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Multilinguals' use of L1 and L2 inner speech

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ABSTRACT

Research on inner speech is still in a nascent stage. The present paper investigates consecutive multilinguals' self-reported language use for inner speech with a focus on the L1 (first language) and L2 (second language). Its aim is to identify influential variables in these processes and to investigate if findings from previous studies are applicable across different L1s. The topic is approached using a triangulation approach, which consists of 24 in-depth interviews and a web survey study completed by 167 multilinguals from German-speaking and Asian backgrounds. Quantitative analysis showed that the L1 is generally used more frequently than the L2 in inner speech. Furthermore, high frequency of using the L2, naturalistic exposure to it and high self-reported proficiency in the L2 as well as a high bilingualism index boost its use for inner speech, as does the overall number of languages known. The qualitative analysis furthermore supports the crucial role of these variables in the internalisation of L2 inner speech and shows that they can even shift language use for inner speech entirely from the L1 to English (L2) in case it is frequently and proficiently used and in case a bi-/multilingual experiences naturalistic exposure to English in the L2 environment.

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Introduction

Linguists and non-linguists have been interested in the question of linguistic relativity for a long time. Links between language and mind are far from alien to multilinguals, especially, who have more than one language at their disposal. Invaluable insights into the topic are given in autobiographical reflections, such as Hoffman's (1989) or Ye's (2004). The latter, a Chinese immigrant to Australia, for instance, writes in this respect:

[T]he struggle between English and Chinese is constant. When speaking English, I may think in English, but only partially; the next moment, it flicks back to Chinese. Sometimes [...] I can hear myself speaking English, but the substance seems to be in Chinese. It is my thoughts wrapped in a loose mantle of another language. (Ye 2004, 138)

Humboldt is seen as the forefather of linking this interest in 'ways how languages shape – and re-shape – thought' (Pavlenko 2011a, 9) to inner speech, the 'sub-vocal self-talk that takes place in an identifiable linguistic code' (Pavlenko 2014, 208). Despite the longstanding interest in this topic, it has not been investigated extensively so far in multilingual contexts (Dewaele 2015; Pavlenko 2011b). Most research into multilinguals' language use focuses on external uses of an LX (referring to any foreign language attained after the age of 3 [Dewaele 2016, 2017]). These differ very much from internal uses though regarding their underlying purposes, but also regarding the restrictions

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on language choice. Thus, gaining a deeper understanding of the latter is crucial as it gives valuable insights into multilinguals' selves and multi-competent language users' minds (Cook 1991, 1998, 2016; Dewaele 2015), especially as '[i]nternal uses may well outweigh external in terms of time' (Cook 1998). Just as Watzlawick, Beavin, and Jackson (1967, 51) once stated that '[o]ne cannot *not* communicate', thinking is also an essential mechanism in us human beings (Descartes, as quoted in Hammer 2017a, 1) and we often engage in communicating with ourselves in inner dialogues. Reflections on language use in inner speech clearly open a window into this 'rather important and universal mechanism in human consciousness and psychic activity' (Sokolov 1972, 1).

In light of the understood universal importance of inner dialogue, the present paper aims to identify decisive factors in these processes in order to provide a deeper understanding of links between language and thought in multilinguals. Drawing on the results of 24 in-depth interviews and a web survey study, which was based on adaptations of the Bilingualism and Emotions Web Questionnaire (BEQ) (Dewaele and Pavlenko 2001–2003) and in which 167 bi-/multilinguals participated, links between demographic as well as language-related variables and language use when talking silently to oneself will be investigated. This should also add to our understanding of influential variables in L2 (second language) internalisation, which describes 'an extension of L2 use beyond social and communicative realms, into the more intellectual spheres of internal information processing and finally, the ability to think verbally in the L2 (Guerrero 2009)' (Hammer 2017b, 73).

The paper is organised as follows: the literature review starts with a definition of inner speech and discusses it in multilingual contexts. It then elaborates on previous studies. The next section discusses the methodology used and includes a description of the research questions, the procedure, the participants, independent and dependent variables. The presentation of results contains statistical analyses and interview extracts, which will be linked to the previously mentioned studies in the discussion. In the conclusion, the findings will be summarised and expanded.

