dative sentences in English and in Italian is provided.

#### 1.4. The dative alternation in English and Italian

Let us first consider the structural choices that can be made in the production of English dative sentences. In the following sentences (1a – b) we present a prepositional object (PO), and a double object (DO), also known as the *dative alternation*:

- (1) a. The girl is giving a flower to the teacher (PO)  
 b. The girl is giving the teacher a flower (DO)

When speakers want to produce the two ditransitive constructions in 1a and 1b, they go through different processing stages (Bock & Levelt, 1994): At first, they must choose the appropriate thematic roles for the three entities involved in the event, that is the girl (Agent) performing the act of giving a flower (Theme) to the teacher (Recipient). Lemmas associated with these entities/roles are then activated and lexically selected to receive grammatical functions (subject, object, indirect object). Here the speaker can decide to realize the Recipient as an indirect object/PP as in the PO sentence (1), in which the [*the girl*]NP is the subject, [*a flower*]NP is the object, and [*to the teacher*]PP is the indirect object, or to realize it as the first direct object/NP in DO sentence (2), in which [*the girl*]NP is the subject, [*the teacher*]NP is the first direct object, and [*a flower*]NP is the second direct object. Parallel to these choices, they are encoded syntactically in hierarchical representations, which then determine the linear word order of the phrasal constituents. Finally, speakers can produce a PO structure with a NP-V-NP-PP word order or a DO with a NP-V-NP-NP word order, reflected in the two examples above and in Figure 4 below (taken from Bresnan and Ford, 2010):



**Figure 4.** Differences in thematic role and grammatical function realizations in DO vs. PO

Italian, on the other hand, does not have this alternation, licensing only PO constructions (2a – b):

- (2) a. La ragazza dà un fiore alla maestra (PO)  
 b. \*La ragazza dà la maestra un fiore (DO)

Being a relatively free word order language, phrasal constituents in a sentence can be scrambled in different linear positions according to the status of the discourse (Samek-Lodovici, 2015). In fact, sentences like 3a happen naturally in conversation and are perfectly grammatical and well formed:

- (3) a. La ragazza dà alla maestra un fiore (SPO)

Samek-Lodovici (2015) argued that one of the possible reasons for their occurrence may be a particular pragmatic interpretation of the event described, perhaps linked to a focused prosodic contour. This *marked* construction (i.e., with a different word order with respect to the typical, *unmarked* one in 2a), then, is achievable if the argument structure is informed by some pragmatic or semantic specifications. Furthermore, its thematic grid reflects that of the *unmarked* PO structure: [*la ragazza*]NP is the Agent, [*un fiore*]NP is the Theme, and [*alla maestra*]PP is the Recipient, but with a different superficial linearization NP-V-PP-NP.

English display this construction too (4a), even though it is relatively rare in natural discourse (5.6% of occurrences in the Brown corpus (Wasow, 1997, in Pickering et al., 2002):

- (4) a. The girl is giving to the teacher a flower (SPO)

Table 1 below compares the word order of the internal phrasal constituents with their relative thematic mapping:

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

English	Italian
PO (NP <sub>Agt/Sub</sub> – V – NP <sub>Thm/Dobj</sub> – PP <sub>Rcpt/OObj</sub> )	PO (NP <sub>Agt/Sub</sub> – V – NP <sub>Thm/Dobj</sub> – PP <sub>Rcpt/OObj</sub> )
Shifted PO (NP <sub>Agt/Sub</sub> – V – PP <sub>Rcpt/OObj</sub> – NP <sub>Thm/Dobj</sub> )	Shifted PO (NP <sub>Agt/Sub</sub> – V – PP <sub>Rcpt/OObj</sub> – NP <sub>Thm/Dobj</sub> )
DO (NP <sub>Agt/Sub</sub> – V – NP <sub>Rcpt/OObj</sub> – NP <sub>Thm/Dobj</sub> )	*DO (NP <sub>Agt/Sub</sub> – V – NP <sub>Rcpt/OObj</sub> – NP <sub>Thm/Dobj</sub> )



As can be seen from the table, English and Italian share two representations for a ditransitive event, that is a prepositional object (PO) dative and a shifted prepositional object (SPO) dative construction. Their arguments are assigned the same thematic roles but are realized in the opposite order. Moreover, only English possesses a further representation, that is a double object (DO) dative construction. Again, the internal arguments of the verb are assigned the same thematic roles, a different phrasal constituent structure, but their linearization is parallel to that of the shifted PO, in which the Recipient is placed right after the verb and before the Theme.

These comparisons are necessary to support our research questions and predictions in the following paragraph.

## 2. Cross-Linguistic Structural Priming in English-Italian Heritage Bilinguals

### 2.1. Introduction

In the present chapter we report the results of a cross-linguistic structural priming experiment with the English dative alternation as prime condition and Italian as target language. It was conducted to investigate whether the structural representations in English-Italian heritage bilinguals are fully shared across languages (Hartsuiker et al., 2004; Schoonbaert et al., 2007; Bernolet et al., 2013) and whether structural priming is influenced by language experience and contextual factors (Montrul, 2008, Polinsky, 2018b). Furthermore, we compare the results found in the first experiment to those found in the same experiment with English late learners of Italian as L2.

### 2.2. Research questions

The main research questions that animated the present thesis were the following:

1. *Is there a cross-linguistic structural priming effect of the dative alternation (PO/DO) from English to Italian in English-Italian heritage bilinguals?*
2. *Does the dominant language (i.e., English) influence the priming of the weaker language (i.e., heritage Italian)? Since Italian does not allow DOs, can English DO constructions prime illicit DO constructions in Italian or is there some structural processing constraint?*
3. *What role do the quality and quantity of input play in the processing of the heritage language? In other words, how do language experience and contextual factors impact on their processing (language immersion, age of acquisition, proficiency)?*

According to our prediction, we expect a cross-linguistic structural priming effect between English and Italian prepositional object datives. Their proportion will be almost at ceiling, considering that Italian dative verbs realize only PO constructions to express ditransitive events. Therefore, both priming conditions, i.e., English PO and DO structures, will report to have been followed mostly by Italian PO sentences. Consequently, we do not expect any Italian DO dative sentence to be produced after neither English PO nor DO primes. This would be consistent with those linguistic accounts that

consider/deem syntax to have stronger foundations deeply rooted in early language acquisition, and thus not easily subjected to structural modifications even in heritage speakers (Kootstra & Doedens, 2016).

Nevertheless, we predict that the English DO primes can indeed influence the structural representations of Italian datives at a higher conceptual level, yielding responses that mirror the linear order of the thematic mappings in the prime sentence, i.e., the Recipient-Theme order in a *conceptual-to-linear* mapping situation (Cai, Pickering, & Branigan, 2012). Hence, English-Italian heritage speakers are expected to produce a higher percentage of shifted POs (e.g., *La bambina dà alla maestra un fiore*), and a higher number of dative clitics (e.g., *La bambina le dà un fiore*) following an English DO prime than after a PO prime. Furthermore, their dominance in English suggests that there may be some bias transfer from the English verb in the prime to the representation of its translation-equivalent in Italian verbs, leading to a higher production of these unexpected structures after DO-biased verbs (Bresnan, 2007).

If these predictions were to be confirmed, we could suggest that English-Italian heritage speakers share the conceptual and structural representations of similar structures across English and Italian, but they share only conceptual representations when constructions in a language require different grammatical mappings on the other.

## **2.3. Method**

### **2.3.1. Participants**

Participants were 21 English-Italian heritage bilinguals (mean age = 48.6; range = 19 – 69; F = 19 and M = 4) who lived in Australia (N=8), in the UK (N=6), in the US (N=5), in Canada (N=1) and New Zealand (N=1). They were recruited online via social media, Italian Cultural Institutions, and Italian Consulates in English-speaking countries.

Their biographic information was collected via a Language Profile Questionnaire on Google Form, adapted from the Bilingual Language Profile (BLP) questionnaire by Birdsong, Gertken, & Amengual (2012). Data reported that all 21 heritage bilinguals had Italian as first language and were dominant in English. 13 participants were simultaneous bilinguals, while 8 participants acquired Italian before English (mean age of onset of English = 2.7 years old).

Participants rated their Italian (L1) proficiency with respect to four skills (understanding, speaking, reading, and writing) on a self-assessment scale from 1 (i.e., not well at all) to 6 (i.e., very well). The mean average of their skills was 4.9.

6 more participants (mean age = 55.3; range = 29 – 67; F = 5 and M = 1) completed the priming task but were excluded from the analysis because of missing audio files (> 50%; N=3) or unintelligible answers as a consequence of low proficiency in Italian (N=3).

All participants gave their informed consent prior to completing the study and were unaware of the real purpose of the experiment (Appendix C).

### 2.3.2. Materials

The materials included 16 experimental sets. Each set consisted of an English prime sentence, a translation-equivalent Italian verb hint, and a target image depicting a ditransitive event.

Prime sentences consisted of English full sentences either in PO or DO condition. Prepositional object (PO) datives presented a NP-V-NP-PP linear order, corresponding to Subject-Agent-Theme-Recipient in terms of thematic role mappings and to subject-direct object-oblique object functional mappings. Double object (DO) datives, instead, presented a NP-V-NP-NP word order, corresponding to Agent-Recipient-Theme in terms of thematic role mappings and to subject-indirect object-direct object functional mappings. Subjects and indirect/oblique objects were always animate and preceded by the definite article ‘the’, while the direct object was always inanimate and preceded by the indefinite article ‘a/an’.

