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Dialect Recognition via Lexical Processing: Is It a Viable Litmus Test?

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Abstract: For decades, linguists have been working to formulate an objective means of distinguishing dialects from languages, but dialect recognition has largely remained a subjective enterprise. Only recently have some studies proposed a processing-based psycholinguistic approach toward dialect recognition. These studies argued that dialect words are stored as a co-dependent representation, not as an independent representation of the words of bilingual speakers. Based on these studies, we investigated the lexical selection and processing mechanisms of bilingual and bidialectal speakers of two understudied languages, Oromo and Amharic, using the picture–word interference paradigm. We found independent lexical representations for both the bilingual and the bidialectal groups, which implies the involvement of the same cognitive mechanisms in both language and dialect processing. Thus, we argue that bidialectal speakers have flexible lexical representation and selection mechanisms that are dependent on the speakers' previous language experience. Here, we propose a dynamic lexical selection model that accommodates diverse dialect ecologies.

Keywords: bidialectal speakers; dialect recognition; lexical selection; lexical representation

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1. Introduction

The question who should be considered a bilingual is difficult to answer, mainly because there is no objective means of distinguishing dialects from languages (Hazen 2001; Kirk et al. 2022; Labov 1998; Macnamara 1967; Melinger 2018, 2021). Identifying dialects from languages has remained a subjective enterprise. In most cases, whether certain varieties are dialects or languages is adjudicated based on non-linguistic parameters. For instance, the clusters of Gurage varieties that are spoken in the southwest of Ethiopia are considered 'languages', although most speakers of the varieties effectively communicate (see Feleke et al. 2020; Feleke 2021; Gutt 1980; Hetzron 1972; Menuta 2015). Similarly, Norwegian, Swedish, and Danish are mutually intelligible, but they are referred to as 'Scandinavian languages' (Gooskens 2007; Gooskens and Swarte 2017). Conversely, mutually unintelligible Chinese varieties are called 'Chinese dialects' (Tang and Van Heuven 2009, 2015). In most cases, differentiating between dialects and languages is complicated by the interference of political and sociocultural factors. A reliable means of controlling these factors has not been discovered.

In psycholinguistics, the difference or similarity between languages and dialects is barely discussed, and the ramification of this neglect has been extremely underestimated. In most studies, bidialectals or speakers of two or more dialects are considered monolinguals (Fernández and Cairns 2010; Luk 2015; Rowe and Grohmann 2013), with the assumption being that bidialectal speakers have linguistic and cognitive architectures that pattern with those of monolingual speakers. Based on this presumption, in most studies on bilingualism, bidialectal speakers serve as a monolingual control group—a normative placebo (Luk 2015; Rothman et al. 2023). However, contrary to the general perception in psycholinguistics, studies indicate that bidialectal speakers are more like bilinguals than monolinguals in terms of language representation and processing (Antoniou et al. 2016; Kubota et al. 2023;

Lundquist and Vangsnes 2018; Poarch et al. 2019; Vorwerg et al. 2019). The resemblance between bilingual and bidialectal speakers has serious repercussions for studies that compare bilinguals to the control monolinguals. If bidialectal and bilingual speakers have the same representation and processing architecture, the comparison between bilinguals and the control bidialectal/monolingual speakers cannot be justified. Presumably, due to such unwarranted comparisons, most theories of second-language acquisition, language processing and the cognitive advantages of bilingualism have remained debatable subjects (Antoniou 2019; De Bruin et al. 2015; Gunnerud et al. 2020).

There have recently been promising attempts to exploit methods of psycholinguistics to resolve the enduring challenges of differentiating between dialects and languages. For example, Melinger (2018, 2021) proposed a functional processing-based approach toward dialect recognition that compares bidialectal lexical processing to bilingual lexical processing. Melinger's proposal was an extension of previous studies that deployed the picture–word interference paradigm to investigate bilingual lexical representations (e.g., Costa et al. 1999; Costa and Caramazza 1999). These studies reported a facilitation effect of translation equivalents, and based on the facilitation effect, they argued that bilingual speakers have a language-specific lexical representation. Using the same analogy and method, Melinger (2018) investigated bidialectal speakers of Scots and Scottish Standard English and argued that the lexical selection of bidialectal speakers reflects a co-dependent lexical representation, unlike the lexical selection of bilingual speakers, which reflects an independent lexical representation. In a subsequent study, Melinger (2021) investigated bidialectal speakers of British and American English and replicated the co-dependent lexical representation of bidialectal speakers. Moreover, Declerck and Kirk (2023) recently employed the voluntary language-switching paradigm and reported a similar result. They investigated bidialectal speakers of Dundonian Scots and Scottish Standard English and found a symmetrical switch cost between the Dundonian Scots and the Scottish Standard English. However, they could not find the mixing benefit previously observed in similar bilingual studies. Therefore, they concluded that there is a difference between bilingual and bidialectal language control.

The processing-based proposal is an important recent development. If it is consistently confirmed in diverse contexts that bidialectal speakers are different from bilingual speakers in terms of lexical representation, this difference can be utilized to distinguish dialects from languages. However, the processing-based proposal has not been widely recognized. For example, Dylman and Barry (2018) recently studied bilingual speakers of various languages as well as monolingual speakers of English using the picture–word interference paradigm and found an independent representation of synonym words, contrasting the co-dependent proposal. They argued that there is a communality between bidialectal and bilingual speakers in terms of lexical selection and representation. A similar argument was made by Kirk et al. (2022). They studied Dundonian and Scottish Standard English as well as Öcher Platt and Standard German bidialectal speakers using the language-switching task. They found a strong similarity between the lexical selection mechanisms of the bidialectal groups and control bilinguals. In both bidialectal groups, they found an asymmetrical switching cost with longer naming latencies when switching back into the local dialects. Analogously, Vorwerg et al. (2019) investigated Swiss German and Standard German bidialectal speakers as well as Swiss German and Tamil bilingual speakers using language-switching experiments. They found a similar pattern of switch cost in the bilingual and the bidialectal groups. Evidence of the independent representation of dialects also comes from ERP studies. For example, Kubota et al. (2023) recently investigated number and gender agreement processing by native Northern Norwegian dialect speakers and by the speakers of other Norwegian dialects who had exposure to the Northern dialect. Their ERP results showed that bidialectalism entails the representation of distinct mental grammars for each dialect.

Evidently, there are contradictory views about the lexical representation of bidialectal speakers. To illustrate whether bidialectal speakers are different from bilingual speakers in terms of language representation, first and foremost, these discrepancies need to be addressed. Studies indicate that the discrepancies usually originate from specific properties of the studied dialects and the ecosystem in which the dialects are acquired. Different linguistic properties influence cognitive processing differentially (see Blasi et al. 2022; Kutlu and Hayes-Harb 2023), but ironically, most models of language processing are drawn from a handful of extremely privileged languages of the Western world, primarily from English (Blasi et al. 2022; Kidd and Garcia 2022; Kutlu and Hayes-Harb 2023; McCrink and Shaki 2016; Vaid 2022). Dialect representation also has a strong link with the contexts in which the dialects are acquired or used. Some dialect contexts offer equal conversation opportunity for every dialect. These types of contexts exert a stronger influence on cognitive processing than contexts in which just one of the dialects is frequently used (Alrwaita 2021; Alrwaita et al. 2022, 2023a, 2023b; Green and Abutalebi 2013).

Therefore, there are ecological and linguistic biases that have a wide range of ramifications for the current models of lexical representation and their application. In the present study, we aim to fill this lacuna by investigating the speakers of two understudied Afro-Asiatic languages: Oromo and Amharic. The two languages are spoken in East Africa, in Ethiopia. By investigating these languages, we aim to achieve two general objectives. First, we re-examine the models of lexical selection and representation of bilingual and bidialectal speakers in a new language ecology. Second, we assess the efficacy of the processing-based approach toward dialect recognition by comparing the bilingual lexical processing architecture to that of the bidialectal speakers. Hence, our study addresses both theoretical and practical concerns. It examines the arguments about the models of lexical representation of bilingual and bidialectal speakers. Concurrently, it evaluates the reliability of the processing-based approach toward dialect recognition.

The Ethiopian language ecology is an ideal testing ground for addressing these objectives. Oromo and Amharic have distinctive linguistic properties that are uncommon to most Indo-European languages; for example, converbs and the non-concatenative morphology (Bisang 2006; Ferguson 1970; Tosco 2000). Moreover, the Oromo dialect context is a unique type of diglossia. The Western Oromo dialect dominates the school context, and the local dialects are actively used in the outside school contexts. However, unlike most diglossic contexts, there is no stereotyping, social status or prestige attached to any of the dialects (Walga 2021). The diglossic context allows the regular use of both the Western (school) and the local dialects. As previously noted, this kind of context exerts a stronger influence on cognitive processing than a context in which only one of the dialects is frequently used. In addition, Oromo bidialectal speakers have access to a second language (English), and studies indicate that regular switches between two languages attenuate the overall cognitive processing (Bialystok 2007; Blom et al. 2017; Kroll and Bialystok 2013).

1.1. Bilingual Lexical Selection

Previous studies indicate that an attempt to select a word results in the activation of multiple other lexical candidates (see Anders et al. 2015; Costa et al. 1999; Finkbeiner et al. 2006; Navarrete et al. 2014; Peterson and Savoy 1998). For example, in the picture–word interference paradigm, if a picture co-occurs with a categorically related distractor (e.g., picture = DOG, distractor = cat), the picture naming will be slower than if the picture co-occurs with unrelated distractor (e.g., picture = DOG, distractor = window). This phenomenon has been termed the semantic interference effect (see Friesen et al. 2016; Glaser and Düngelhoff 1984; Schriefers et al. 1990). It has been argued that the semantic interference effect arises from the distractor word converging with the activation of a semantic alternative to the target picture. Previously, the semantic interference effect was observed in the distractor words drawn from the target languages (e.g., picture = ORANGE, distractor = lemon) and from the non-target languages (e.g., picture = CAT, distractor = *perra* 'dog in Spanish'). The sematic interference effect is usually larger when the distractor words are semantically related to the target (e.g., picture = FISH, distractor = whale)—semantic distance effect (see Aristei and Rahman 2013; Rose et al. 2019).