Literature review

Inner speech in multilingual contexts

Inner speech has been referred to in various ways, a common one being 'the activity of talking to oneself in silence' (Morin 2012, 436). This definition implies that self-talk usually happens in an identifiable code. Being understood here as a mental activity, it clearly needs to be distinguished from private speech. The latter refers to 'audible self-talk' (Guerrero 2005, 25) and is, according to Vygotsky (1934/1984), a precursor of inner speech in children, who tend to initially talk aloud to themselves to solve problems or cognitive challenges they encounter, which thus contributes to their cognitive development. Adults engage in it much less frequently than children (Morin 2012). Recent studies (e.g. Mani and Plunkett 2010) have shown that also infants may use language covertly (Perrone-Bertolotti et al. 2014) and it seems the 'little voice inside our head [...] is a common everyday experience' (220), which most of us share from early on for various reasons, such as self-regulation (Morin 1993), language-related aspects, self-awareness and problem-solving (Morin 2005), but also emotional release (Morin 2012; Pavlenko 2014). Clearly, it 'is social in origin' (Morin 2012, 443) and can be described as a 'key component of human processes' (Larrain and Hays 2012, 5).

Quite multi-faceted in nature, the topic furthermore increases in complexity when investigated in multilingual contexts. Multilinguals, who are understood here as multi-competent LX users (Cook 2016; Dewaele 2017), differ from monolinguals in having 'knowledge of more than one language in the same mind' (Cook 2012, 3768) at their disposal when speaking silently to themselves. The knowledge of either language in a multilingual's mind is neither to be seen as static nor as isolated from the other language(s) this person knows and other mental processes as '[a]t the highest level of all, the languages must be an interconnected whole within a single mind, an eco-system of mutual interdependence' (Cook 2016, 7). Hence, it is crucial to approach any investigation into multilinguals holistically and accept that multilinguals are 'a complete linguistic entity, an integrated

whole' (Baker and Wright 2017, 12). Consequently, their internal and external language use deviates from monolinguals' but it does so because of their uniqueness and this should not be misinterpreted as failure or deficient language use (Cook 2007, 2016; Cook and Singleton 2014). We additionally need to keep in mind that multilinguals hardly use their languages to the same extent and in the same contexts, leading to different degrees of activation of the languages (Grosjean 2010). Multilinguals always need to make a choice which language to use when depending on mostly contextual factors. When considering the abovementioned in the context of inner speech, language choice might not be entirely controllable though and many factors, such as language dominance or naturalistic exposure to an LX, might affect the likelihood of using also the LX in these contexts (Dewaele 2015). To what extent multilinguals are able to deliberately control their language use in inner speech is not clear. Pavlenko (2014) argues that just as people cannot entirely control whether or not to use inner speech at all, which language to use in inner speech is also mostly outside of multilinguals' conscious control. Furthermore, she mentions that the functions underlying inner speech in the L2 differ from those in the L1 (first language) – at least in initial stages of attainment. It takes time and practice for multilinguals to use an L2 in inner speech 'for dialogic purposes' (Dewaele 2015, 3) and, usually, LX acquirers tend to use the LX initially mostly to mentally rehearse (Pavlenko 2014). This rehearsal-related function was also shown in Guerrero's (2005) study investigating 472 Spanish ESL (English as a second language) students at a Puerto Rican university. Not only do the functions of multilinguals' language use in inner speech differ – at least in initial stages of LX acquisition –, but so does the likelihood of internalising L2 inner speech. The following section will, thus, elaborate on findings from previous studies regarding influential factors in these processes.