The English verbs in the prime were selected from Gries & Stefanowich (2003; 2004) according to their bias towards DO or PO structures: four verbs (*give, offer, show, serve*) were DO-biased, four verbs (*sell, hand, throw, send*) were PO-biased, resulting in a total of 8 different verbs. Each verb was then repeated twice in alternating conditions, meaning that each participant saw the same verb both in the DO and in the PO condition in two different prime sentences. Verbs were in the present continuous tense, which was judged as more natural by native English participants in the norming experiment. A list of the prime sentences can be found in Appendix A.

The verb hints consisted of the Italian translations of the English prime verbs: *dare, offrire, mostrare, servire, vendere, passare, lanciare, mandare*. They were placed under corresponding target pictures. Since Italian a dative event can be expressed only with a prepositional dative structure, Possible verb bias towards an Italian PO or DO structure was not considered, since Italian allows only PO constructions.

16 different target pictures were created in Pixton<sup>1</sup> and eventually modified with Clip Studio Paint<sup>2</sup> to better express the desired action (Appendix B). They depicted actions that involved two animate characters (human or animal), and an inanimate object. They were all black and white and reflected the left-to-right reading order. Such disposition was taken in order not to influence the production of one or the other dative structure. Additionally, other 32 filler sets were constructed. Each of them consisted of an English prime sentence, an Italian verb hint, and a target picture. Filler primes were transitive (active or passive), locative, and unaccusative sentences.

### 2.3.3. Design

The experiment was constructed with a 2x1 factorial design, defined by the Sentence Condition factor (DO prime or PD prime) and the Verb factor (same verb). Every experimental item was shown to all participants in either condition. The dependent variables were the proportion of PD and DO target responses after a PD prime, and the proportion of PD and DO target responses after a DO prime.

Two counterbalanced lists were designed, each containing the 64 trial sets in the opposite condition and order. For example, if List 1 had an active verb as the first sentence (e.g., *The guard is chasing the prisoner*), List 2 had the same sentence in passive condition as the last item (e.g., *The prisoner is chased by the guard*). Their order of appearance was pseudo randomized, with three filler sets between the appearance of a dative sentence. Moreover, dative sentences with the same verb appeared with at least ten trials of distance between them. For instance, if a DO sentence with the verb *give* appeared at the beginning of the experiment, the second sentence with the verb *give* in PD condition would appear at least ten experimental and filler trials later.

### 2.3.4. Procedure

After filling out the Language Profile Questionnaire, participants were sent an email with the link to the priming experiment hosted online on Pavlovia. Together with the link, they were also assigned a random participant ID to insert in the Pavlovia home screen before starting the experiment. The email also contained a few precautions to adopt while doing the experiment in order to avoid any data loss. Among these, care about finding a quiet place where to speak loudly and clearly, and not

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<sup>1</sup> Pixton Comic & Storyboard Builder for Education. (2021). Pixton. <https://www.pixton.com/>

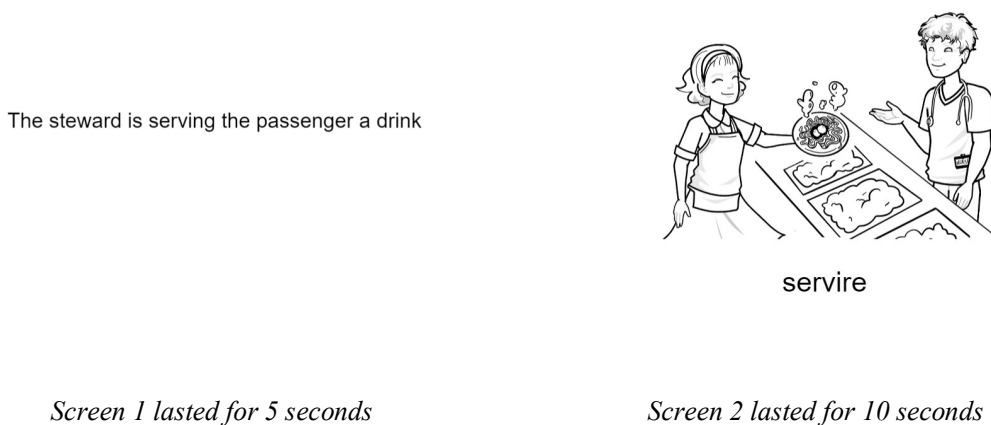
<sup>2</sup> イラストマンガ制作アプリ CLIP STUDIO PAINT (クリスタ). (2021). CLIP STUDIO.NET. <https://www.clipstudio.net/>

to change tabs in their browser while doing the experiment since Pavlovia is sensitive to such changes when recording spoken responses. The experiment was created locally in PsychoPy v3.0 (Pierce et al., 2019) and run online on Pavlovia<sup>3</sup>.

As the experimental session started, participants had to give their informed consent to the recording and storing of their spoken productions by pressing <SPACE> on their keyboard (Appendix D). They were then given detailed instructions in English, both vocal and written, on how to complete the experiment. Two demos were also provided in order to be as clear as possible on what was asked of them. They were instructed to read the English sentence out loud, and to describe the successive picture with a simple Italian sentence, using the verb provided underneath it. They were told to name all the elements depicted, and to address the animate characters in a specific (e.g., l'infermiere) or generic way (e.g., il ragazzo). They were also given three practice sets to familiarize themselves with the task. As the experiment started, participants saw the prime sentence and the target picture sequentially. Figure 5 illustrates a sample set of what they saw on screen:

**Figure 5.** Sample of experimental set as seen by the participants on their computer screen

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Timing restrictions were inserted in the experimental trials in order to elicit the first sentence that came to their mind: Prime sentences lasted on screen for 5 seconds, while target pictures lasted for 10 seconds. The timing was appropriate to elicit a complete sentence in high proficient heritage bilinguals but not on low proficient ones. Participants did not have the possibility to pause or stop the trials without aborting the whole session. The experiment took approximately 20 minutes to complete.

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<sup>3</sup> Pavlovia. (2021). Pavlovia. <https://pavlovia.org/>

### 2.3.5. Scoring

Participants' spoken descriptions were manually transcribed and binary coded by the researcher. For each target description, the first response produced by the speaker was kept and scored as follow, keeping in mind the word order of the internal arguments:

- **PO** if the arguments were mapped in a NP-V-NP-PP word order  
e.g., *La ragazza sta dando una banana al ragazzo*
- **DO** if the arguments were mapped in a NP-V-NP-NP word order  
e.g., *Il ragazzo sta mostrando il papà il disegno*
- **Shifted PO** if the arguments were mapped in a NP-V-PP-NP word order  
e.g., *La signora offre all'uomo l'ombrello*
- **Clitics** if the target sentence contained a dative clitic  
e.g., *Mi ha servito una tazza di caffè*
- **Other** if descriptions contained other kinds of structures  
e.g., *Lo stregone passa la scopa*

For the purpose of this study, errors of morphology were not taken into account. Once scoring was done, each response was binarized (0,1) according to their respective coding in an excel file. Shifted PO, dative clitics, and DOs were grouped together under the “Lax Non-Target” label in order to facilitate the statistical analysis and to separate them from the Others.

## 2.4. Results

The data was scored and analyzed according to the coding scheme presented in the *Scoring* section. Table 2 reports the numbers, mean proportions, and standard deviation of the Italian dative occurrences produced after each English prime condition, i.e., either DO or PO primes:

### English-Italian Heritage Speakers

**Table 2.** Total number, mean proportions and standard deviation (sd) of prepositional object (PO), double object (DO), shifted PO, Clitics and Other responses by prime condition

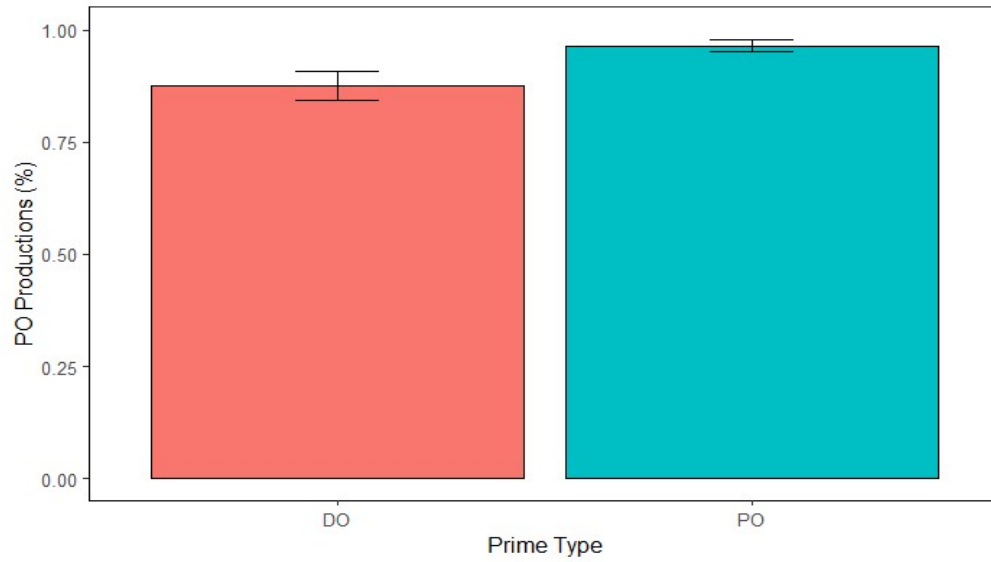
	PO		DO		Shifted PO		Clitics		Others	
	<i>n</i>	<i>% (sd)</i>	<i>n</i>	<i>% (sd)</i>	<i>n</i>	<i>% (sd)</i>	<i>n</i>	<i>% (sd)</i>	<i>n</i>	<i>% (sd)</i>
<i>Condition</i>										
DO	137	.82 (.17)	4	.02 (.06)	10	.06 (.1)	5	.03 (.08)	12	.07 (.09)
PO	155	.92 (.12)	1	.01 (.02)	1	.01 (.02)	3	.02 (.04)	8	.04 (.08)

As can be seen from the table, 21 English-Italian heritage bilinguals produced a total of 336 Italian dative sentences: 292 POs (86.9%); 5 DOs (1.48%), 11 ShiftedPOs (3.27%), 8 Clitics (2.4%), and 20 Others (5.95%). Overall, they produced higher proportion of PO responses irrespective of prime condition. More specifically, the number of PO target responses increased by 10% after PO primes (92%) with respect to DO primes (82%), showing a significant priming effect between the two conditions. A marginal effect of priming can also be found in the numbers of Lax Non-Target descriptions (DOs, Shifted POs and Clitics) as a function of prime type, that is DO primes elicited more Lax Non-Target descriptions (11.3%) than PO primes (2.9%). Moreover, if we look more closely at the single responses, DO and dative clitic productions were very few after both DO and PO primes, being only the 3.8% of all dative productions. Shifted POs were also a few even though they were produced 5% more after DO primes (6%) compared to the number of Shifted POs after PO primes (1%). Since PO and Lax Non-Target productions have shown an effect of priming, we report in the following figures the proportion of PO target and Lax Non-Target descriptions by means of proficiency.