Unlike the same-category words, a competition between translation equivalents (e.g., picture = DOG, distractor = *perra* 'dog in Spanish') results in facilitation. This phenomenon is termed the translation equivalent facilitation effect. Costa et al. (1999) and Costa and Caramazza (1999) interpreted this effect as an indication of a language-specific lexical selection mechanism. In other words, the facilitation effect of the translation equivalents reflects the fact that the lexical selection mechanism only inspects the lexicon of the target language. There are many similar proposals. For example, La Heij (2005) proposed the complex access- simple selection model. The model predicts that lexical representation in the non-target language may not be activated at all. In other words, only the lexical representation of the target language is activated.

Besides the language-specific lexical selection model, there are other language non-specific lexical selection models (see De Bot 1992; De Bot and Schreuder 1993; Green 1986; Poulisse and Bongaerts 1994). The language non-specific models argue that both languages of bilingual speakers are active during speech productions, i.e., the flow of activation is not restricted to just one language. For example, according to the Reactive Inhibition Model (Green 1998), the representations of both languages are activated, but the representations associated with the unintended language node are reactively inhibited. This inhibition prevents the non-target language from being considered or from causing substantial interference. This model predicts that a lexicon external device inhabits the activation of the lexical items of the languages not in use, ensuring that their activation levels are lower than the lexical nodes in use. De Bot (2004) proposed a multilingual processing model, which predicts that lexical representation of both the target and the non-target languages are activated, but the activation level of the lexical representation of the target language may be increased. Furthermore, Finkbeiner et al. (2006) argued that lexical representations of both languages are activated, but speakers simply select the most activated word irrespective of the language. Some also argued that lexical selection does not necessarily involve competition. For example, Mahon et al. (2007) proposed the Response Exclusion Hypothesis: the idea that lexical selection is non-competitive and the observed semantic interference effect is a post-lexical process that excludes distractor words.

1.2. Bidialectal Lexical Selection

Studies on the lexical representation of bidialectal speakers are scant. This is partly because there has been a perception that bidialectalism does not exist as an independent entity. For instance, Hazen (2001) argued that there is no a true bidialectal speaker, i.e., humans cannot maintain two dialects in the same way they can maintain two languages. Hazen (2001) contended that a true bidialectalism entails a stable native-like mastery of two distinct dialects as well as the ability to switch between two dialects without mixing the features from the two systems of the dialects. In other words, for bidialectalism to exist, dialects need to be represented independently and processed like languages. Similarly, Labov (1998) argued that dialects are more co-dependent than languages; hence, since two dialects cannot have separate systems, they have co-dependent representations. A similar view was held by many others (e.g., Hudson 1996; Wei 2000). These arguments suggest that the same representation is shared by the vocabulary of bidialectal speakers. This in turn implies that the set of rules and representations that belongs to one dialect might not necessarily exist in another dialect (see Melinger 2018). This means that the lexical representation of bidialectal speakers cannot be inhibited or ignored in a manner that is analogous to the representation of bilingual speakers.

Melinger (2018) tested these assumptions by investigating whether the lexical selection of Scots and the Scottish Standard English bidialectal speakers is different from that of bilingual speakers using the picture–word interference paradigm. The study predicted a co-dependent representation of dialect words as opposed to the independent representation of words of bilingual speakers. Figure 1 illustrates the hypothesized representations of dialect words. Melinger (2018) predicted that bidialectal speakers have the co-dependent representation depicted in the right frame, not the independent representation in the left frame. According to Melinger, if the representation of dialect words is independent, like the representation of the words of bilinguals, dialect words must be independently organized via their association with the dialect membership tag (D1 and D2 in the left frame). In the independent representation, each dialect has its own basket, and only the representation of the target dialect is activated without significant interference from the representation of the non-target dialect. The selection of the target word is achieved via the dialect membership tag. However, if the representation of dialect words is co-dependent, words from both dialects must be accommodated by a single representation (the right frame in Figure 1). The latter prediction assumes that dialect equivalents are distinguished by their conceptual-level features, not by the independent representations. According to Melinger (2018), the conceptual features are not able to inhibit interference between dialect equivalents since there is no perfect matching between the features. Hence, the lexical organization on the left (see Figure 1) accounts for the facilitation effect of dialect equivalents, while the organization on the right does not. Data from the Scots and the Standard Scottish English bidialectal speakers confirmed the co-dependent representation; hence, Melinger (2018) concluded that the lexical representation of bidialectal speakers is different from the representation of the words of bilingual speakers.

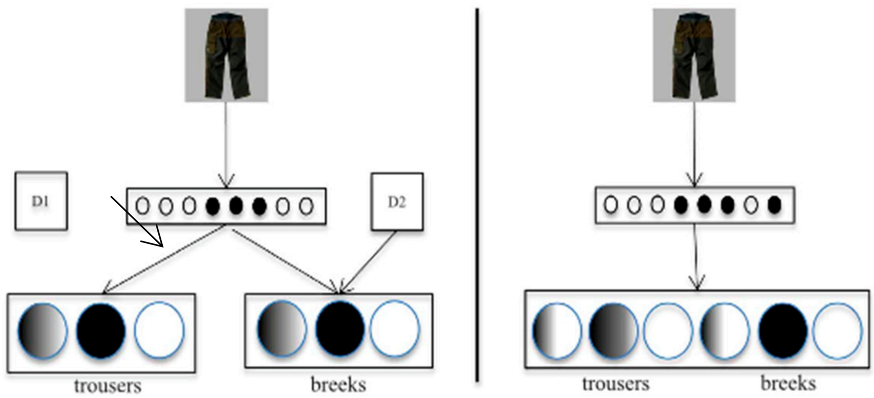

Figure 1. Lexical organization of bidialectal speakers (from Melinger 2018), independent (**left frame**) and co-dependent (**right frame**). D1 and D2 in the squares stand for the dialect tag for native and nonnative dialects, respectively. The top and bottom rectangles containing circles stand for the conceptual and lexical representations, respectively. The circles within the bottom rectangles represent hypothetical lexical items. The arrows show the top-to-bottom lexical selection hierarchy.

In a subsequent study, Melinger (2021) investigated British and American English bidialectal speakers and compared them with monolingual as well as bilingual speakers, again using the picture–word interference paradigm. Once more, the study confirmed the co-dependent representation of dialect words. Based on this, Melinger (2021) argued that the lexical selection mechanisms of bidialectal speakers are different from the lexical selection mechanisms of bilingual speakers. According to Melinger, translation equivalents contain overlapping conceptual features. Hence, a single conceptual representation is strengthened, leading to a strong one-to-one lexical competition. However, dialect words encode various context-related conceptual features, i.e., dialect equivalents will not have perfectly overlapping conceptual features since they are susceptible to diverse contextual interpretations. As a result, the activation from dialect equivalents can spread beyond the standard semantic space. The argument that supports the co-dependent dialect representation also comes from studies previously conducted using the voluntary language-switching paradigm. For example, Declerck and Kirk (2023) investigated bidialectal speakers of Dundonian Scots and Scottish Standard English and found a symmetrical switch cost between the Dundonian Scots and the Scottish Standard English. However, they did not find the mixing benefit previously observed in bilingual voluntary switching. Hence, they concluded that there is a difference between bilingual and bidialectal language control.

Some recent language-switching studies have challenged the co-dependent dialect representation proposal. For example, as also noted in Section 1, Kirk et al. (2022) studied Standard Scottish English and Orcadian dialect speakers and reported a switch cost asymmetry with longer naming latency when switching back from the Standard Scottish English into the dominant local Orcadian dialect. According to Kirk and colleagues, the observed picture-naming asymmetry mirrors the observation from bilingual picture naming. Based on these findings, they argued that the mechanisms of bidialectal lexical access are similar to those found in bilinguals. Similarly, Vorwerg et al. (2019) investigated Swiss German and Standard German bidialectal speakers as well as Swiss German and Tamil bilingual speakers and found a similar pattern of switch costs in the bilingual and the bidialectal groups; in both groups, the switch costs were asymmetrical, favoring switching into the socio-linguistically preferred dialect (Swiss German) in the bidialectal group and the slightly less dominant language (Tamil) in the bilingual group. The study concluded that bidialectal switching is affected by similar mechanism of language control to bilingual switching. There are also ERP studies that corroborate the independent representation of dialects. For instance, Kubota et al. (2023) studied the number and gender agreement processing by native Northern Norwegian dialect speakers as well as by the speakers of other Norwegian dialects who had exposure to the Northern dialect. Their ERP results showed that bidialectal speakers have distinct representations of the grammars for each dialect.

Several other studies previously argued that the control mechanisms that govern the use of dialects are analogous to those described for bilinguals (e.g., Antoniou et al. 2016; Blom et al. 2017; Dylman and Barry 2018; Ross and Melinger 2017). The most relevant one is Dylman and Barry (2018), which recently investigated the lexical representation of bilingual and monolingual speakers using the picture–word interference paradigm and reported the facilitation effects of both translation equivalents and synonym words. Dylman and Barry (2018) argued that the facilitation effect observed during lexical selection is not a typical characteristic of bilingual lexical representation; rather, it is the integral behavior of all types of lexical-processing mechanisms. Their argument supports the dialect-specific lexical representation of bidialectal speakers. According to Dylman and Barry (2018), the inter-lexical facilitation effect is asymmetrical, i.e., L1-to-L2 facilitation is stronger than L2-to-L1 facilitation. In other words, the inter-lexical facilitation is always stronger for L1, which has the stronger representation. This argument contradicts Kroll and Stewart (1994), who previously argued that L2-to-L1 facilitation is stronger because L2-to-L1 translation is accomplished on just a lexical basis, as opposed to the L1-to-L2 translation, which involves conceptual mediation. The process of conceptual mediation requires additional processing time. Kroll and Stewart (1994) further argued that the L2 vocabulary is smaller in size than the L1 vocabulary and accessing words from such a diminished vocabulary size incurs an extra processing cost. Furthermore, according to Kroll and Stewart (1994), the stronger L2-to-L1 facilitation link patterns with the course of second-language development. Second-language learners acquire lexical links between L1 and L2 before they can conceptually mediate L2. Therefore, they quickly and accurately translate from L2 to L1 before they do so from L1 to L2.