Individual differences in inner speech in multilinguals

Investigating internal language use is, generally, a challenging endeavour. It is difficult to measure (Uttl, Morin, and Hamper 2011) as it 'cannot be directly observed but only indirectly inferred' (Morin 2012, 437). Commonly used methodologies include self-reports, such as interviews, autobiographical memories or questionnaires (Pavlenko 2014), but also experimental designs using, for instance, think-aloud protocols (Morin 2012). Uttl, Morin, and Hamper (2011) investigated the reliability and validity of five widely used questionnaires designed to measure the self-reported use of inner speech. The results from 380 student volunteers led them to conclude that 'self-reports of inner speech are reliable but have only limited validity' (1719). As also indicated by Dewaele (2015), only 89% of their sample shared English as L1 though, which might have led to a distortion of their results. They seem to have taken a 'monolingual perspective' (Cook 2016, 1), which sees bi-/multilinguals 'as two [or more] monolinguals inside one person' (Baker and Wright 2017, 16). This, according to Cook, is clearly unrealistic as LX users are 'language users in their own right' (4) who will never use an LX in the same way as a(n idealised monolingual) native speaker of said language (see also Selinker [1972]). In the following, the focus therefore lies on previous studies investigating multi-competent LX users' language use in inner speech, the inquiry of which is 'still in its emerging stage' (Pavlenko 2011b, 242).

Cook (1998) was among the first to investigate differences in internal and external language use among 59 L2 users in different domains. His findings showed an L1 advantage for mental tasks and for praying as well as a link between public use of an L2 and the likelihood of using it in inner speech. Instances of external language use showed an L2 advantage.

Larsen et al. (2002) investigated the role the age of arrival plays regarding language use in inner speech in 20 Polish immigrants to Denmark, who had lived there for 30 years. Whereas the group of those 10 subjects having immigrated sooner (age of arrival = 24 years) were shown to use Danish more frequently in inner speech than those who on average immigrated at the age of 34, the latter reported using Polish more frequently in spontaneous inner speech. Additionally, self-rated L2 proficiency was shown to be linked with the frequency of using L2 inner speech (Larsen et al. 2002, 50).

Furthermore, Guerrero (2005) found a link between L2 proficiency and its use in inner speech, with more proficient speakers using it to a greater extent than less proficient ones when investigating the abovementioned 472 L1 Spanish ESL students at a Puerto Rican university.

When investigating 552 Spanish-English bilingual college students' language use for different mental tasks in the US, Vaid and Menon (2000, 33) identified three influential variables when 'thinking to oneself': the length of residence in the US, the language of early instruction at school and language dominance. While 43% of those bilinguals describing themselves as dominant in Spanish reported thinking to themselves only in Spanish, 44% of the Spanish-dominant bilinguals mentioned thinking in both English and Spanish. In the English-dominant group, 71% stated that they only think to themselves in English and a mere 20% reported doing so in both languages.

Additionally, Dewaele (2004) found a link between language dominance and language use in inner speech when analysing data from 1039 multilinguals participating in the BEQ (Dewaele and Pavlenko 2001–2003). Those who reported being dominant in the L1 also reported using it significantly more frequently in inner speech than others. Still, Dewaele (2015, 4) mentions, 'LX dominance and self-perceived L1 attrition do not completely wipe out the use of the L1 for inner speech'. When re-analysing the data of a subsample ($n = 386$) of the BEQ, who rated themselves as maximally proficient in an LX, Dewaele (2011) found an L1 preference in their case, despite both languages being constantly used. This supports Pavlenko's (2005) idea of language embodiment, according to which the L1 is deeply entrenched in us as we are affectively socialised in this language in childhood (see also Reilly and Seibert [2009]). This 'integration of phonological forms of words and phrases with information from visual, auditory, olfactory, tactile, kinesthetic and visceral modalities, autobiographical memories and affect' (Pavlenko 2012, 421) is highly relevant when discussed in the case of sequential multilinguals as, frequently, the languages attained later in life do not show the same emotional resonance as the L1 which might be partly linked to maturational but also context-related factors (Pavlenko 2012). Indeed, LX users frequently show 'increased automaticity of affective processing in the L1 and heightened electrodermal reactivity to L1 emotion-laden words' (405) and decreased reactivity and automaticity in comparable L2 contexts. Even though the L1 is, consequently, often perceived as most powerful and emotional language (Dewaele 2011) this does not mean that an LX cannot gain this powerfulness and emotionality too in certain cases. In another study investigating 1454 multilinguals' language use in inner speech, Dewaele (2015) identified self-reported frequency of use as well as the degree of LX socialisation as influential variables besides self-rated proficiency in the languages concerned. Additionally, the CoA (context of acquisition), perceived emotionality and the AoA (age of onset of acquisition) of an LX were linked to the likelihood of using it in inner speech. According to Dewaele, this can be 'interpreted as a sign of conceptual restructuring' (1) and shows that 'the LX can attain embodiment and take over – or share – the role of the L1 in inner (emotional) speech' (17). This means that using an LX extensively and being immersed in the LX society may not only cause a shift in language use but also seems to affect the emotional resonance of languages in multilinguals and can lead to the restructuring of cognitive concepts (Hammer 2016; Pavlenko 2014). This finding also stresses the great relevance of Dynamic Systems Theory when aiming to gain a deeper understanding of language development in LX users over time (De Bot et al. 2013): the dynamic nature underlying language systems in multilinguals and their interplay with other cognitive processes (Cook 2016), shaped to some extent by external but also internal factors, may also lead to dynamic patterns of "reprogramming" of the bilingual mind' (Pavlenko 2014, 168).