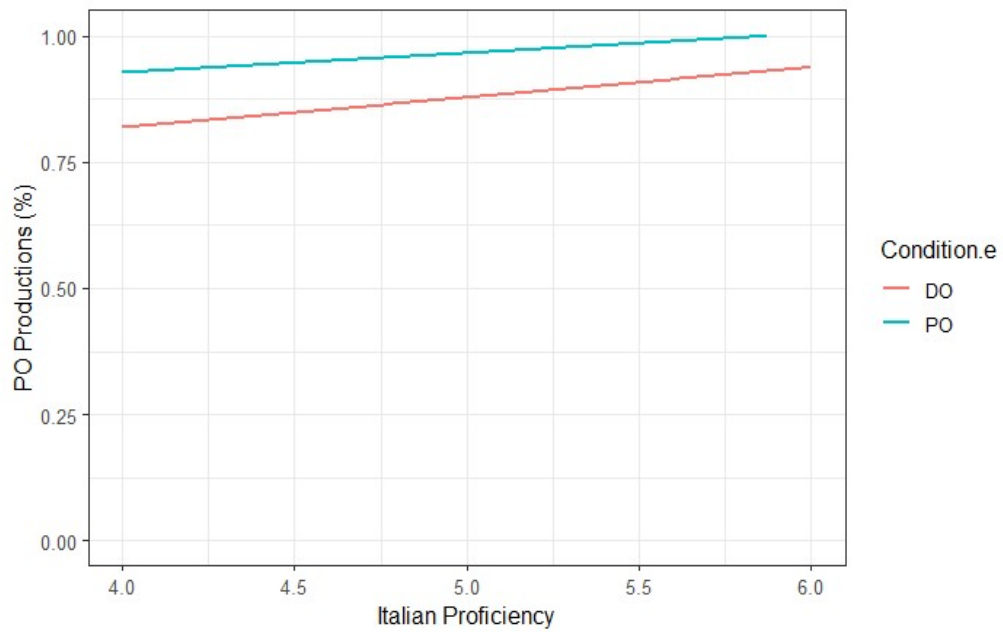
In Figure 6 and 7 we can see that the proportion of Italian PO descriptions increased after both prime types (English POs and DOs) as Italian proficiency increased. In fact, POs were produced more after POs than after DOs when proficiency was higher. POs were also produced less after POs when proficiency was lower, but still at higher rates compared to POs after DOs. Summarizing, highly proficient HSs produced more POs after PO primes and more POs after DO primes, and a parallel trend was found in less proficient HSs:



**Figure 6.** Proportions of PO productions by prime type in HSs

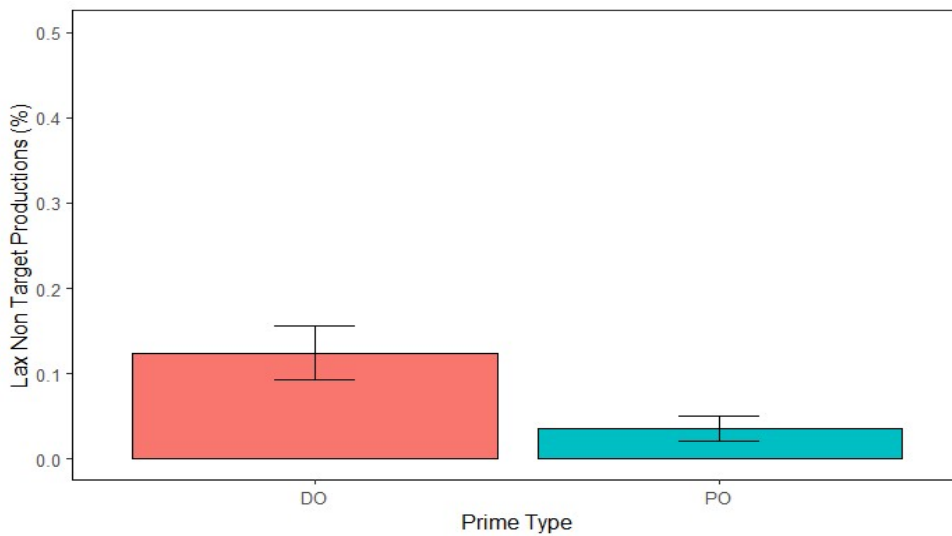


**Figure 7.** Proportions of PO productions by Italian proficiency in HSs

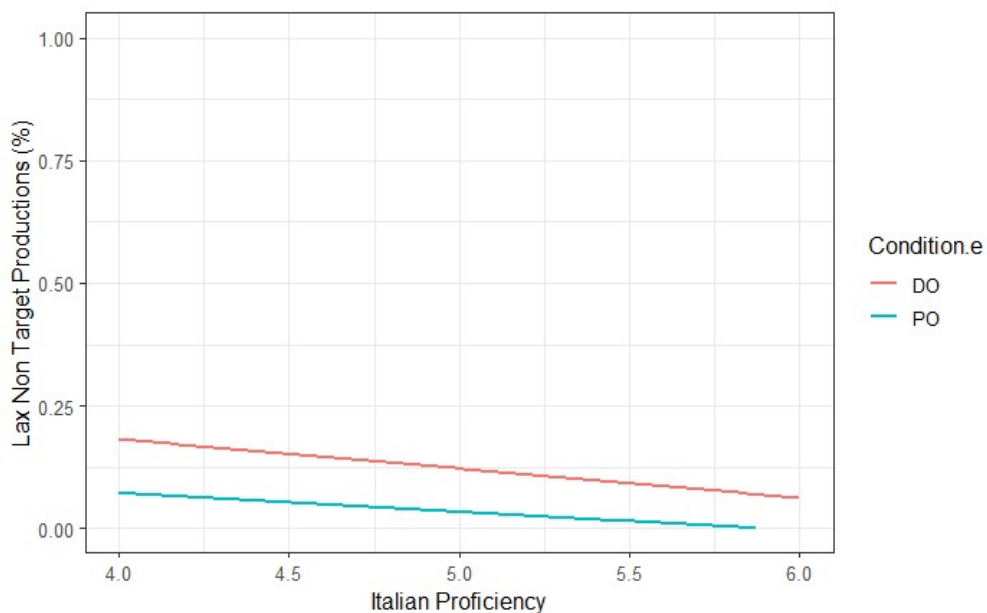


In Figure 8 and 9 we turn to illustrate the tendency of Lax Non-Target descriptions with respect to the mean level of proficiency. In this case, their proportion showed an inversed tendency with respect to that found for POs when the proficiency variable was considered: HSs produced more Lax Non-Target descriptions when their Italian proficiency was lower than when it was higher. Furthermore, the graph shows that they produced a higher proportion of Lax Non-Target descriptions after DO primes, and significantly less Lax Non-Target descriptions after PO primes. While Lax Non-Target responses were still produced in higher numbers after DOs than after POs at all proficiency levels, their occurrence decreased as proficiency increased.