As we pointed out in Section 1, the discrepancies regarding the lexical representation of bidialectal speakers can be associated with the dialect ecologies in which the dialects are acquired. Since every dialect context has its own unique characteristics, bidialectal speakers may have diverse lexical representation and processing architectures. For example, Melinger (2018, 2021) investigated bidialectal speakers of English who did not have exposure to any other languages. Conversely, most bidialectal communities are bilinguals; they speak one or more additional languages. The bilingual experience of switching between two languages can enhance the supervision of a parallel activation of dialect words. Furthermore, the frequency and consistency of use of each dialect can affect the dynamics of lexical selection and representation. It could be that bidialectal speakers who use both dialects on a daily basis are better at inhibiting competing lexical activations than those who less frequently use each of the dialects (see Antoniou et al. 2016; Kalia et al. 2014). In connection with this, Kirk et al. (2022) and Vorwerg et al. (2019) illustrated that bidialectal lexical access matches bilingual lexical access if the dialects are used in distinct and non-overlapping social contexts. To add more, Lundquist and Vangsnes (2018) recently argued that bidialectal speakers show different processing profiles, based on their language experiences. They identified various types of bidialectal speakers based on the speakers' processing profiles. To sum up, the above studies show that a reliable proposal about the lexical representation of bidialectal speakers should take the language context into account. There is no one-size-fits-all answer; bidialectal speakers adopt different lexical selection and representation mechanisms based on their linguistic profiles and the overall dynamics in the dialect ecology.

2. The Present Study

In the present study, we aim to achieve two general objectives. First, we investigate the lexical selection and representation mechanisms of bilingual and bidialectal speakers in a language context that was not previously investigated. Second, we examine the efficacy of the processing-based approach toward dialect recognition by investigating bilingual and bidialectal speakers of understudied languages. Specifically, we aim to (1) re-examine the language-specific model of bilingual lexical selection that has been advocated for the last several decades, essentially by Costa and Caramazza (1999) and Costa et al. (1999); (2) determine whether bidialectal lexical representation mirrors the independent representation suggested by Dylman and Barry (2018), Kirk et al. (2022) and Kubota et al. (2023) or the co-dependent representation proposed by Melinger (2018, 2021) and Vorwerg et al. (2019); (3) inspect the asymmetrical inter-lexical facilitation link reported by Dylman and Barry (2018); and finally, (4) determine the extent to which bidialectal speakers are distinguished from bilingual speakers based on their lexical selection and processing architectures. To address these objectives, we carry out two successive picture–word interference experiments. In the first experiment, we investigate the lexical representation of bilingual speakers. In the second experiment, we examine the lexical representation of the bidialectal speakers. Based on the results obtained from the two experiments, we aim to answer the following questions. (1) Is bilingual lexical selection language-specific or language non-specific? (2) Is bidialectal lexical selection co-dependent or independent? (3) Is the inter-lexical facilitation during lexical selection symmetrical or asymmetrical? (4) In general, can dialects be distinguished from languages via lexical processing?

Regarding the bilingual lexical selection, we predict a facilitation effect of the translation equivalents, following Costa et al. (1999), Costa and Caramazza (1999) and other recent studies (e.g., Finkbeiner et al. 2006; Santesteban and Schwieter 2020). These studies proposed a language-specific lexical selection of bilingual speakers. Pertaining to the lexical selection and representation of the bidialectal speakers, we predict an interference effect of dialect equivalents, based on Declerck and Kirk (2023) and Melinger (2018, 2021). As to the direction of the inter-lexical facilitation link, we expect an asymmetrical facilitation with either stronger L1-to-L2 facilitation based on Dylman and Barry (2018) or L2-to-L1 facilitation based on Kroll and Stewart (1994). Lastly, following Melinger (2018, 2021), we predict that bidialectal and bilingual speakers show clear differences in their lexical representation and selection mechanisms.

By addressing these questions, we intend to make both theoretical and methodological contributions. First, by tapping into the arguments concerning the lexical representations of bilingual and bidialectal speakers, we strive to understand how bilinguals store and retrieve words from two or more languages and how they manage competitions among words of closely related varieties. Moreover, we assess the reliability of the current lexical representation models in the context of understudied languages. We also reflect on the long-standing methodological debate in psycholinguistics pertaining to the monolingual control normativity. In recent studies on bilingualism, the rationale of comparing target bilinguals to a monolingual control group has been challenged (see Auer 2007; Kirk et al. 2022; Luk 2015; Minnaard and Dembeck 2014; Rothman et al. 2023) based on emerging evidence, which shows that a true homogenous monolingual control does not exist. If we manage to objectively distinguish dialects from languages, we will be able to make a positive contribution to the efforts being made to resolve this argument.

We previously argued that cognitive processing can be differentially influenced by languages that have different linguistic properties, and we further indicated that cognitive processing has a strong connection with the language ecology in which the languages or dialects are acquired. In this respect, our study introduces languages and language contexts that are different from those that were previously investigated. Our study investigates Oromo and Amharic—Afro-Asiatic languages spoken in Ethiopia. Amharic belongs to the Semitic language family (Feleke et al. 2020; Hetzron 1972, 1977). It is the lingua franca of the country (Ethiopia) and the dominant language of the media, science, arts, and philosophy (Getachew and Derib 2006; Meyer 2006). Being the working language of the Federal Government of Ethiopia, the standard Amharic is taught as a second language in most schools across the country. As a native language, Amharic is spoken in the Amhara Regional State of Ethiopia and in major cities and towns across the country (Getachew and Derib 2006; Meyer 2006). Amharic has several dialects (see Hayward and Hayward 1992; Marcos 1973; Mengistu 2018). The standard Amharic, which is the target of our study, is spoken in big cities across the country. It is used as a medium of instruction in the cities and in two administrative regions or states—the Amhara Regional State and the Southern Nations, Nationalities and Peoples' Regional State (Getachew and Derib 2006; Mengistu 2018). There are several non-standard Amharic dialects. These dialects are spoken in various rural districts of the Amhara Regional State (Marcos 1973; Mengistu 2018). There are no empirical studies on the power dynamics and stereotyping associated with the Amharic dialects. However, the non-standard dialects are often associated with rural lifestyles. The standard urban dialect symbolizes the modern lifestyle of literate communities (Mengistu 2018). Only a few studies previously documented the geographical distribution of Amharic dialects (e.g., Marcos 1973; Mengistu 2018), and they mainly focused on the lexical and phonological variations among the dialects.

Oromo is a Lowland East Cushitic language. It is spoken in the Oromia Regional State—one of the states in Ethiopia. It serves as a working language of the region and as a medium of instruction in most elementary schools across the region (Walga 2021). Oromo has several dialects (see Clamons 1992, 1993; Feleke and Lohndal 2023; Kebede 2009; Negesse 2015). Our study targets only the Eastern and the Western Oromo dialects. As native dialects, these two dialects are spoken at geographically distant locations—the Eastern dialect in the eastern part of the country and the Western dialect in the western part. None of the Oromo dialects is officially recognized as a standard dialect. However, for historical reasons, the Western dialect is taught in schools across the Oromia region (Tegegne 2015). It also serves as a medium of instruction in elementary schools across the region. Hence, native speakers of the Eastern Oromo dialect receive exposure to the Western dialect via schooling and the media, starting from the early elementary grades. Little is known about the sociolinguistic situations of the Oromo dialects. Given that there is de jure no standard dialect of Oromo, we assume that the stereotyping associated with the status of the dialects is minimal.

Since the native speakers of the Eastern Oromo dialect have extensive exposure to the Western dialect starting from the early elementary grades—via school as well as media—they become bidialectal speakers at approximately the age of 10 (see Feleke 2024). The dialect learning is asymmetrical, i.e., native speakers of the Eastern dialect have access to the Western dialect, but native speakers of the Western dialect do not have significant exposure to the Eastern dialect. The speakers of both Oromo dialects are exposed to Amharic (the standard one) at grade five—at approximately the age of 11 (Benson et al. 2012). Since Amharic is the language of the Federal Government of Ethiopia, it is a de facto second language for most speakers of both the Eastern and the Western Oromo dialects. However, due to the lack of strong regulatory mechanisms that reinforce Amharic learning, and partly due to the negative attitude associated with Amharic (Alemu and Tekleselassie 2006), there is a significant disparity among Oromo speakers when it comes to their Amharic fluency. The fluency scale varies from non-speakers to nativelike speakers.

In the current study, we investigate bidialectal speakers of the Eastern and the Western Oromo dialects along with the Oromo–Amharic bilingual speakers. The target bidialectal speakers had insignificant exposure to the second language—Amharic. In other words, they did not attend Amharic classes starting from elementary school. The target Oromo–Amharic bilinguals are native speakers of the Western Oromo dialect, and they learned Amharic as a second language via classroom instruction; hence, they are sequential bilinguals. To avoid the potential impact of bidialectalism, native speakers of the non-Western Oromo dialects were not included in the bilingual category.

3. The Experiments

We carried out two successive picture–word interference experiments to answer the questions we outlined in Section 2. In both experiments, we mimicked the methodology of Melinger (2018). The participants were first and second year students at Haramaya University in Ethiopia. We determined our sample size based on the number of participants previously studied by Melinger (2018). Each experiment took approximately 45 min, including a picture familiarization phase, a practice session, and the experiment.