Apparently, high levels of attainment are prerequisite for an LX to be frequently used in inner speech. When investigating 149 Polish-English bilinguals, who had all moved to the UK as young adults, Hammer and Dewaele (2015) found that an increase in self-reported proficiency in the LX is, besides the AoA, age and frequency of use, also linked with high acculturation levels in the LX-speaking community (see also Schrauf [2009]). Hammer (2017a) then investigated if acculturation also has an effect on L2 use in inner speech among the 149 Polish-English bilinguals (mostly) living in the UK. The results demonstrated that this is indeed the case in various inner speech

domains, such as diary writing, thinking of events experienced in the L1 or L2 as well as inner monologues including praying. Highly acculturated participants reported using their L2 significantly more often in all cases. Besides acculturation levels, which were strongly linked to length of residence, participants' social networks and their future plans regarding residence were furthermore influential in these processes. When analysing the data with a focus on function-specific language use, Hammer (2017b) found tight links between migrants' self-reported degrees of acculturation and frequency of L2 use across all three language functions she investigated, including cognitive and communicative functions, but also inner speech. Again, L2-speaking social networks were linked to higher frequencies of self-reported L2 inner speech.

As made evident by the aforementioned research, inner speech in multilingual contexts has been investigated but more extensive research is still needed. Thus, the present paper aims to identify influential variables in these processes further by means of investigating multilinguals with L1 backgrounds which have not been analysed in these contexts so far. Consequently, the overall aim is to see whether language use in inner speech is possibly also influenced by the type of L1 or if particular variables are influential across different languages. In particular, the paper responds to a call for investigating non-Western contexts too with regard to language use in inner speech as 'most, if not all, studies to date have been conducted in Western contexts and we do not know whether their findings are applicable to non-Western contexts' (Pavlenko 2014, 211).

Methodology

Research questions

The following research questions were formulated to investigate language use in inner speech in multilinguals with a focus on the use of the L1 and L2:

- (1) Do consecutive multilinguals report using the L1 more frequently in inner speech than the L2?
- (2) Does living in an English-speaking country increase the self-reported frequency of its use in inner speech?
- (3) To what extent do the following factors influence the self-reported frequency of using the L1 and/or L2 in inner speech?
 - (a) Demographic variables: age, gender, education level
 - (b) Language-related variables: self-reported frequency of use of the L1 and L2, AoA (English), number of languages known, self-perceived language proficiency, self-reported language dominance, CoA, Western vs. non-Western L1 background

Procedure

The data in this study were gathered using a web survey, which is based on adaptations of the BEQ (Dewaele and Pavlenko 2001–2003). It included 30 closed and open-ended questions on multilinguals' language use in neutral and emotional contexts with an additional focus on gender and language use. The questions consisted of various sets, focusing on language (learner) history, past and present habits regarding language use in emotional and non-emotional situations and participants' attitudes on these matters. As the participants were proficient users of L2 English, the language of the survey was English. The participants' L1s differed. This allowed for also analysing cross-cultural and cross-linguistic variation with a focus on L1 and L2 inner speech in L1 users from Western and non-Western contexts (Pavlenko 2014).