**Figure 8.** Proportions of Lax Non-Target productions by prime type in HSs

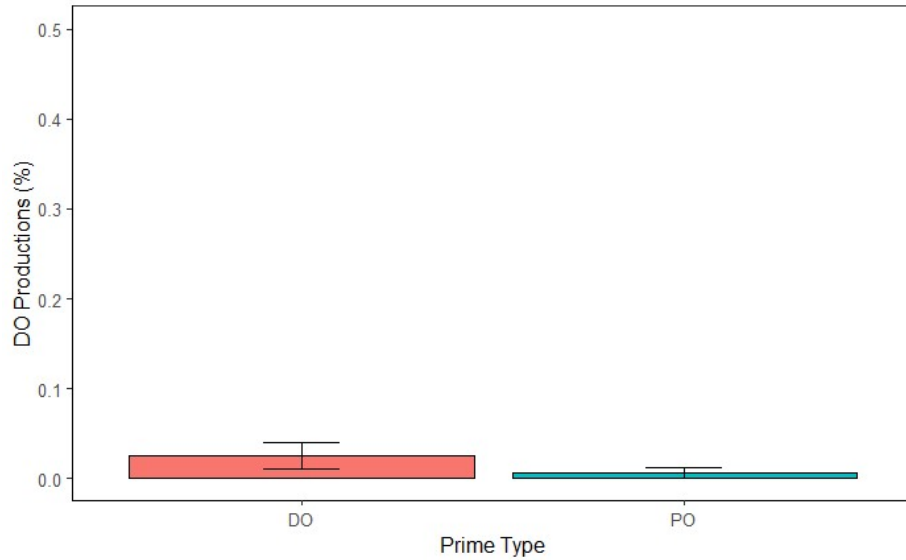


**Figure 9.** Proportions of Lax Non-Target productions by Italian proficiency in HSs

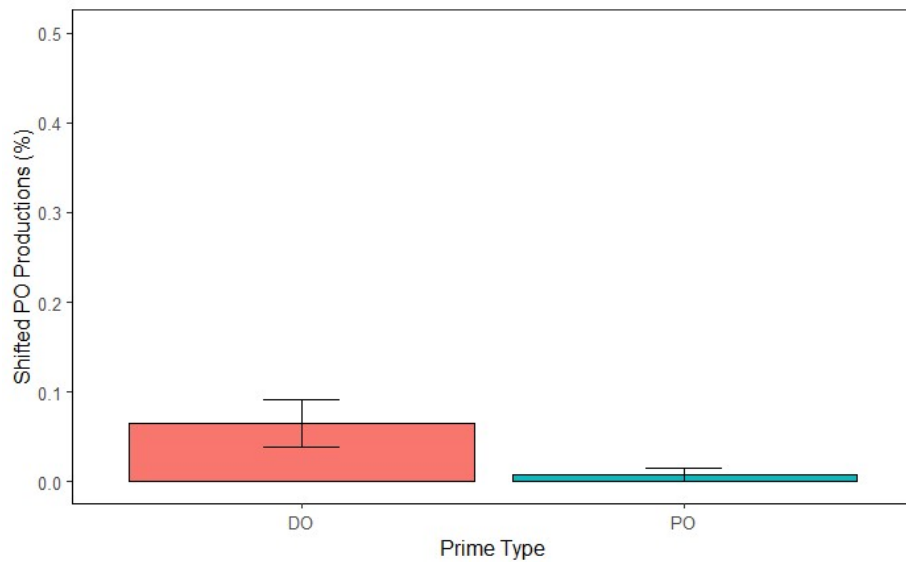


Since the term Lax Non-Target was used to group those productions that diverged from the expected ones, in Figure 10, 11, and 12 we look more closely at the production rates of DOs, shifted POs, and dative clitics to understand which target condition caused the tendency illustrated in Figure 8.

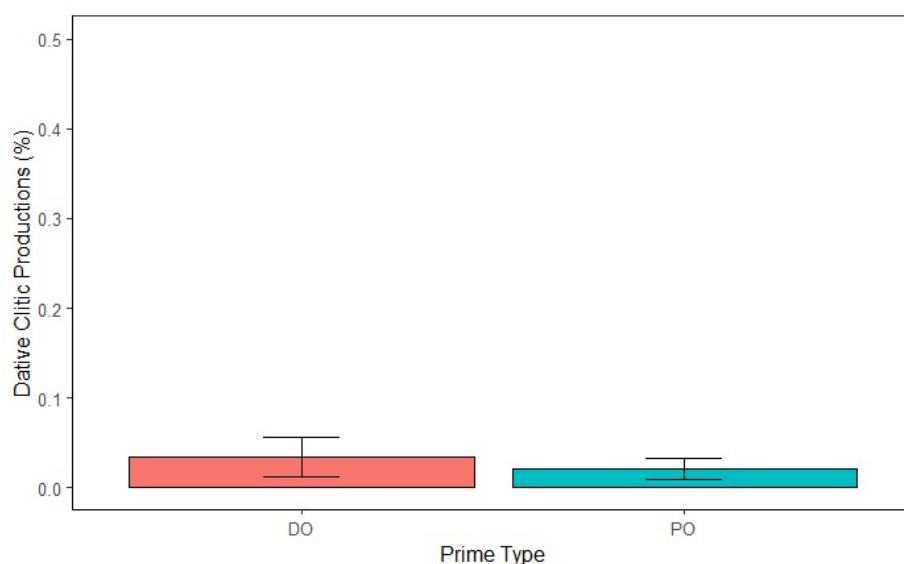
**Figure 10.** Proportions of DO productions by Italian proficiency in HSs



**Figure 11.** Proportions of Shifted PO productions by Italian proficiency in HSs



**Figure 12.** Proportions of dative clitic productions by Italian proficiency in HSs



Comparatively, shifted POs resulted to have the higher production rates with respect to DOs and dative clitics, as previously shown in the descriptive statistics in Table 2.

To give a more comprehensive view of the non-target utterances produced by our HS participants, in the following Tables (3 – 5) we report the transcriptions of Lax Non-Target (DOs, shifted POs, and clitics) productions after both prime condition and verb hint. The prime sentence for each condition and the picture to which they were associated can instead be found in Appendix A and B. We also report some examples of Other responses.

**Table 3.** Transcriptions of DOs productions after prime condition and verb hint

<i>Condition</i>	<i>Verb hint</i>	<i>DO productions</i>
DO	mostrare	Il ragazzo sta mostrando <u>il papà</u> il disegno
DO	servire	La ragazza sta servendo <u>l'uomo</u> gli spaghetti alla bolognesa
PO	servire	La signora serve il dottore il pranzo
DO	offrire	La ragazza sta offrendo <u>il ragazzo</u> un ombrello
DO	offrire	La donna offre <u>il ragazzo</u> un ombrello

**Table 4.** Transcriptions of shifted PO productions after prime condition and verb hint

<i>Condition</i>	<i>Verb hint</i>	<i>Shifted PO productions</i>
DO	passare	La cantante sta passando <u>al cantante</u> la chitarra
DO	offrire	La signora offre <u>all'uomo</u> l'ombrello
DO	servire	La donna serve <u>all'infermiere</u> la pasta
DO	servire	La ragazza serve <u>al dottore-</u> no, all'infermiere il cibo
DO	dare	La ragazza dà <u>a una bambina</u> una banana
DO	dare	La bambina dà <u>al suo papà</u> la banana
DO	dare	La ragazza dà <u>a suo papà</u> una banana
DO	mostrare	La ragazza mostra <u>al fidanzato</u> il vestito
DO	mostrare	Il bambino sta mostrando <u>a suo padre</u> il disegno
DO	mostrare	Il figlio mostra <u>al papà</u> il disegno
PO	mostrare	Il ragazzo sta mostrando <u>a un signore</u> un disegno che ha appena finito

**Table 5.** Transcriptions of dative clitic productions after prime condition and verb hint

<i>Condition</i>	<i>Verb hint</i>	<i>Dative clitic productions</i>
DO	servire	Mi ha servito una tazza di caffè
DO	passare	Mi ha passato una scopa
DO	mandare	Ti mando i soldi dalla mia banca
DO	lanciare	Mi ha lanciato le chiave
PO	lanciare	Ecco, ti lancia le chiavi
DO	offrire	Io gli offro un hamburger
PO	offrire	Mi ha offerto un hamburger
PO	offrire	Ti posso offrire un panino?

Other productions consisted mainly of transitives (N=17) such as in 5a, si-passives (N=1) such as in 5b, and other sentences (N=1) such as in 5c:

- (5) a. Lo stregone passa la scopa  
b. Si vende il gelato nella strada  
c. Voglio mangiare spaghetti – me ne servi per piacere?

Interestingly, of these 20 other responses, 7 followed the verb *serve / servire* (N=4 after DO and N=3 after PO), 10 followed the verb *sell / vendere* (N=6 after DO and N=4 after PO), 1 followed the verb *send / mandare* (N=1 after DO), and 2 followed the verb *hand / passare* (N=1 after PO and N=1 after DO).

## 2.5. Discussion

Taken together, these results show a significant main effect of prime type, that is English-Italian heritage speakers were producing a higher percentage of PO descriptions after PO primes than after DO primes. A higher percentage of Lax Non-Target (DOs, Shifted DOs, Clitics) was also found after being primed with a DO construction than after being primed with a PO construction. There was not a statistically significant interaction with proficiency, although we can gather from the graphs that Heritage Speakers tended to produce an overall higher number of POs as proficiency increased irrespective of both prime conditions. These results were expected as they approximate to those seen in Sfriso (2020), who investigated the dative alternation in native Italian speakers: since Italian allows only PO dative constructions, it seems reasonable that HSs who were highly proficient in Italian would produce a higher percentage of PO constructions after both prime types, perhaps meaning that the core aspects of Italian syntax have been strongly acquired and that an English transfer or influence is less likely as confidence in Italian increases. This confidence is also reflected in the proportion of Lax Non-Target responses: contrarily to what predicted, HSs produced very few shifted POs and dative clitic constructions, and surprisingly, they also produced a few illicit Italian DOs. However, concerning these latter findings, we cannot be sure if their occurrence is a question of language transfer from English or if it is a question of scarcity of linguistic input in Italian. An interesting issue is posed by the dative clitic productions: although participants interpreted the events from their point of view, a strategy possibly linked to their low proficiency (Figure 12) the mere production of dative clitics indicates that they have been exposed to enough Italian linguistic input as children to acquire this critical feature (Romano, 2020). Furthermore, this 13.1% of Non-Target productions could

indicate that some processing at a higher conceptual level has been passed down during the processing of these syntactic constructions. However, before drawing any conclusions, we further investigate the representations and processing of this English dative alternation in English Late Learners of Italian as L2. A comparison between the two groups of bilinguals could help us in understanding this production tendency.

### **3. Cross-Linguistic Structural Priming in English Late Learners of Italian**

#### **3.1. Introduction**

In this chapter we further investigate the dative productions of English Late Learners of Italian (L2ers) who live immersed in an English-speaking environment to better understand whether the processing of English and Italian datives changes when the L1 is English instead of Italian, therefore implying a dominant language influence from a L1 to L2 perspective.