3.1. Experiment I: Bilingual Speakers of Oromo and Amharic

3.1.1. The Participants

Twenty-four (24) Oromo–Amharic bilingual speakers (F = 7, M = 17) took part in the experiment. The participants averaged 21.5 years of age (R = 19–24). They had no exposure to any other Oromo dialects except the Western Oromo dialect, which is their native dialect. They learned Amharic starting from elementary school—starting at grade five. Via their responses to a background questionnaire, the participants confirmed (1) they understand most lexical correspondences between Oromo and Amharic; (2) they can comprehend long and complex Amharic sentences; (3) they are able to interpret Amharic written texts, and (4) they have no difficulty in reading and writing in Amharic. The participants had exposure to English starting from early elementary school—grade one. English was also their medium of instruction at the secondary and tertiary levels.

3.1.2. The Materials

Forty-eight (48) pictures with noncognate labels in Oromo and Amharic were selected from various electronic sources. We sized the pictures into 600 by 600 pixels. Before the experiment, the pictures, along with superimposed Amharic and Oromo labels, were evaluated by an additional 15 Oromo–Amharic bilingual speakers based on 5 pts Likert scales, where 1 means that the label on the picture does not represent the picture and 5 means that the label represents the picture. Then, 24 pictures that received $\geq$3.5 average rating scores were selected for the experiment. The average rating score of the Oromo labels was 4.28 (SD = 0.373) and the average rating score of the Amharic labels was 4.77 (SD = 0.201). Then, each picture was paired with written distractors. The label of the target picture and the written distractor always had a different onset. All the distractors were noncognate words, and they were controlled for both word length (measured in terms of the number of syllables) and frequency. The frequencies of the Amharic labels, the Oromo labels and the distractor words were obtained from SKELL (Kilgarriff et al. 2015). The length of the Oromo labels (M = 2.32) and the Amharic labels (M = 2.92) was not significantly different, *t*-test, $t(46) = 1.680$, $p = 0.106$. Moreover, the frequency of the Oromo labels (M = 37.49) was not significantly different from the frequency of the Amharic labels (M = 33.40), $t(46) = 0.223$, $p = 0.826$. The length of the Oromo labels (M = 2.32) was not significantly different from the length of the Oromo distractors (M = 2.44), $t(23) = -0.664$, $p = 0.524$. Furthermore, the frequency of the Oromo labels (M = 37.49) was not significantly different from the frequency of the Oromo distractors (M = 29.85), t (23) = 0.455, p = 0.653. In addition, there was no significant difference between the length of the Amharic labels (M = 1.92) and the length of the Amharic distractors (M = 2.20), t (23) = −1.319, p = 0.200, and there was no significant difference between the frequency of the Amharic labels (M = 33.39) and the frequency of the Amharic distractors (M = 33.03), t (23) = 0.030, p = 0.997. A complete list of the target and distractor words is provided in Appendix A.1.

Then, the Oromo and Amharic distractor words were superimposed on the pictures. Oromo and Amharic use different writing systems—Latin and Ge'ez, respectively. Therefore, the Oromo distractor words were written in the Latin script, and they were always written in capital letters. The Amharic distractor words were written in the Ge'ez script. The distractors of both languages were written in 28 font size in Times New Roman. In separate blocks of trials, the participants named the pictures in their L1 or L2. Within each block, there were four distractor words for each picture: the picture's name in L1; an unrelated control word in L1; the picture's name in L2; and an unrelated control word in L2. Hence, each picture appeared four times in each language block, and it appeared eight times in the whole experiment. For each naming language, we compared the effects of distractors that are identical to the target name—same condition (e.g., picture = *ADURREE* 'cat in Oromo', distractor = *adurree* 'cat in Oromo' and picture = *DƗMMƏT* 'cat in Amharic', distractor = *dɨmmət* 'cat in Amharic') and those that were translations of the target name—translation equivalent condition (e.g., picture = *ADURREE* 'cat in Oromo', distractor = *dɨmmət* 'cat in Amharic' and picture = *DƗMMƏT* 'cat in Amharic', distractor = *adurree* 'cat in Oromo'), both assessed against the unrelated control words: an unrelated control word in L1—within-language control (e.g., picture = *ADURREE* 'cat in Oromo', distractor = *mana* 'house in Oromo' and picture = *MANA* 'house in Oromo', distractor = *adurreee* 'cat in Oromo') as well as an unrelated word in L2—cross-language control (e.g., picture = *ADURREE* 'cat in Oromo', distractor = *bet* 'house in Amharic' and picture = *BET* 'house in Oromo', distractor = *adurree* 'cat in Amharic'). We predicted that an identical distractor word produces a large facilitation effect when naming in L1 and in L2.

There were 96 items in each block (24 pictures × 4 distractors) and a total of 192 items in the 2 blocks. To prevent the participants from anticipating the distractor's position, the word position varied randomly in the region around fixation. However, for a given picture, the distractors always appeared in the same location. In each block, the stimuli of the various conditions appeared an equal number of times. The block trials were randomized, with the restriction that the distractors of the same experimental condition or of the same language did not appear in consecutive trials. Before the experiment, there was a training session involving eight pictures from additional materials, paired with either Oromo or Amharic unrelated distractors. The pictures always appeared in the center of the computer screen.

3.1.3. Procedures

The participants named identical pictures in each of their two languages, i.e., the production occurred in only Oromo or in only Amharic in each block, with the order of language counterbalanced across the participants. In each block, the instruction was always provided in the language of production. The participants were told to name the pictures as fast and as accurately as possible, ignoring the written distractors. Prior to each block, the participants were presented with the entire set of pictures, along with their expected names in the language of the experiment, using a PowerPoint projector and a personal computer. Then, the experimenter showed the pictures without their names and the participants named each picture. During the picture naming, errors were corrected, and the participants proceeded to the next step after naming all the pictures correctly. The training session took 10–15 min. Then, they completed the practice block prior to the actual experiment. During the experiment, the participants were not instructed to sit at a particular distance from the computer, but they were told to sit comfortably and to avoid movements throughout the experiment. In the experiment, each trial began with a centrally presented fixation cross displayed for 500 ms on a computer screen. Then, a 250 ms blank screen preceded the onset of the picture. The picture appeared on the computer screen and stayed for 1000 ms. The participants had 2.5 s to respond. The picture-naming latency was measured from the onset of the stimulus to the beginning of the naming response. The stimulus presentation was controlled by DMDX (see Forster and Forster 2003). The responses were recorded by connecting a HyperX SoloCast USB microphone to the computer's sound card. Then, the waveform of the acquired voice was visually inspected for the response time and accuracy using Check Vocal (Protopapas 2007). The participants were tested individually in a soundproof booth.

3.1.4. Results

Trials in which the participants produced the wrong word, stuttered, and hesitated or failed to respond, including any trial with an RT faster than 200 ms and slower than 2500 ms, were classified as errors and discarded from the RT analysis (N = 666). Additionally, any trial which had a $\pm$2.5 z-score was treated as an outlier (N = 57). These steps resulted in 15% data loss. In total, 3886 trials were included in the final analysis. For the analysis, we fitted the Linear Mixed Effect Model with subject and item random intercept and random slopes for the languages of picture naming in R (version 3.2.3) using the lme4 package (Bates et al. 2015) to predict the effects of the distractor conditions (same, translation equivalent, within-language control and cross-language control), the languages of picture naming (Oromo and Amharic) and blocks (first and second blocks) on the response time. We used dummy coding for the reference to multiple levels of the categorical variables. For the distractor conditions, the cross-language control condition served as the reference level; for the languages of picture naming, Amharic served as a reference level; and for the block conditions, the first block was used as a reference level.

We did not find a significant effect of the languages of picture naming, i.e., the picture-naming latency was almost the same when the pictures were named in Oromo and when they were named in Amharic ($B = -25.94$, 95% CI [−64.94, 13.06], $t(3872) = -1.30$, $p = 0.192$; $\beta = -0.11$, 95% CI [−0.27, 0.05]). However, we found a significant effect of the distractor conditions, i.e., compared to the baseline cross-language control condition, the picture-naming latency was shorter in the same condition ($B = -63.67$, 95% CI [−91.93, −35.40], $t(3872) = -4.42$, $p < 0.001$; $\beta = -0.26$, 95% CI [−0.38, −0.15]) and it was also shorter in the translation equivalent condition ($B = -48.04$, 95% CI [−76.54, −19.55], $t(3872) = -3.31$, $p < 0.001$; $\beta = -0.20$, 95% CI [−0.32, −0.08]). However, there was no significant difference between the two control conditions: within-language and cross-language controls ($B = 4.70$, 95% CI [−23.71, 33.10], $t(3872) = 0.32$, $p = .746$; $\beta = 0.02$, 95% CI [−0.10, 0.14]). Moreover, there was a marginally significant interaction between the languages of picture naming and the distractor conditions; for the translation equivalent condition, the response time was slightly shorter when the pictures were named in Oromo than when they were named in Amharic ($B = -36.24$, 95% CI [−75.69, 3.21], $t(3872) = -1.80$, $p = 0.072$; $\beta = -0.15$, 95% CI [−0.31, 0.01]). Similarly, the response time was marginally shorter in the same condition when the pictures were named in Oromo than when they were named in Amharic ($B = -36.74$, 95% CI [−76.20, 2.71], $t(3872) = -1.83$, $p = 0.068$; $\beta = -0.15$, 95% CI [−0.32, 0.01]). Finally, we found a significant effect of the blocks. Naming the pictures during the second block took a longer time than naming the pictures during the first block ($B = 49.74$, 95% CI [17.80, 81.68], $t(3872) = 3.05$, $p < 0.001$; $\beta = 0.21$, 95% CI [0.07,0.34]). Figure 2 shows the error bar and the average response time of each condition.

The number of errors in the participants' responses exceeds 5%. Hence, we separately analyzed the patterns of the errors using the Poisson family of the Generalized Linear Model. In general, fewer errors were made when the pictures were named in Oromo than when they were named in Amharic ($B = -0.68$, 95% CI [−1.05, −0.31], $p < 0.001$). Moreover, fewer errors were made in the second block than in the first block ($B = -0.54$, 95% CI [−0.76, −0.33], $p < 0.001$), but comparable numbers of errors were made across the four distractor conditions. On the other hand, there was a significant interaction between the languages of picture naming and the blocks; in the second block, a higher number of errors was made when the pictures were named in Oromo than when they were named in Amharic (B = 0.40, 95% CI [0.09, 0.72], $p < 0.01$). Likewise, there was a significant interaction between the languages of picture naming and the distractor conditions; when the pictures were named in Oromo, more errors were made in the same condition than in the cross-language control condition ($B = 0.47$, 95% CI [0.03, 0.92], $p < 0.05$).