The data were gathered by means of non-probability sampling, combining convenience sampling and snowball sampling (Dörnyei 2007; Wilson and Dewaele 2010). The survey was advertised through e-mails to colleagues and students in the UK, Austria, Thailand and Hong Kong and was also published in forums for multilinguals living in English-speaking countries. The data from the web survey were analysed with SPSS 24.

For ‘breadth and depth of understanding and corroboration’ (Johnson, Onwuegbuzie, and Turner 2007, 151), the quantitative data from the web survey was complemented by 24 guided in-depth interviews with consecutive multilinguals living in London to obtain more detailed explanations (Dörnyei and Taguchi 2010). The interviews added an emic perspective (Pike 1954) and their aim was ‘to give participants a voice’ (Dewaele 2015, 8) and let them explain themselves possible reasons underlying language use in inner speech. Even though the 24 interviewees, who had filled in the survey prior to the semi-structured interviews, are representative of only some of the participants of the web survey study, their thoughts still give deep insights into the topic and reveal aspects that were not captured in the survey. The interviews, which were conducted in English, included (1) a general question on language use for inner speech, refined questions on (2) specific inner speech domains (mental calculations and dreaming), (3) influential factors in using a specific language for inner speech and (4) dynamic changes in language use for inner speech. Some of those questions were taken from the BEQ (Dewaele and Pavlenko 2001–2003); others were phrased as more refined, follow-up questions to the quantitative analysis of the web survey data. The interviews were transcribed, amounting to a corpus of 65,850 words. Their analysis was based on Mayring’s (2000) qualitative content analysis. Aspects were, accordingly, grouped into content analytical units and categories were formed according to relevant topics. Their formation was a dynamic process, which was first based on the research questions and afterwards refined via ‘feedback loops’ (Mayring 2000, 3) taking the material into consideration, too.

Participants

Respondents were 167 bi-/multilinguals, who were mostly highly proficient users of English (L2). In the web survey study, the female participants clearly outnumbered the male ones (76.05%, $n = 127$), which is not rare in web survey-based research in SLA (Second Language Acquisition) (Dewaele 2010; Wilson and Dewaele 2010). Their mean age was 30.66 years ($SD = 11.6$), ranging from a minimum of 19 years to a maximum of 71 years. The multilinguals were highly educated with 15 having a doctoral degree (8.98%), 70 a Master’s degree (41.92%), 41 a Bachelor’s degree (24.55%), 11 having completed a certificate programme (6.59%) and 25 having a general qualification for university entry (14.97%). Only 3 participants had completed an apprenticeship (1.80%) and 2 had finished compulsory education (1.20%).

The most frequent L1 was German ($n = 106$), followed by Thai ($n = 41$), Chinese ($n = 15$), Japanese ($n = 4$) and Filipino ($n = 1$). They were all sequential L2 users of English with an average AoA of 9.21 years (min. = 4, max. = 13; $SD = 3.16$). 107 (64.07%) reported having learned English in instructed settings. The remaining participants had experienced a mixture of both instructed input and acquisition outside the school context ($n = 57$, 34.13%) or stated having acquired it in a naturalistic context ($n = 3$; 1.80%). In total, the multilinguals reported knowing 32 different languages, amounting to 39 bilinguals (23.4%), 59 trilinguals (35.3%), 41 quadrilinguals (24.6%) and 28 pentalinguals (16.8%). 104 participants (62.28%) lived in their country of origin and 55 (32.93%) in English-speaking countries. Only 8 (4.79%) reported living in a country other than the aforementioned. The sample generally consists of frequent users of their L2. A majority of the participants use English on a daily basis ($n = 127$); 73 participants even stated that they use it several hours a day (43.7%). Consequently, it comes as no surprise that they rated their English skills on average as fluent to fully fluent on a scale from 1 (least proficient) to 5 (fully fluent) in the different skills (mean_{total} = 4.27; $SD = .69$; mean_{speaking} = 4.03; $SD = .763$; mean_{comprehension} = 4.32; $SD = .633$; mean_{reading} = 4.3; $SD = .696$; mean_{writing} = 4.02, $SD = .739$). On average, the self-reported L1 proficiency amounted to 4.84 ($SD = .542$; mean_{speaking} = 4.90; $SD = .504$; mean_{comprehension} = 4.90; $SD = .503$; mean_{reading} = 4.84; $SD = .649$; mean_{writing} = 4.71, $SD = .751$). Still, self-perceived proficiency in the L1 also ranged from a minimum of 1 to a maximum of 5 in the different skills, which clearly demonstrates that not everyone perceived themselves as maximally proficient in the L1. As the idea of linguistic multi-competence (Cook 2016) is adopted here, according to which the languages a person knows are not to be seen as isolated