#### **3.2. Research questions**

Hence, the same experiment illustrated in Chapter 2 was reproduced with a different bilingual group in order to answer to the follow up research question below:

- 1. To what extent English-Italian heritage speakers differ from English L2 Italian learners in the production of dative target sentences?*

Compared to the results from the priming experiment conducted with English-Italian HSs reported in the previous chapter, in English L2ers of Italian we expect a lower production of shifted POs but a higher production of illicit Italian DOs as a function of prime type, that is when they are primed with a DO structure, they are more likely to utter these constructions. Moreover, these DO responses are expected to reflect a transfer of structural bias from the English prime verb to the Italian target verb. If these expectations were met, we could suggest that L2 Italians share unsparingly conceptual and structural representations between English and Italian, showing a higher degree of integration in comparison with English-Italian heritage bilinguals as a consequence of an absence of those processing constraints that were acquired earlier in infancy for the Italian language. These results could give further evidence that the “native” language, the first language acquired since birth, plays a fundamental role in the grammatical outcomes of languages (Wiese et al., 2022).



### **3.3. Method**

#### **3.3.1. Participants**

Participants were 20 English Late Learners of Italian as L2 (mean age = 49.4; range = 24– 76; F = 12 and M = 8) who lived in Australia (N=4), in the UK (N=3), and in the US (N=13). They were recruited online via social media, Italian Cultural Institutions, and schools of Italian in English-speaking countries.

Their biographic information was collected via a Language Profile Questionnaire on Google Form, adapted from the Bilingual Language Profile (BLP) questionnaire by Birdsong et al. (2012). Data reported that all 20 L2ers had English as first language and they started to learn Italian after 5 years old (10 L2ers learned Italian at mean AoO = 12.6 years old; 10 L2ers reported to have learned Italian after the 20 years of age). Participants rated their Italian (L2) proficiency with respect to four skills (understanding, speaking, reading, and writing) on a self-assessment scale from 1 (i.e., not well at all) to 6 (i.e., very well). The mean average of their skills was 4.2.

10 more participants (mean age = 51.5; range = 22– 79; F = 7 and M = 3) completed the priming task but were excluded from the analysis because of missing audio files (> 50%; N=3), low proficiency (N=5), or different mother tongue from English (N=2).

All participants gave their informed consent prior to completing the study and were unaware of the real purpose of the experiment.

#### **3.3.2. Materials, Design, Procedure, Scoring**

The priming experiment was the same as the one administered to English-Italian heritage speakers. Therefore, materials, design, procedures, and scoring were the same as the one illustrated in Section 2.1.2., 2.2.3., 2.1.4., 2.1.5.

### **3.4. Results**

The data was scored and analyzed following the coding scheme presented in the *Scoring* section. Table 6 reports the numbers, mean proportions and standard deviation of dative productions as a function of prime condition, i.e., either DO or PO primes:

### English Late Learners of Italian

**Table 6.** Total number, mean proportions and standard deviation (sd) of prepositional object (PO), double object (DO), shifted PO, Clitics and Other responses by prime condition

	PO		DO		Shifted PO		Clitics		Others	
	<i>n</i>	<i>% (sd)</i>	<i>n</i>	<i>% (sd)</i>	<i>n</i>	<i>% (sd)</i>	<i>n</i>	<i>% (sd)</i>	<i>n</i>	<i>% (sd)</i>
<i>Condition</i>										
DO	140	.87 (.12)	9	.06 (.08)	1	.01 (.02)	0	.0 (.0)	10	.06 (.1)
PO	143	.89 (.1)	8	.05 (.1)	1	.01 (.02)	0	.0 (.0)	8	.05 (.07)

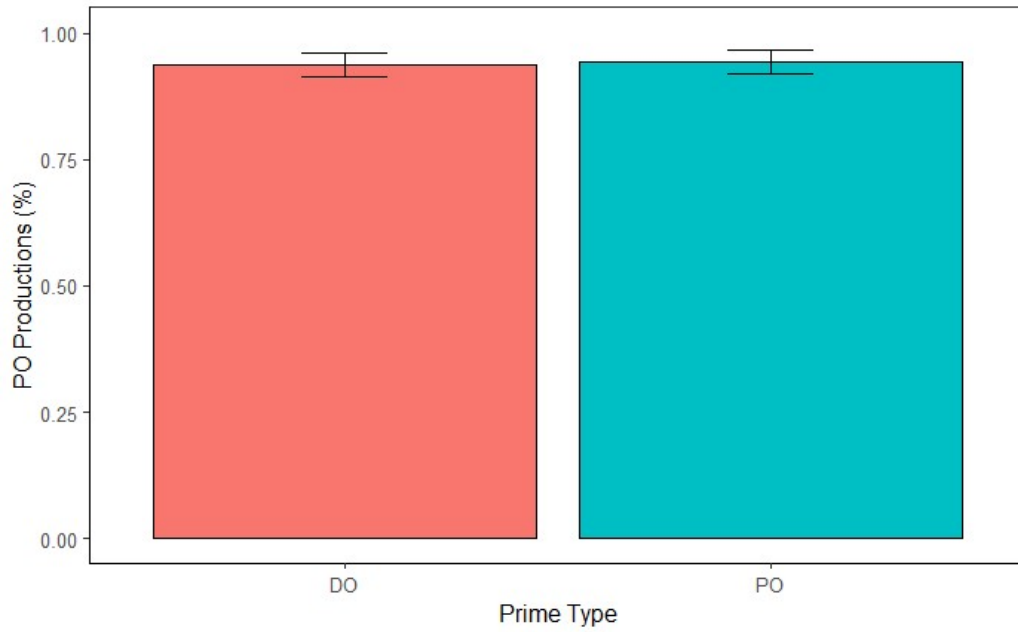
As can be seen from the table, 20 English learners of L2 Italian, who were living immersed in an English-speaking context, produced a total of 320 dative sentences: 283 POs (88.4%), 17 DOs (5.3%), 2 ShiftedPOs (0.6%), 0 Clitics (0%), and 18 Others (5.6%).

Overall, they produced a higher proportion of PO responses with respect to other kind of responses, but only with a 2% difference between the two conditions (87% vs. 89%). Italian DO sentences were also produced in the same amount after both DO and PO primes. Interestingly, they produced only 2 shifted POs and none with dative clitics. The proportion of these Lax Non-Target productions can be compared to the proportion of Other responses, which were almost produced to the same extent (5.9% vs. 5.3%).

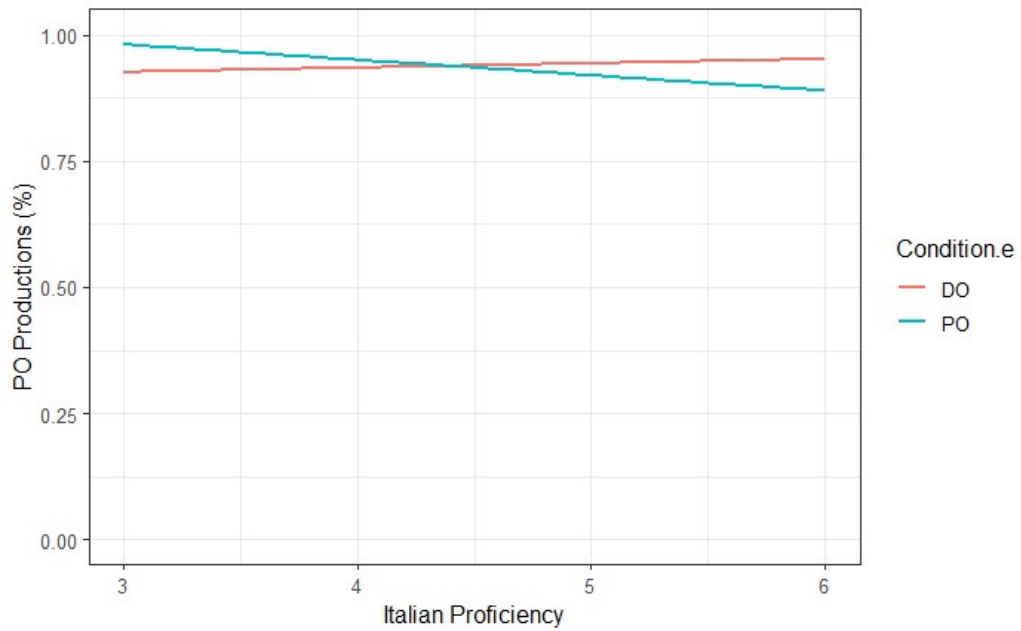
As we did for the HSs, we report in the following figures the proportion of PO and Lax Non-Target productions by means of proficiency. We also provide the transcriptions of DO and shifted PO target sentences along with a few examples of Other descriptions.

Figures 13 and 14 show the trend of PO target productions with respect to the mean level of proficiency. Although PO target sentences are almost the 90% of the whole dative productions and differ only by 2% after PO and DO primes, there is an inversed pattern in their production as a function of proficiency. In fact, it seems that POs decreased with the increasing of proficiency after PO primes, while POs after DO primes increased with proficiency, suggesting that DOs primed more POs as proficiency increased, while POs primed less POs as proficiency increased. Overall, L2ers produced more POs after DOs than after POs at higher levels of proficiency.