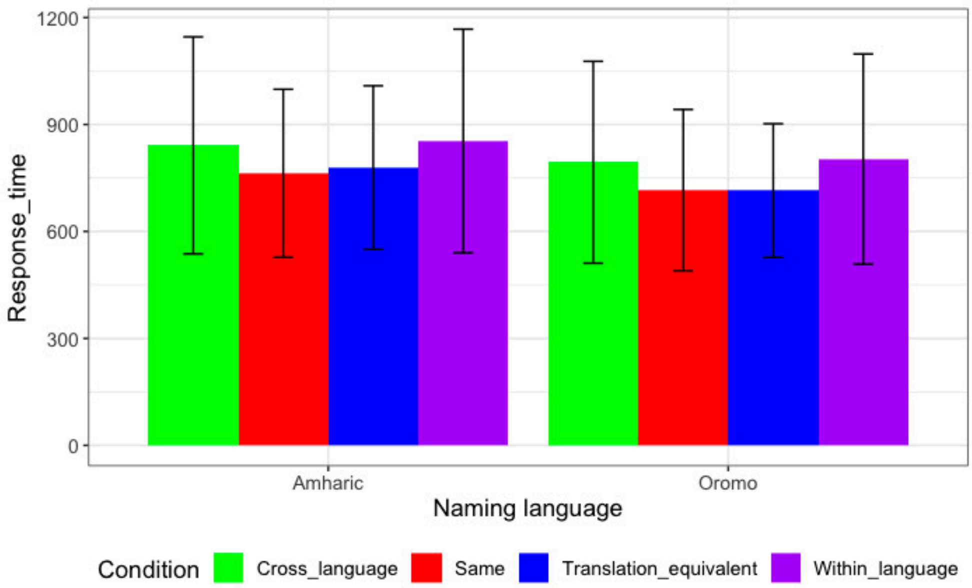

Figure 2. Error bars and mean response times (in ms) of the distractor conditions.

3.1.5. Discussion

The results obtained from the Oromo–Amharic bilingual speakers indicate a facilitation effect of the translation equivalent distractors, replicating the results previously reported by Costa et al. (1999), Costa and Caramazza (1999) and Dylman and Barry (2018). These results complement the proposal that bilingual speakers have a language-specific lexical representation. However, they do not replicate the stronger L1-to-L2 inter-lexical facilitation link previously proposed by Dylman and Barry (2018). We found the shorter response times of the translation equivalent condition when the pictures were named in Oromo than in Amharic, irrespective of the block order (also see Appendix B.1). In this respect, our results align with the findings previously reported by Kroll and Stewart (1994). Kroll and colleague reported a stronger L2-to-L1 facilitation during the between-language word translation. They provided several explanations that support the stronger L2-to-L1 facilitation. First, mapping from L1 to L2 requires conceptual negotiation, and this negotiation increases the latency of processing. Second, L2 to L1 mapping is an automatic process because it is a common way of learning the meanings of words in second-language acquisition. Third, the second language has usually a small vocabulary size and accessing words from the L2 vocabulary can be more costly in terms of the processing time. Data from the Oromo–Amharic bilinguals also indicate that switching between two languages can introduce an interference effect (block effect). This interference effect may indicate a simultaneous activation of the target and non-target languages (see Bobb and Wodniecka 2013; Branzi et al. 2014; Declerck and Koch 2023; Misra et al. 2012). We do not peruse further the switch cost effect because it is outside the scope of our study. Finally, we assume that the relatively high number of errors observed during the naming of the pictures in Amharic implies that retrieving words from the second language can be easily distracted, unlike retrieving words from the native language, which has stronger representation. This is a likelihood scenario, as we observed more errors in the same condition, where the distractors are the names of the pictures themselves. Furthermore, naming the pictures in the first block is more susceptible to error than naming the same pictures in the second block. This could be an indication of the effect of adaptability to the test materials. It could be that the participants were better acquainted with the pictures in the second block. In addition, since both the first and the second languages are already active during the second block, it could also be that the participants are in a more bilingual mode.

3.2. Experiment II: Bidialectal Speakers of Oromo

3.2.1. The Participants

Twenty-six (26) bidialectal speakers (F = 2, M = 24) of the Eastern and the Western Oromo dialects took part in the experiment. On average, they were 22 years old (R = 19–25). The Eastern dialect was their native lect. They acquired the Western Oromo dialect via formal instruction, and they had exposure to the dialect for about 12–13 years. The Western dialect was also their medium of instruction at elementary school. Studies recently conducted by Feleke (2024) and Feleke and Lohndal (2024) indicate that the Eastern dialect speakers acquire the Western dialect grammar at around the age of 11. However, according to Feleke (2024), the Eastern dialect remains dominant for most of the speakers. The target bidialectal speakers had extremely limited knowledge of Amharic, and via the background questionnaire they confirmed that (1) they cannot read and write in Amharic; (2) they are not able to communicate in Amharic without being assisted by translators; (3) they do not have a frequent contact with speakers of Amharic, and (4) they do not consider themselves speakers of Amharic. They had exposure to English starting from early elementary school—grade one. English was also their medium of instruction at the secondary and tertiary levels.

3.2.2. The Materials

Forty (40) pictures that had noncognate labels in the two Oromo dialects were collected from electronic sources. We sized the pictures into 600 by 600 pixels. Before the experiment, the pictures were evaluated by 12 bidialectal speakers of the Eastern and the Western Oromo dialects. Each picture was paired with either the Eastern or the Western Oromo labels, and the 12 bidialectal speakers rated the pictures on 5 pts Likert scale, where 1 means the label on the picture does not represent the picture and 5 means the label on the picture represents the picture. Then, 24 pictures with average rating scores $\geq$3.5 were selected for the experiment. The average rating score for the Eastern dialect was 4.33 (SD = 0.32), and the average rating score for the Western dialect was 4.04 (SD = 0.56). There was no statistically significant difference between the rating score of the Eastern dialect (M = 4.33) and that of the Western dialect (M = 4.06), *t*-test, t (46) = 1.36, p = 0.268. In addition, there was no significant difference between the frequency of the Eastern dialect labels (M = 8.99) and the frequency of the Western dialect labels (M = 11.25), t (46) = −534, p = 0.599. Furthermore, we did not find a significant difference between the syllable length of the Eastern dialect labels (M = 2.29) and that of the Western dialect labels (M = 2.46), t (46) = −1.282, p = 0.213. More importantly, the length of the letters of the Eastern dialect labels (M = 6.21) did not significantly differ from the length of the letters of the Western dialect labels (M = 6.71), t (46) = −1.492, p = 0.149.

Following the picture identification, each picture was paired with distractor words drawn from the Eastern and the Western Oromo labels to create the four distractor conditions. For each naming dialect, we compared the effects of distractors that were identical to the target name—same condition (e.g., picture = *LUKKUU* 'chicken in the Eastern dialect', distractor = *lukkuu* 'chicken in the Eastern dialect' and picture = *HANDAAK'K'OO* 'chicken in the Western dialect', distractor = *handaak'k'oo* 'chicken in the Western dialect') and those that were translations of the target name—dialect equivalent condition (e.g., picture = *LUKKUU* 'chicken in the Eastern dialect', distractor = *handaak'k'oo* 'chicken in the Western dialect' and picture = *HANDAAK'K'OO* 'chicken in the Western dialect', distractor = *lukkuu* 'chicken in the Eastern dialect'). The two target conditions were assessed against unrelated control words: an unrelated control word in the first dialect—within-dialect control (e.g., picture = *LUKKUU* 'chicken in the Eastern dialect', distractor = *hulaa* 'door in the Eastern dialect' and picture = *HULAA* 'door in the Eastern dialect', distractor = *lukkuu* 'chicken in the Eastern dialect') as well as an unrelated word in the second dialect—cross-dialect control (e.g., picture = *LUKKUU* 'chicken in the Eastern dialect', distractor = *balbala* 'door in the Western dialect' and picture = *BALBALA* 'door in the Western dialect', distractor = *lukkuu* 'chicken in the Eastern dialect').

The distractor words were superimposed onto the pictures. The distractor words were written in the Latin script, and they were always written in capital letters in the 28 font size of New Times Roman. When pairing the distractor words with the target pictures, care was taken to prevent any spurious semantic, phonological, or orthographic relationship between the distractor words and the target picture labels. To avert the anticipation of the distractor location, the word position varied randomly in the region around the fixation. However, for a given picture, the distractor always appeared in the same location. Then, in separate blocks of trials, the participants named the pictures either in their first dialect or in their second dialect. Within each block, there were four distractor words for each picture (the picture's name in the first dialect, unrelated word in the first dialect, the picture's name in the second dialect, and unrelated word in the second dialect). Hence, there were 96 items in each block (24 pictures $\times$ 4 distractors), and a total of 192 items in the two blocks. The block trials were randomized, with the restriction that the same picture and the same distractor word did not repeat in consecutive trials. The order of the dialect of picture naming was counterbalanced across the participants.

3.2.3. Procedures

The procedures and instructions were identical to those in Experiment I. First, the participants familiarized themselves with the pictures in either dialect. Each picture, along with its label, was presented using a personal computer and a PowerPoint projector, and the participants named the entire set of pictures. Then, they named the pictures without the written labels, and the errors were instantly corrected by the experimenter. The practice session took 15–20 min. The participants proceeded to the next step after naming all the pictures correctly. Before the experiment, eight practice trials with distractor words drawn equally from the four conditions were presented and completed by the participants. During the experiment, the participants were instructed to name the pictures as quickly and accurately as possible, ignoring the written distractors. The response time was measured from the onset of the stimulus to the onset of the naming response. The stimulus presentation was controlled by DMDX. The responses were recorded by connecting the HyperX SoloCast microphone to the computer's sound card. Then, the voice waveform was visually inspected for the response time and accuracy using Check Vocal. The participants were tested individually in a soundproof booth.