from each other, their self-reported bilinguality is reflected in a second-order variable, the so-called *bilingualism index*. It is the sum of their self-perceived L1 and L2 proficiency in the different skills and, consequently, ranges from 0 to 40. In the present sample, the participants rated their bilinguality on average as 36.36, ranging from a minimum of 11 to a maximum of 40 ($SD = 4.242$).

The interviewees were 24 L2 users of English living in the UK (18 females, 6 males). Half of them shared L1 German, the other half Chinese. The remaining socio-demographic profile was similar to the participants of the web survey.

Independent variables

Demographic variables

As age and gender have been shown to be influential variables in language variation (Coates 2016; Stilwell Peccei 2011), participants were asked for both. Additionally, they were asked about their education level (ranging from compulsory education, apprenticeship, general qualification to university entrance and certificate programme to Bachelors, Masters and PhD). Furthermore, they were asked for their residence. Possible answers included 'English-speaking country', 'country of origin' and 'other'.

Language-related variables

Participants were asked for the starting point of learning the L2. This is crucial as differences in LX use depending on the AoA of LX have often been suggested (for an overview of studies on the age factor, see, e.g. Moyer [2014]; Muñoz and Singleton [2011]).

Furthermore, they were asked for the overall number of languages known (bilingual, trilingual, quadrilingual, pentalingual). As L2 users show increased meta-linguistic awareness (Cook and Singleton 2014), knowing more than two languages might also affect internal language use.

As previous studies showed that self-rated proficiency is a good indicator of actual language proficiency (MacIntyre, Noels, and Clément 1997), language proficiency was measured on a scale ranging from 1 (least proficient) to 5 (fully proficient) in the different skills (speaking, comprehension, reading and writing). As the attainment of the skills is interdependent (Macnamara 1969), an overall proficiency was calculated as the sum of the participants' evaluations for both languages. As mentioned above, the so-called *bilingualism index* was additionally calculated in acknowledgement of the concept of linguistic multi-competence. Based on Dewaele's and Stavans' 'global multilingualism measure' (2014, 10), it is the sum of L1 and L2 proficiency. Separate calculations for L1/L2 proficiency were still necessary to disentangle L1/L2 influences. Linked to proficiency, the participants were also asked for their dominant language (s) (L1, L2 or multi-dominant) and about the context they acquired them in (naturalistic, instructed or mixture of both). Finally, they were also asked how often they used the L1 and L2. The choices were (1) Yearly or less, (2) Monthly, (3) Weekly, (4) Daily, (5) Several hours a day.

In order to investigate the effect of Western and non-Western L1 contexts (Pavlenko 2014), the participants formed two groups: group 1 were from a Western context (L1 German) and group 2 shared an Asian background. As (self-report) studies have shown similar outcomes when investigating participants from different cultural and linguistic backgrounds of group 2 regarding the expression and perception of emotions, which are among the main triggers for inner speech (see, e.g. Besemeres 2004; Caldwell-Harris et al. 2010; Caldwell-Harris, Kronrod, and Yang 2013; Dewaele 2010; Levy 1984; Markus and Kitayama 1991, 1994; Pavlenko 2005; Russel and Yik 1996; Shaver, Wu, and Schwartz 1992; Toya and Kodis 1996), the grouping seems justified. The role of type of L1 was additionally analysed more closely where possible.

Dependent variable

The dependent variable in this study was the frequency of using L1 and L2 inner speech. The data was obtained with the following question taken from the BEQ (Dewaele and Pavlenko 2001–2003): 'If you

form sentences silently (inner speech), what language do you typically use?’ Participants were asked to report the use on a Likert-scale defining the following range: never = 1, sometimes = 2, frequently = 3, all the time = 4.