**Figure 13.** Proportions of PO productions by prime type in L2ers

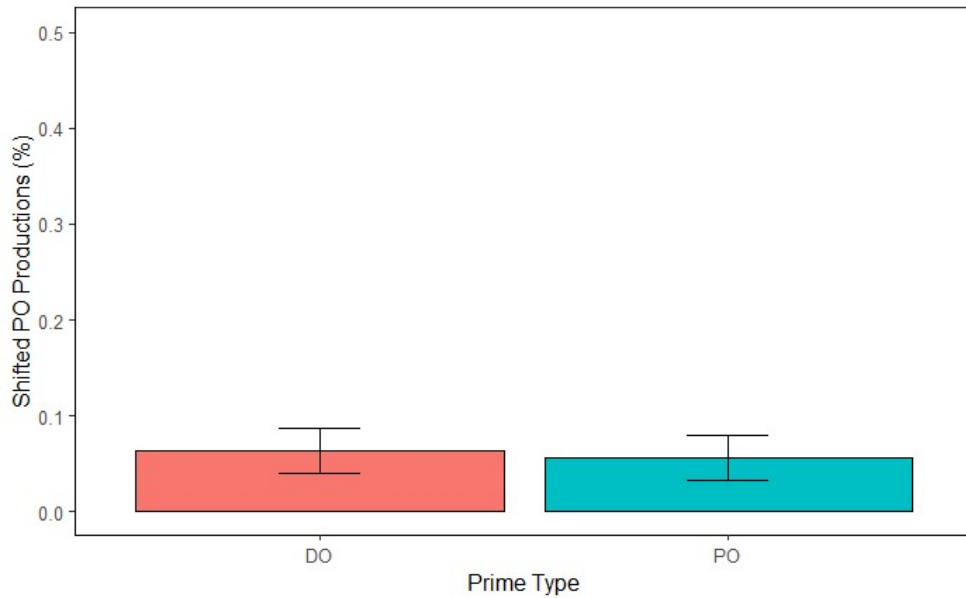


**Figure 14.** Proportions of PO productions by Italian proficiency in L2ers

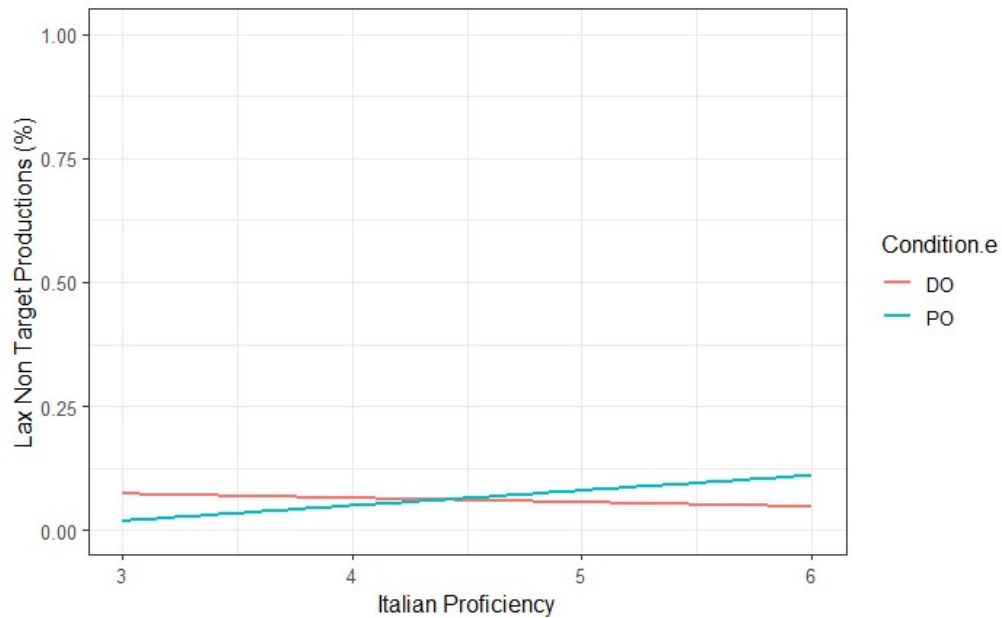


Figures 15 and 16 show the trend of Lax Non-Target descriptions with respect to the mean level of proficiency. L2ers produced an even percentage of Lax Non-Target (DOs and shifted DOs) descriptions after DO and PO priming sentences. However, they produced more Lax Non-Target descriptions at lower levels of proficiency after DO primes, production which decreased as proficiency grew. Comparatively, PO sentences were produced less if their proficiency was low and more as proficiency increased.

**Figure 15.** Proportions of Lax Non-Target productions by prime type in L2ers

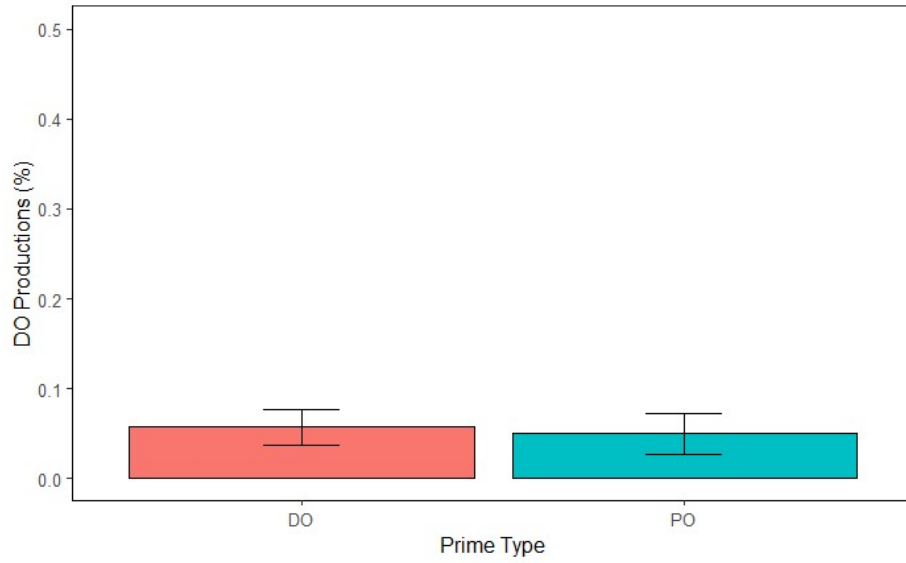


**Figure 16.** Proportions of Lax Non-Target productions by Italian proficiency in L2ers

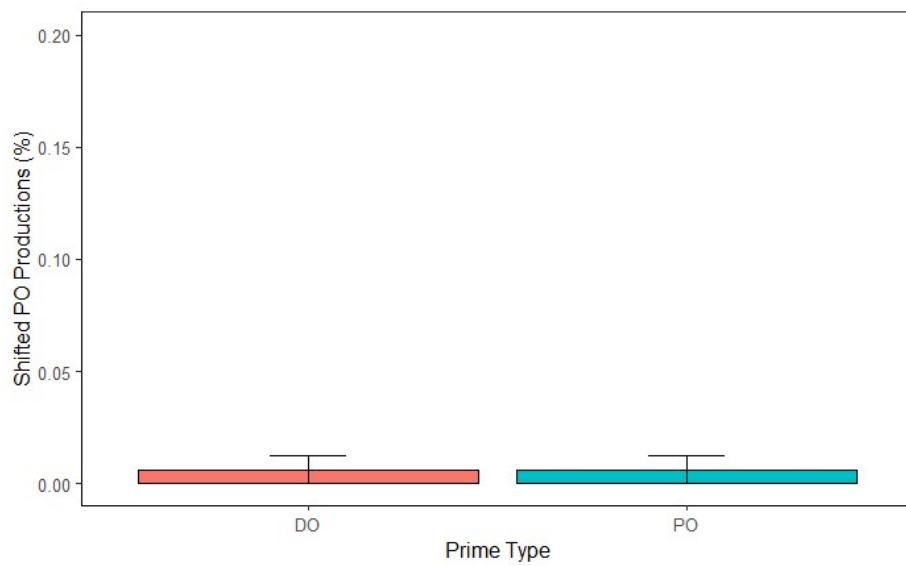


In Figure 17 and 18 we look more closely at the production rates of DOs and shifted POs to understand which target condition caused the tendency illustrated in Figure 15.

**Figure 17.** Proportions of DO productions by Italian proficiency in L2ers



**Figure 18.** Proportions of Shifted PO productions by Italian proficiency in L2ers



Comparatively, DO target sentences resulted to have the higher production rates with respect to shifted POs, as previously shown in the descriptive statistics in Table 6.

To give a more comprehensive view of the non-target utterances produced by our L2 participants, in the following tables (7 – 8) we report the transcriptions of Lax Non-Target (DOs and shifted POs) productions after both prime condition and verb hint. The prime sentence for each condition and the picture to which they were associated can instead be found in Appendix A and B. We also report some examples of Other responses.

**Table 7.** Transcriptions of DO productions after prime condition and verb hint

<i>Condition</i>	<i>Verb hint</i>	<i>DO productions</i>
PO	dare	La ragazza dà la professoressa un fiore
DO	offrire	La cucina offra l'uomo un hamburger
DO	offrire	Uno chef offre un uomo un hamburger
PO	offrire	La donna offre l'uomo un ombrella
PO	offrire	Lo chef offre il vecchio un hamburger
DO	servire	La-Il cameriere serve la ragazza un caffè...
DO	servire	Il cameriere serve la donna un caffè
DO	servire	L'uomo serve la donna un caffè
PO	servire	La donna serve l'infermiere il suo pranzo
PO	servire	La donna serve il dottore il cibo
DO	mandare	La donna manda suo figlio dei soldi
DO	mandare	Il ragazzo sta mandando la ragazza un poste-regalo
DO	mostrare	La donna mostra l'uomo il vestito
DO	mostrare	Il figlio sta mostrando il papà un dipinto che ha fatto
PO	mostrare	La moglie mostra suo marito suo nuovo vestito
PO	mostrare	Un figlio mostra suo padre un'immagine... un disegno
PO	mostrare	Lei sta mostrando il suo ragazzo il nuovo vestito

**Table 8.** Transcriptions of Shifted PO productions after prime condition and verb hint

<i>Condition</i>	<i>Verb hint</i>	<i>Shifted PO productions</i>
DO	dare	La bambina dà alla mamma-la nonna un fiore
PO	mostrare	Il ragazzo sta mostrando al suo padre il suo lavoro d'arte

Other productions consisted mainly of transitive (N=15) such as in 6a, missing arguments (N=2) such as in 6b, and other sentences (N=1) such as in 6c.