3.2.4. Results

Trials in which the participant produced the wrong word, stuttered and hesitated or failed to respond, including any trial with an RT faster than 200 ms and slower than 2500 ms, were classified as errors and discarded from the RT analysis (N = 700). Additionally, any trial which had a ± 2.5 z-score was treated as an outlier (N = 80). This resulted in 15.6% data loss. In total, 4212 trials were included in the final analysis. For the analysis, we fitted the Linear Mixed Effect Model with the subject and item random intercept and random slopes for the dialects of picture naming in R (version 3.2.3) using the lme4 package (Bates et al. 2015) to predict the effects of the dialects of picture naming (Eastern and Western), distractor conditions (same, dialect equivalent, within-dialect control and cross-dialect control) and blocks (first and second) on the picture-naming response time. We used dummy coding for the reference to the multiple levels of the categorical variables. For the distractor conditions, the cross-dialect control condition served as s reference level; for the dialects of picture naming, the Eastern dialect served as a reference level; and for the block conditions, the first block was used as a reference level.

We found a significant effect of the dialects of picture naming (see Figure 3), i.e., naming the pictures in the Western dialect took a longer time than naming the pictures in the Eastern dialect (*B* = 39.76, 95% CI [6.89, 72.62], t(4155) = 2.37, $p < 0.01$; β = 0.16, 95% CI [0.03, 0.28]). There was also a significant effect of the distractor conditions, i.e., the response time of the dialect equivalent condition was significantly shorter than the response time of the baseline cross-dialect control condition (*B* = −74.12, 95% CI [−103.18, −45.05], t(4155) = −5.00, $p < 0.001$; β = −0.29, 95% CI [−0.40, −0.18]), and the response time of the same condition was significantly shorter than the response time of the cross-dialect control condition (*B* = −71.44, 95% CI [−100.35, −42.53], t(4155) = −4.84, $p < 0.001$; β = −0.28, 95% CI [−0.39, −0.17]). There was no significant difference between the two control conditions (*B* = −16.04, 95% CI [−44.80, 12.72], t(4155) = −1.09, $p = 0.274$; β = −0.06, 95% CI [−0.17, 0.05]). We also found a significant interaction between the dialects of picture naming and the distractor conditions; the response time was higher in the dialect equivalent condition when the pictures were named in the Western dialect than when they were named in the Eastern dialect (*B* = 60.16, 95% CI [18.98,101.34], t(4155) = 2.86, $p < 0.001$; β = 0.23, 95% CI [0.07, 0.40]). Similarly, in the same condition, the response time was marginally higher when the pictures were named in the Western dialect than when they were named in the Eastern dialect (*B* = 37.14, 95% CI [−3.95, 78.22], t(4155) = 1.77, $p = 0.076$; β = 0.14, 95% CI [−0.02, 0.31]). In addition, we found a significant effect of the blocks; naming the pictures in the second block took a longer time than naming the pictures in the first block (*B* = 38.98, 95% CI [18.33, 59.63], t(4155) = 3.70, $p < 0.001$; β = 0.15, 95% CI [0.07, 0.23]).

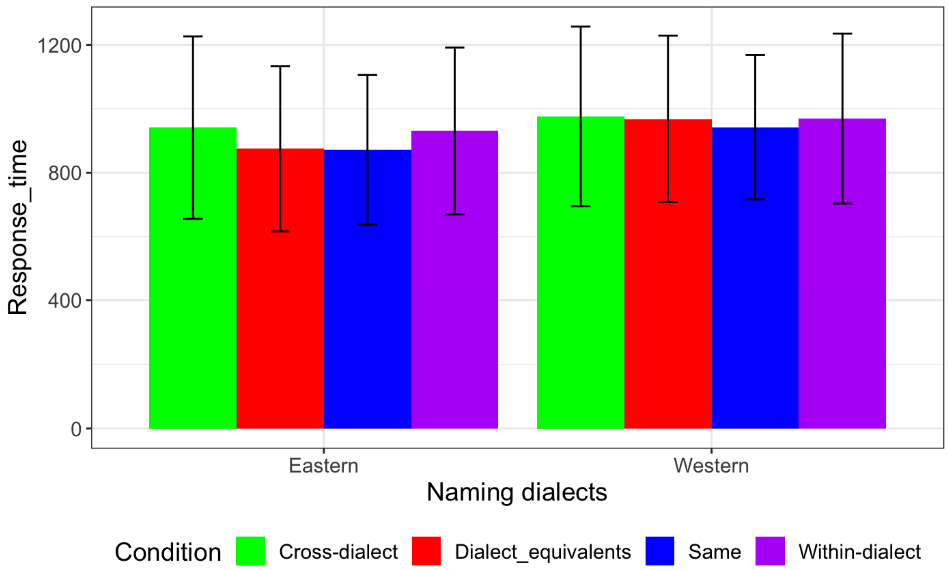

Figure 3. Mean response times (in ms) and error bars across dialects and conditions.

The number of errors made during the picture naming exceeds 5%. Hence, we examined the patterns in the errors using the Poisson family of the Generalized Linear Model. An equal number of errors was made when the pictures were named in the Eastern and in the Western dialects. Similarly, a comparable number of errors was made across the four distractor conditions. However, fewer errors were made in the second block than in the first block (*B* = −0.56, 95% CI [−0.79, −0.35], $p < 0.001$). Moreover, there was a significant interaction between the dialects of picture naming and the blocks; when the pictures were named in the Western dialect, the number of errors in the second block was significantly higher than the number of errors in the first block (*B* = 0.58, 95% CI [0.27, 0.88], $p < 0.001$). There was no significant interaction between the dialects of picture naming and the distractor conditions.

3.2.5. Discussion

The results reported above show that there is a facilitation effect of dialect equivalents. This further implies that bidialectal speakers have a dialect-specific or an independent lexical representation, contrary to the co-dependent lexical representation previously proposed by Melinger (2018, 2021) and others. The observed inter-lexical facilitation effect is also different from the D1-to-D2 facilitation previously reported by Dylman and Barry (2018). Our finding aligns with the D2-to-D1 mapping proposed by Kroll and Stewart (1994). The direction of the facilitation link (also see Appendix B.2) reflects the fact that the Eastern dialect is the dominant lect of the bidialectal speakers (also see Feleke 2024; Feleke and Lohndal 2024). Moreover, the Oromo bidialectal speakers generally make more errors in the first block than in the second block, which may reflect familiarity with the task. However, when the pictures are named in the Western dialect, more errors are made in the second block than in the first block. Tentatively, we assume that the high number of errors in the second block reflects the interference of the Eastern dialect, which was activated in the first block. As we previously stated, the issue of the language-switching cost is beyond the scope of our investigation.

4. General Discussion

In the present study, we strived to answer four research questions. (1) Is bilingual lexical selection language-specific or language non-specific? (2) Is bidialectal lexical selection co-dependent or independent? (3) Is there an asymmetrical inter-lexical facilitation during lexical selection and processing? (4) Can dialects be distinguished from languages via lexical processing? In this section, we address these questions, based on the results reported in Section 3 and the arguments made in related previous studies.

4.1. Bilingual vs. Bidialectal Lexical Selection

We have seen that the picture-naming latency is shorter when the distractors are translation equivalents of the target pictures. In other words, there is a facilitation effect of translation equivalents during lexical selection and processing. The observed facilitation effect corroborates the language-specific lexical representation of bilingual speakers, which was proposed by Costa et al. (1999) and Costa and Caramazza (1999). The observed facilitation effect of the translation equivalents also implies that the lexical selection mechanism only inspects the lexicon of the target language. There are different proposals regarding how the lexical items of the non-target language are suppressed (see Costa et al. 1999; Costa and Caramazza 1999; Green 1998). Costa et al. (1999) and Costa and Caramazza (1999) argue that extralinguistic (inhibitory control) mechanisms manage the selection of the target language and the suppression of the non-target language. Some scholars argue that the lexical representation of the non-target language may not be activated at all, and therefore, there is no need for suppression (see La Heij 2005). Some others argue that both languages are activated during lexical selection, but the representation associated with the non-target language is reactively inhibited (e.g., Green 1998). So far, there is no clear and conclusive explanation.

The critical concern that the present study wants to address is whether the lexical selection and representation of bilingual and bidialectal speakers are governed by the same underlying mechanisms. In connection with this, we have seen a facilitation effect of dialect equivalents. The observed facilitation effect implies that bidialectal speakers have an independent lexical representation, not the co-dependent lexical representation previously proposed by Melinger (2018, 2021) and by Declerck and Kirk (2023). In other words, bilingual and bidialectal speakers have similar lexical selection and representation architecture, as reported by Dylman and Barry (2018), Kirk et al. (2022), Kubota et al. (2023), and Vorwerg et al. (2019). Data obtained from the Oromo bidialectal speakers show that, irrespective of the language group, equivalent words persistently lead to facilitation, entailing the representation of words of both bilingual and bidialectal speakers being independent. This finding has vital theoretical ramifications. First, the observed dialect-specific lexical representation of bidialectal speakers complements a long-standing argument that bidialectal speakers have a separate system for each of the dialects they speak (see Amaral and Roeper 2014; Eide and Åfarli 2020; Roeper 1999; Roeper 2016 for a similar argument on the grammatical representation of bidialectal speakers). In this regard, our study also sheds light on the long-established discrepancies between the models of lexical and grammatical representations of bidialectal speakers. It establishes a link between the grammatical and lexical representations by proposing the same independent system at both the lexical and grammatical levels. Our finding also converges with the lexicalist models, which claim a strong linkage between the lexical and grammatical representations (see Blanco-Elorrieta and Caramazza 2021; Grüter et al. 2012; Prévost and White 2000). In sum, data from the Oromo bidialectal speakers suggest that bidialectal speakers are indistinguishable from bilingual speakers based on their lexical selection and representation mechanisms. These findings have important repercussions for psycholinguistic studies that usually rely on monolingual control.

In Experiment I, we found an inter-lexical facilitation effect of translation equivalents. The observed facilitation effect is asymmetrical, i.e., the L2-to-L1 inter-lexical facilitation link is slightly stronger than the L1-to-L2 facilitation link, contrasting with the results previously reported by Dylman and Barry (2018). We found a similarly stronger D2-to-D1 inter-lexical facilitation link in Experiment II, contrary to the stronger D1-to-D2 facilitation implied in Dylman and Barry (2018). Dylman and Barry (2018) argued that the activation of words of the stronger language (L1) facilitates the activation and selection of words of the weaker (L2) language. Our findings rather pattern with the L2-to-L1 and D2-to-D1 stronger inter-lexical facilitations proposed by Kroll and Stewart (1994). Kroll and Stewart (1994) argued that the L2-to-L1 facilitation link is stronger since L2-to-L1 translation is accomplished on just lexical bases, as opposed to the L1-to-L2 translation, which involves conceptual mediation. The process of conceptual mediation needs additional processing time. Kroll and Stewart (1994) further argued that the L2 vocabulary is smaller in size than the L1 vocabulary and that accessing words from such a diminished vocabulary size incurs an extra processing cost. Furthermore, according to Kroll and Stewart (1994), the stronger L2-to-L1 facilitation link patterns with the course of second-language development. Second-language learners acquire a lexical link between L1 and L2 before they can conceptually mediate L2. Therefore, they quickly and accurately translate from L2 to L1 before they do the same from L1 to L2. The arguments in Dylman and Barry (2018) and in Kroll and Stewart (1994) indicate that the direction of the inter-lexical facilitation is determined by the language dominance and second language or dialect fluency. In this respect, recent studies by Feleke (2024), and Feleke and Lohndal (2024) indicate that the Oromo–Amharic bilinguals are more balanced than the bidialectal Oromo speakers. According to the studies, although the Eastern and Western Oromo dialect speakers use both dialects on a daily basis, the Eastern dialect is their dominant lect. Therefore, the weaker inter-lexical facilitation effect of the translation equivalents is most likely associated with the fact that Oromo–Amharic bilingual speakers are balanced bilinguals.

4.2. Dialect Detection via Lexical Processing

The primary concern of the present study is determining the extent to which the lexical selection mechanism of bidialectal speakers can be used to distinguish dialects from languages. In this regard, the data we obtained from the Oromo bidialectal speakers are not promising. Contrary to our prediction, the processing mechanism that underpins the selection and representation of dialect words is not essentially different from the lexical selection and representation mechanism of bilingual speakers. An independent lexical representation, not the co-dependent representation proposed by Melinger (2018, 2021), Kirk et al. (2022) and Vorwerg et al. (2019), characterizes both groups. This leads us to the conclusion that the lexical selection mechanism of bidialectal speakers cannot be used as a valid means of differentiating dialects from languages.

Why are there discrepancies among the studies then? Well, we believe that every bidialectal speaker is different; bidialectal speakers adopt different lexical selection and processing mechanisms based on their previous language experiences. For example, Melinger (2018, 2021) investigated monolingual bidialectal speakers who had no exposure to any language other than English, but our study investigated bidialectal bilingual speakers who have exposure to the second language (English). Since the bidialectal bilingual speakers have the experience of switching not only between their two dialects but also between two languages, this extra practice of switching between two languages can attenuate their inhibition capability. The attenuated inhibition capability in turn enhances the lexical selection and processing mechanisms. Several studies previously indicated that an enhanced inhibitory control mechanism plays a crucial role in suppressing intrusions from non-target languages (see Green 1998, 2011; Green and Abutalebi 2013).

Studies show that there is a direct link between previous language experiences (e.g., frequency and consistency of use) and inhibitory control (see Alrwaita 2021; Alrwaita et al. 2022; Green 2011; Green and Abutalebi 2013; Linck et al. 2008). In this regard, the Oromo bidialectal speakers use both dialects daily, the Eastern dialect in the outside school contexts and the Western dialect in the school context. We assume that the Oromo dialect context is different, for example, from the British–American English dialect context. The British–American English bidialectal speakers may not use both English dialects on a daily basis in distinct contexts. Previous studies also show that exposure to remotely related dialects enhances the inhibitory control more swiftly than exposure to dialects that are closely related (see Alrwaita 2021; Oschwald et al. 2018). Therefore, the discrepancies in the previous studies can be related to the degree of similarity between the dialects of the bidialectal speakers. Moreover, as noted in Section 1, the dynamics of the context in which the dialects are acquired and used can affect the lexical selection mechanisms. In the case of Oromo, the Western dialect is formally taught in school contexts while the speakers actively use the local Eastern dialect in the outside school contexts. This provides ample opportunities for regularly switching between the two dialects. Several studies indicate that there is a strong link between the frequency of switching between two dialects and the dialect-processing capability (Alrwaita 2021; Alrwaita et al. 2022; Green and Abutalebi 2013; Lundquist and Vangsnes 2018).

Given the strong link between the lexical representation of bidialectal speakers and the dialect context, we believe that any proposal pertaining to the lexical selection of bidialectal speakers should take the variables of the dialect context into account. In Figure 4, we propose a Dynamic Lexical Selection Model (DLSM), which we adopted from Dylman and Barry (2018). The model assumes that the lexical representation of bidialectal speakers interacts with the context in which the dialects are acquired and used. Like many previous lexical selection models (see Kroll and Stewart 1990, 1994), the Dynamic Lexical Selection Model presupposes that lexical selection involves activations at different levels of lexical selection hierarchy. The conceptual level is at the top of the hierarchy and the phonological level at the bottom, and in-between there is the lexical level. In Figure 4, the levels are interconnected by the down-pointing arrows. At the conceptual level, the visual input, for example, *adurree* 'cat' in the target (Western) dialect and the distractor word *bašoo* 'cat' in the Eastern dialect, initiates the activation of the conceptual representation—for example, the cat has four legs, a mammal, and a domestic animal. Meanwhile, the distractor word concurrently activates the lexical and the phonological representations. Then, the activation is sent from the conceptual level to the lexical level. At the lexical level, three types of activations engage in the lexical selection processes: (1) activation from the conceptual level, (2) inter-lexical facilitation activation (in Figure 4, the solid horizontal arrow shows the stronger D2-to-D1 inter-lexical facilitation) and (3) activation from the inhibitory control (IC). In Figure 4, the activation from the inhibitory control is represented by a thick solid arrow. The activation from the conceptual level facilitates both the target (*adurree*) and the distractor word (*bašoo*). Similarly, the inter-lexical facilitation activates both the target and the distractor word. Since both the target and the distractor word receive an equal level of activations from the conceptual level and from the inter-lexical facilitation, the selection of the target (*adurree*) is ultimately determined by the activation from the inhibitory control. The inhibitory control selects the target dialect via the dialect tag (D1 = Eastern dialect, D2 = Western dialect). In the figure, the thickness of the arrow shows the strength of the activation, i.e., the strongest activation comes from the inhibitory control. The word selected at the lexical level is eventually articulated at the phonological level. It is important to note that the inhibitory control also interacts with the inter-lexical facilitation. We have seen that the (a)symmetry of the inter-lexical facilitation link is the outcome of language dominance. For balanced bilinguals who presumably have enhanced inhibitory control, there is an inter-lexical facilitation link of equal magnitude.

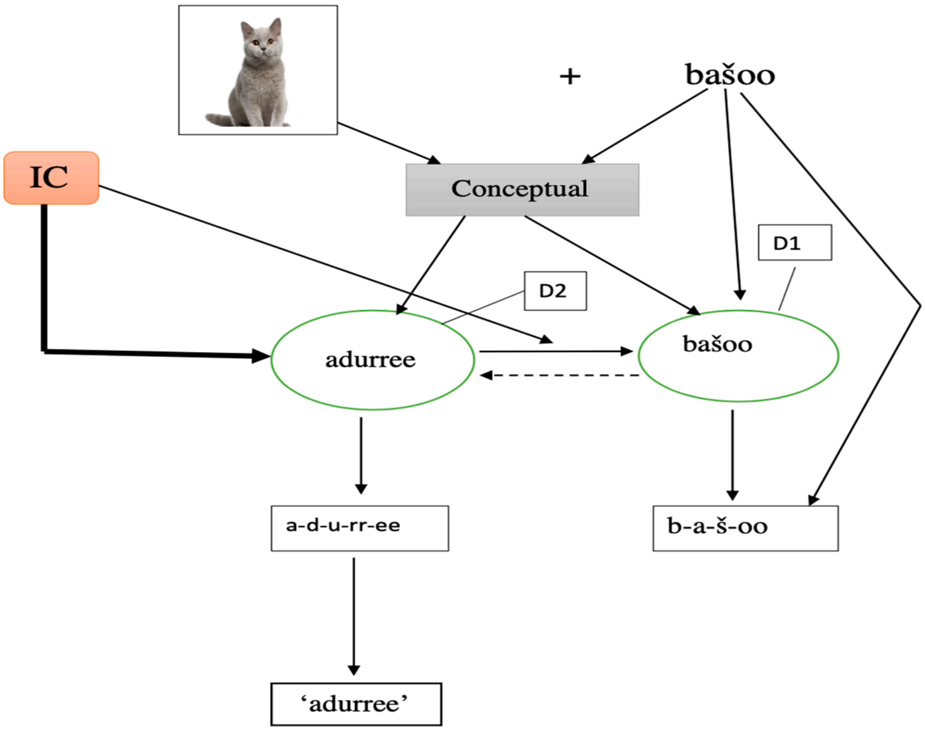

Figure 4. The hierarchy of lexical selection mechanisms of bidialectal speakers. The horizontal arrows indicate the inter-lexical facilitation, and the solid horizontal arrow shows the stronger D2-to-D1 inter-lexical facilitation. The arrows connecting the IC to the horizontal arrows indicate the link between the inhibitory control and inter-lexical facilitations. All the down-pointing arrows show the top-to-bottom hierarchy of lexical selection mechanisms.