- (6) a. La poliziotta sta lanciando il pallone  
b. La donna offre...  
c. Al panificio c'è una ragazza che vende il pane

Interestingly, of these 18 other responses, 8 followed the verb serve / servire (N=6 after DO and N=2 after PO), 3 followed the verb sell / vendere (N=3 after PO), 1 followed the verb offer / offrire (N=1 after DO), 2 followed the verb hand / passare (N=2 after PO), and 3 followed the verb throw / lanciare (N=2 after DO and N=1 after PO).

### **3.5. Discussion**

The results of the priming experiment concerning the productions of L2ers of Italian shows that they produced almost an overall higher proportion of POs after both prime types than the rest of sentence structures. Statistically speaking, neither prime type nor proficiency seem to significantly influence the productions of dative descriptions in Italian. However, in the graphs above we can notice some interesting interactions between prime types and Italian proficiency. Descriptively, L2ers produced more POs after POs at lower levels of proficiency and less POs after POs at higher levels of proficiency. Furthermore, L2ers produced more POs after DOs as their proficiency increased, while they produced less POs after DOs at lower levels of proficiency. This tendency is mirrored in their productions of Lax Non-Target descriptions. In fact, as proficiency increased, the production of Lax Non-Target structures after PO primes increased too. Conversely, PO descriptions after DOs tended to decrease as proficiency grew. We could assume that the decreasing trend of PO descriptions after PO primes as proficiency increased may be compensated by a higher production of Lax Non-Target descriptions after PO primes.

As stated in the *Scoring* section, the label Lax Non-Target descriptions clustered together DO and shifted PO target productions, which respectively constituted the 5.3% and 0.6% of all dative descriptions produced by L2ers of Italian.

From this premise, and since L2ers tend to produce structures that are not allowed in Italian, such as DOs, we could hypothesize that the representations and processing of the dative alternation in English late learners of Italian are fully shared between languages at higher levels of proficiency in Italian. This strong integration can be found both at a conceptual and at a structural level since the thematic and syntactic mappings of English DO primes perseverate on the production of Italian target descriptions.

## **4. Analysis of variance (ANOVA) and general discussion**

### **4.1. ANOVA analysis on dative target productions**

A further analysis of variance (ANOVA) was performed in R (R Core Team, 2021) to compare the effect of prime type, proficiency, and prime type x proficiency (independent variables) on the whole productions of our priming experiment (dependent variables).

Table 9 shows the results of this effect on the production of POs. This analysis revealed that there was a statistically significant effect of prime type on PO productions ( $p < 0.01$ ). Moreover, there was a statistically significant interaction between prime type and group ( $p < 0.01$ ), and between proficiency and group ( $p < 0.01$ ).



**Table 9.** ANOVA analysis for all participants – PO productions

	<b>Df</b>	<b>Sum Sq</b>	<b>Mean Sq</b>	<b>F value</b>	<b>Pr (&gt;F)</b>
<i>Prime type</i>	1	0.38	0.39	6.03	<0.01
<i>Proficiency</i>	1	0.01	0.01	0.13	n.s.
<i>Group</i>	1	0.06	0.06	0.88	n.s.
<i>Prime type x Proficiency</i>	1	0.00	0.00	0.00	n.s.
<i>Prime type x Group</i>	1	0.36	0.36	5.58	<0.01
<i>Proficiency x Group</i>	1	0.30	0.30	4.64	<0.01
<i>Prime type x Proficiency x Group</i>	1	0.01	0.01	0.09	n.s.
<b>Residuals</b>	610	38.90	0.06		

Table 10, instead, shows the effect of the independent variables in the left column on shifted PO productions. From this statistical analysis, we can gather that there was a statistically significant effect of prime type on the production of shifted POs ( $p < 0.01$ ), with a significant interaction with the group variable ( $p < 0.01$ ). However, group was only a marginally significant predictor for shifted PO productions. Proficiency also had a marginally significant effect on these target productions ( $p < 0.05$ ).

**Table 10.** ANOVA analysis for all participants – Shifted PO productions

	<b>Df</b>	<b>Sum Sq</b>	<b>Mean Sq</b>	<b>F value</b>	<b>Pr (&gt;F)</b>
<i>Prime type</i>	1	0.14	0.14	6.67	<0.01
<i>Proficiency</i>	1	0.06	0.06	3.13	=0.08
<i>Group</i>	1	0.07	0.07	3.40	=0.07
<i>Prime type x Proficiency</i>	1	0.014	0.01	0.70	n.s.
<i>Prime type x Group</i>	1	0.118	0.11	5.82	<0.01
<i>Proficiency x Group</i>	1	0.000	0.00	0.02	n.s.
<i>Prime type x Proficiency x Group</i>	1	0.006	0.00	0.32	n.s.
<b>Residuals</b>	610	12.32	0.02		

Other ANOVA analyses were performed on the other dependent variables (DOs and clitics), but none of them produced some significant results. Therefore, we decided not to publish them in this section.

## 4.2. General discussion

Experimental evidence from the present research study shows that HSs marginally diverge from L2ers in the production of dative structures in Italian after experiencing English primes. In fact, while they tend to behave similarly to each other and to native Italian speakers (Sfriso, 2020) in the production of PO datives, meaning that both share structural representations for this construction across languages, HSs resulted to be more subjected to the influence of the prime condition, and this tendency grew in parallel with proficiency, although in a non-significant manner. The ANOVA analysis conducted in the previous section confirmed this tendency (Table 9). As such, looking back at the models of language production proposed by Schoonbaert et al. (2007) and Bernolet et al. (2013), we could hypothesize that this result may be due to a stronger activation of the links between the

English verb lemma, the NP-PP combinatorial node, and the Italian translation equivalent verb lemma. Moreover, the strength of this activation is even stronger since PO structures are the only ones licensed by the Italian language. This is reflected in the data by means of an overall higher production of PO sentences, high after DO primes but even higher after PO primes. Such tendency can be also explained by proficiency as HSs' linguistic systems becomes more integrated (Bernolet et al. 2013; Kootstra & Doedens, 2016). L2ers behaved similarly to HSs in the production of POs.

However, the difference in the production pattern of other kinds of structural realizations between groups is worthy of attention. Crucially, along with the priming effect found in POs for HSs, we found another priming effect between the two groups modulated by prime condition, as shown in the ANOVA analysis (Table 10). From the descriptive statistics, we can gather that this effect is due to an opposite tendency in the proportion of Lax Non-Target productions. In fact, HSs produced on average a higher proportion of shifted PO with respect to L2ers, while L2ers produced a higher percentage of illicit DO structures in Italian compared to HSs. This is interesting because while HSs respected the syntactic constraints imposed by Italian, with only an irrelevant number of DO targets (N=2) produced by less proficient speakers, L2ers overrode these Italian constraints and perseverated into employing the English double object construction in the Italian target utterances, thus realizing illicit Italian DOs. From a processing point of view, this behavior may be explained by the activation and selection of the wrong syntactic node and by a weaker imposition of Italian syntactic constraints in L2ers, implying a difference in the structural processing of the dative construction by English-Italian HSs and English L2ers of Italian. It must be further noted that these DO responses cannot be attributed to a simplification of morphology in both L2ers and HSs, because the word order of the phrases reflects the word order of the DO prime (Polinsky & Kagan, 2007).

Overall, the higher production of shifted POs in Italian by HSs suggests that these bilinguals share the same conceptual representations of ditransitive events between languages, but their structural realization is regulated by the syntactic constraints of Italian. As such, these constraints lead this conceptual information to be mapped onto functions and structures available in the target language, maintaining all the while the linear order of the thematic roles present in the prime structure. On the contrary, the higher production of illicit DOs in Italian by L2ers can be seen as the absence of such constraints in their Italian linguistic system, leading to a higher degree of integration of representations and processing between the two languages even at a lower stage of syntactic encoding. Hence, such results could provide evidence that there are in fact some processing benefits provided by the early acquisition of a language (Italian), especially when related to syntax, even when dominance in another language might suggest different outcomes. Conversely, a later acquisition and a difference in the input received, which was probably not enough for the formation of syntactic

constraints in the L2 linguistic system, might permit the speaker to perseverate in applying the L1 structures to the L2, regardless of possible structural errors.

## 5. Conclusions

The cross-linguistic priming experiment described in Chapter 2 and in Chapter 3 aimed at investigating the structural processing and representations of the dative alternation between English and Italian in English-Italian Heritage Bilinguals and English Late Learners of Italian as L2. We employed a Spoken Picture Description Task, in which participants had to read out loud an English sentence and subsequently describe orally a picture in Italian using a verb hint as the main verb of the target sentence. We chose an oral modality because heritage speakers might have not received written input in their heritage language, while L2ers have a higher chance to have received both written and oral inputs in Italian, as they have been learning Italian in a formal setting (see the Participant sections in 2.3.1. and 3.3.1. for more biographic details). The choice of a cross-linguistic priming task is justified by a large body of empirical evidence, which demonstrated that priming – and structural priming in particular – can be a useful methodology to investigate the representations and processes of language in the bilingual mind.