Therefore, according to the dynamic lexical selection model, the inhibitory control plays a decisive role in the process of lexical selection (see Dylman and Barry 2018 for a similar argument). A crucial aspect of this model is that it recognizes the complex linkage among the inhibitory control, lexical representation and dialect context or ecology. The link between the inhibitory control and lexical selection is central to our argument that lexical representation is influenced by the ecosystems in which the dialects are acquired and used. As indicated earlier, studies show that the inhibitory control can be enhanced by regular switching between two languages or dialects (see Bialystok et al. 2005; Colzato et al. 2008; Green 1998, 2011; Linck et al. 2012; Poarch et al. 2019; Shell et al. 2015). These studies argue that frequent switching between two dialects leads to efficient inhibitory control. In turn, efficient inhibitory control results in enhanced inhibition during lexical selection and processing. In other words, there is a symbiotic relationship between the efficacy of the inhibitory control and regular switching between two dialects or languages. We previously argued that the frequency of speakers' switching between two dialects or languages is determined by the dialect context. Some contexts allow for frequent and often unconscious switching between two dialects, but others favor a regular use of just one of the dialects or languages (see Green and Abutalebi 2013). Bidialectal speakers who grow up in dialect contexts that provide equal opportunities to use both dialects, for example, the Oromo dialect context, may develop the independent lexical representation, but those who grow up in the dialect contexts that do not provide equal opportunities (e.g., British–American English dialect context), may have the co-dependent representation. This means that every bidialectal speaker is different in terms of their lexical selection and representation. Hence, we believe that the heterogeneity of the dialect ecology is the main factor that underpins the discrepancies observed in the previous studies.

5. Conclusions

In the present study, we investigated the lexical selection and representation mechanisms of the bilingual and bidialectal speakers of understudied languages. In two successive experiments, we indicated that bilingual speakers have a language-specific lexical representation. The major contribution of this study relates to the lexical representation of bidialectal speakers. In this regard, we illustrated that bidialectal speakers have dialect-specific lexical representation, as bilinguals have language-specific lexical representation. Furthermore, the pattern of the inter-lexical facilitation link is the same for both bilingual and bidialectal speakers. In both cases, there exists an asymmetrical inter-lexical facilitation with a stronger L2-to-L1 or D2-to-D1 facilitation link. Our findings show that there is no fundamental difference between the lexical representation of bilingual and bidialectal speakers. The robust similarity between the bilingual and bidialectal lexical representation has three vital ramifications: (1) it challenges the co-dependent lexical representation models of bidialectal speakers; (2) it is analogous to the recent arguments in Universal Bilingualism as it proposes that bidialectal speakers have a separate system for each dialect they speak; and finally, (3) it challenges the long-standing trend of comparing bilingual speakers to the monolingual control in psycholinguistics experiments. This tradition assumes homogeneity among the monolingual population, but we have illustrated that monolingual (bidialectal) speakers are representationally very much like bilingual speakers.

Finally, we want to stress that every bidialectal speaker is different when it comes to the lexical selection and representation. Hence, contrary to our findings, bidialectal speakers can also have a co-dependent lexical representation, especially if the context does not allow for regular use of each dialect and fails to offer the possibility of switching between the dialects. Therefore, future studies should compare different dialect ecologies. The symbiosis between dialect ecology and lexical selection must be sufficiently investigated to understand the dynamics of the lexical representation of bidialectal speakers.

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Data Availability Statement: The original data presented in the study are openly available via the Open Science Framework at https://osf.io/hsnqf/?view_only=ae9b10574f474e5dbaf2a95867dd5503 (accessed on 11 May 2024).

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Appendix A

Appendix A.1. List of Distractor Words for Experiment I

Object	Amharic Distractors		Oromo Distractors	
	Same	**Control**	**Same**	**Control**
ABLEE	billəwa/knife	dɨngay/stone	ablee/knife	ɗagaa/stone
ADURREE	dɨmmət/cat	maćɨd/sickle	adurree/cat	haamtuu/sickle
K'OTTOO	mət'rəbya/axe	nəbɨr/tiger	k'ottoo/axe	k'eerreensa/tiger
SIREE	alga/bed	zɨhon/elephant	siree/bed	arba/elephant
SIMBIRROO	wəf/bird	mankiya/spoon	simbirroo/bird	fallaana/spoon
BORAATII	tɨras/pillow	wiššа/dog	boraati/pillow	saree/dog
SAREE	wiššа/dog	məstawət/window	saree/dog	daawwitii/window
HULAA	bərr/door	tɨl/earthworm	hulaa/door	raammoo/earthworm
IĞA	ayn/eye	lɨbs/cloth	iğa/eye	uffata/cloth
K'UBA	t'at/finger	ahɨyya/donkey	k'uba/finger	harree/donkey
K'URT'T'UMMII	asa/fish	ćamma/shoe	k'urt't'ummii/fish	kop'ee/shoe
TIITISSA	zɨnb/fly	k'ɨt'əl/leaf	tiitissa/fly	baala/leaf
FOON	sɨga/meat	məśɨhaf/book	foon/meat	kitaaba/book
K'AWWEE	t'əmənğa/gun	bək'lo/mule	k'awwee/gun	gaangee/mule
HAADA	gəməd/rope	fɨyyəl/goat	haada/rope	reʔee/goat
FURTUU	k'ulf/key	afər/soil	furtuu/key	biyyee/soil
LUKKUU	doro/chicken	aməd/ash	lukkuu/chicken	daaraa/ash
HOOLAA	bəg/sheep	məkina/car	hoolaa/sheep	konkolaataa/car
WARAABEESSA	ğib/hyena	sɨnde/wheat	waraabeessa/hyena	k'amadii/wheat
KOBEE	ćamma/shoe	səgon/ostrich	kobee/shoe	guččii/ostrich
LILMEE	mərfe/needle	ayɨt'/rat	lilmee/needle	hantuuta/rat
K'OĆAA	eli/tortoise	śəgur/hair	k'oćaa/tortois	rifeensa/hair
HAADDUU	mɨlać/blade	ɨbab/snake	haadduu/blade	bofa/snack
URĞII	kokkob/star	mašɨlla/sorghum	urğii/star	bišingaa/surghom

Appendix A.2. List of Distractor Words for Experiment II

Object	Western Dialect Distractors		Eastern Dialect Distractors	
	Same	**Control**	**Same**	**Control**
KOFOO	surree/trouser	adurree/cat	kofoo/trouser	bašoo/cat
BAŠOO	adurree/cat	hank'aak'uu/egg	bašoo/cat	killee/egg
HULAA	balbala/door	guugee/pigeon	hulaa/door	hadarii/pigeon
BUUSAA	ittoo/stew	t'iyyaa/spear	buusaa/stew	k'astii/spear
K'ULFII	furtuu/key	mark'aa/porridge	k'ulfii/key	šuuroo/porridge
ĞEEDALLOO	sardiida/fox	eelee/stove	ğeedalloo/fox	k'ibaaba/stove
HAADA	fooʔaa/rope	handaak'k'oo/hen	haada/rope	lukkuu/hen
KALLOO	gogaa/leather	bolok'k'ee/been	kalloo/leather	ošongoree/bean
SAFII	gundoo/plate	k'oričča/drug	safii/plate	dawaa/drug
RIFEENSA	dabasaa/hair	t'armuusii/bottle	rifeensa/hair	k'aruuraa/bottle
K'IBAABA	eelee/stove	wayaa/cloth	k'ibaaba/stove	huććuu/cloth
ŠUUROO	mark'aa/porridge	balbala/door	šuuroo/porridge	hulaa/door
K'ARUURAA	t'armuusii/bottle	gogaa/leather	k'aruuraa/bottle	kalloo/leather
K'AWWEE	rasaasa/gun	ittoo/stew	k'awwee/gun	buusaa/stew
LUKKUU	handaak'k'oo/hen	marga/grass	lukkuu/hen	c'itaa/grass
DAAKUU	hurraa/flour	surree/trouser	daakuu/flour	kofoo/trouser
C'ITAA	marga/grass	fooʔaa/rope	c'itaa/grass	haada/rope
HUČČUU	wayaa/cloth	t'armuusii/bottle	huććuu/cloth	k'aruuraa/bottle
HADARII	gugee/pigeon	gundoo/plate	hadarii/pigeon	safii/palte
K'ASTII	t'iyyaa/spear	dabasaa/hair	k'astii/spear	rifeensa/hair
OŠONGOREE	bolok'k'ee/bean	rasaasa/gun	ošongoree/bean	k'awwee/gun
KILLEE	hank'aak'uu/egg	abaaboo/flower	killee/egg	ilillii/flower
ILILLII	abaaboo/flower	sardiida/fox	ilillii/flower	ğeedalloo/fox
DAWAA	k'oričča/drug	hurraa/flour	dawaa/drug	daakuu/flour

Appendix B

Appendix B.1. The Magnitude and Direction of the Translation Equivalent Facilitation Effect

Conditions	Oromo	Amharic	Inter-Lexical Facilitation
Cross-language	781	805	
Translation-equivalent	700	760	Oromo ⇄ Amharic
Translation facilitation	**81**	**45**	
Conditions	**Oromo**	**Amharic**	**Direction of Facilitation**
Within-language	774	812	
Same/identity	685	742	Oromo ⇄ Amharic
Identity effect	**89**	**70**	

Note: Identity effect = within-language − same meaning.

Appendix B.2. The Magnitude and Direction of the Dialect Equivalent Facilitation Effect

Conditions	Eastern	Western	Inter-Lexical Facilitation
Cross-dialect	941	976	
Dialect-equivalent	875	968	Eastern ⇄ Western
Dialect facilitation	**66**	**8**	
Conditions	**Eastern**	**Western**	**Direction of Facilitation**
Within-dialect	931	969	
Same/identity	872	943	Eastern ⇄ Western
Identity effect	**59**	**26**	

Note: Identity effect = within-language − same meaning.

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