In the current priming study, we found a difference in the representation and processing of dative structures between the two groups of bilingual speakers. While both groups produced an overall high proportion of Prepositional Object (PO) dative structures, and with higher rates in highly proficient heritage speakers, the tendency in their production of non-target utterances opens some interesting issues. In fact, Heritage Italian Speakers was found to produce more shifted POs (NP-V-PP-NP) and dative clitics (NP-PP-V-NP) after DO and PO primes at lower levels of proficiency, while L2 Italian learners was found to produce more illicit DOs (NP-V-NP-NP) after DO primes at lower levels of proficiency and after PO primes at higher levels of proficiency. Furthermore, the trend in HSs decreased as proficiency increased, but it remained stationary in L2ers, suggesting that this latter group produced illicit DOs all the time irrespective of proficiency in Italian.

These contrasting tendencies could be explained in terms of implicit learning (Chang et al., 2006). Chang et al. (2006) argued that structural priming is a form of implicit learning informed by the incremental predictions made during comprehension. If speakers' inferences about forthcoming linguistic elements reveal to be erroneous, the learners adapt and replace the wrong information with the new one (Chang et al., 2003). As such, we could hypothesize that our HSs and L2ers faced these implicit computations when involved in the priming task, and that the status of and proficiency in

their languages (L1 Italian > L2 English in HSs vs. L1 English > L2 Italian in L2ers) concurred in informing and adjusting those processes needed for the syntactic realizations of the target utterances. Hence, experimental evidence on this study further confirmed our predictions regarding the higher conceptual nature of the priming effect in English-Italian heritage speakers in comparison to the lower syntactic nature of priming in English late bilinguals of Italian.

To conclude, not only acquisition, proficiency, and contextual factors have proved to be fundamental for the outcome of two or more languages, but also play a crucial role in the development of the processing mechanisms shared across languages (Scontras, Fuchs, & Polinsky, 2015).

Further studies should investigate whether these differences in processing can be found in native speakers of Italian who have been immersed in an English-speaking context for a considerable amount of time, and thus influenced by language attrition, compared to native Italian speakers who are immersed in Italian contexts. Leone (in press) is currently collecting data from the two groups of bilinguals just mentioned. Our future plans are to compare the priming productions of HSs and L2 Italian immersed in English-speaking contexts (reported in the present thesis) to those of Italian late learner of English who have been living immersed in an English-speaking environment for more than 5 years, and Italian late learners of English who are currently living in Italy. These comparisons could help us in shedding some light on the role of internal and external factors of bilingual language processing by employing the cross-linguistic structural priming paradigm to investigate the sensitive points in language representations across languages (Bolger & Zapata, 2011).

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## **Appendix A**

### **List A and B**

Two counterbalanced lists of prime sentences for each condition (dative, transitive, locative, and unaccusative).

#### **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

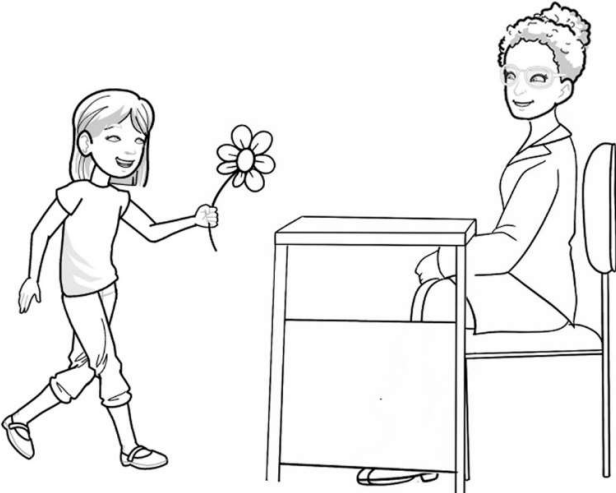
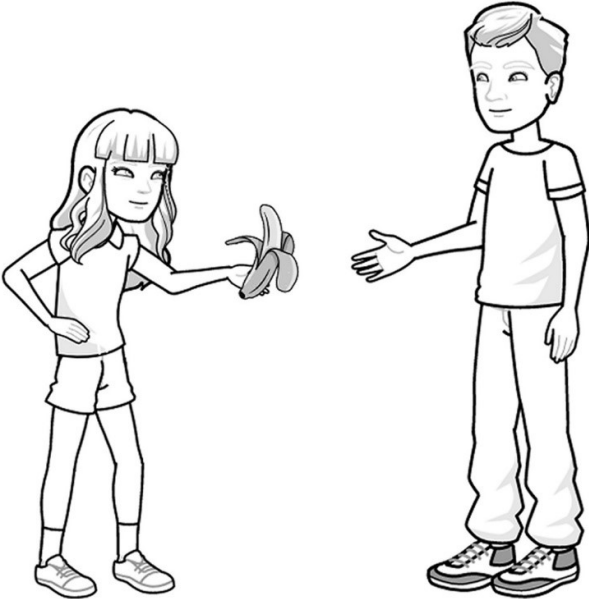
16a – b. The grass is burning



**Appendix B**

**Target pictures**

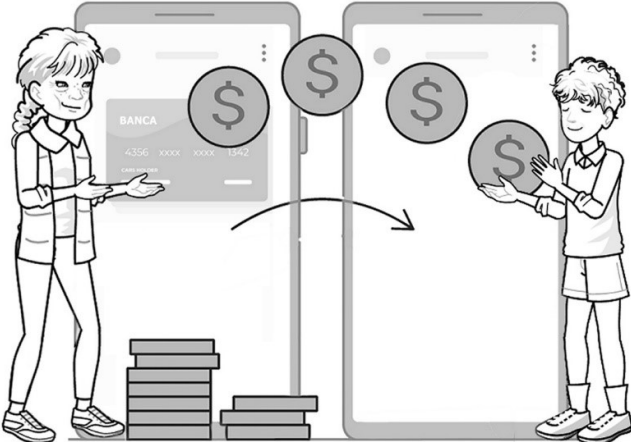
**Verb Hint:** dare



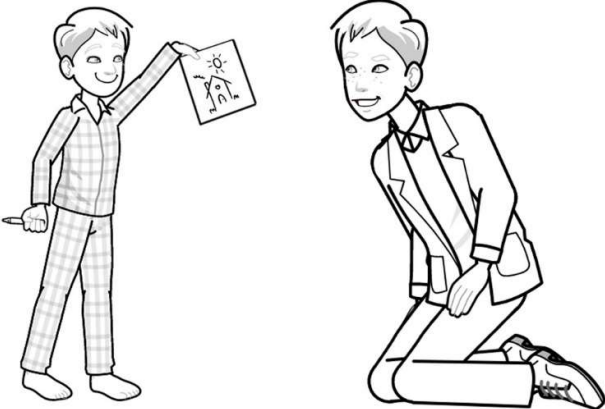
**Verb Hint:** lanciare



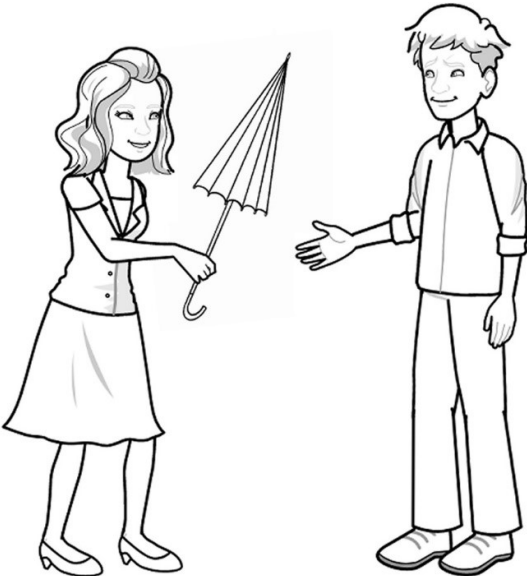
**Verb Hint:** mandare



**Verb Hint:** dare



**Verb Hint:** offrire



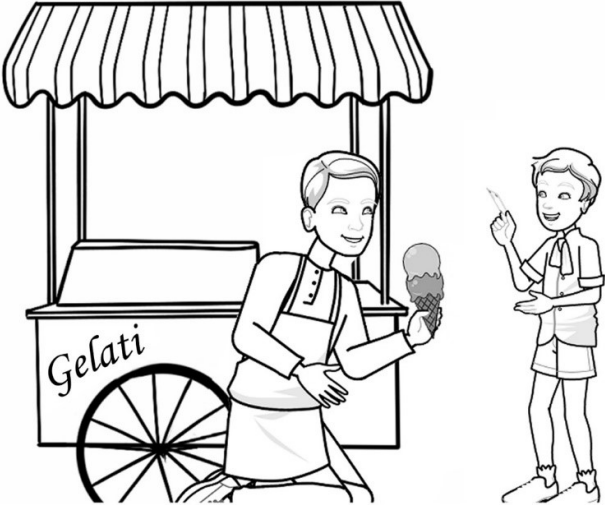
**Verb Hint:** passare



**Verb Hint:** servire



Verb Hint: dare





## 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](mailto: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](mailto: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](mailto:giulia.bencini@unive.it) and/or the co-supervisor at [michaelamae.vann@unive.it](mailto:michaelamae.vann@unive.it) and/or the Data Protection Officer directly at [dpo@unive.it](mailto: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](mailto: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](mailto:commissione.etica@unive.it). If you have any questions regarding the study or the task, please send an email to [842211@stud.unive.it](mailto:842211@stud.unive.it), [888224@stud.unive.it](mailto:888224@stud.unive.it) or [giulia.bencini@unive.it](mailto: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.