Results

As Kolmogorov–Smirnov tests revealed no normal distribution (all $p < .05$), non-parametric tests were run. Wilcoxon tests and Mann–Whitney tests were used instead of t -tests and Spearman’s Correlation Coefficient was used as non-parametric equivalent to Pearson’s Correlation Coefficient as the level of measurement were ordinal scales.

Language preference for inner speech

A Wilcoxon-test showed a significant difference in the self-reported frequency of use of L1 and L2 inner speech ($p = .0003$; $Z = -3.636$; $N = 167$; $r = -.20$). A comparison of mean ranks (see Table 1) revealed that the L2 (Mdn = 3) was used significantly less frequently for inner speech than the L1 (Mdn = 3). The effect size was small though. Figure 1 visualises the overall frequency of L1 and L2 inner speech using mean values.

Residence

In order to investigate whether residence influences the self-reported frequency of using English in inner speech, a Mann–Whitney test was calculated. Participants who reported living in a country other than an English-speaking or their country of origin had to be discarded ($n = 8$). The test revealed a significant difference between participants who were living in their country of origin ($n = 104$) and participants who were living in English-speaking countries ($n = 55$): the latter reported using English significantly more often in inner speech (mean rank = 95.21, Mdn = 3) than those living in their country of origin (mean rank = 71.96, Mdn = 3) (see Table 2). In contrast, those who lived in their country of origin reported using the L1 significantly more often in inner speech (mean rank = 91.90, Mdn = 4) than those living in an English-speaking country (mean rank = 58.07, Mdn = 3) (Table 2). Figure 2 illustrates the frequencies using mean values.

Demographic variables

Spearman analyses showed a negative correlation between participants’ chronological age and the frequency of using the L1 in inner speech. No link was shown regarding the L2 (see Table 3).

Gender showed no effect either when running Mann–Whitney tests with mean ranks of 80.34 (L1 inner speech) and 85.17 (L2 inner speech) for women and 95.63 (L1 inner speech) and 80.28 (L2 inner speech) for men. Kruskal–Wallis tests did not reveal any effect of the level of education in this respect (L1 inner speech mean ranks A-levels: 82.90, certificate programme: 60.23, BA/BSc.: 91.05, MA/MSc.: 81.86, PhD: 67.00; L2 inner speech mean ranks: A-levels: 75.96, certificate programme: 68.82, BA/BSc.: 79.24, MA/MSc.: 83.61, PhD: 96.33) (Table 3).

Table 1. Overall difference in frequency of L1 and L2 in inner speech (Wilcoxon Signed Ranks Test).

Ranks		<i>N</i>	Mean Rank	Sum of Ranks
L1 IS–L2 IS	Negative Ranks (L2 < L1)	76	54.80	4165
	Positive Ranks (L2 > L1)	33	55.45	1830
	Ties	58		
	Total	167		

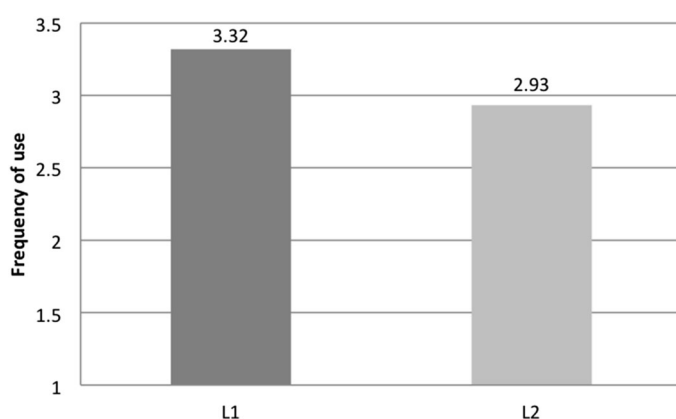


Figure 1. Mean frequencies of L1 and L2 inner speech use.

Table 2. Difference in frequency of using the L1 and L2 in inner speech depending on current country of residence.

Language	<i>N</i>	<i>p</i>	<i>U</i>	Wilcoxon- <i>W</i>	<i>Z</i>	<i>r</i>
L1	159	.001	2023.50	7483.5	-3.268	-.26
L2	159	<.0001	1654.00	3194.5	-4.775	-.38

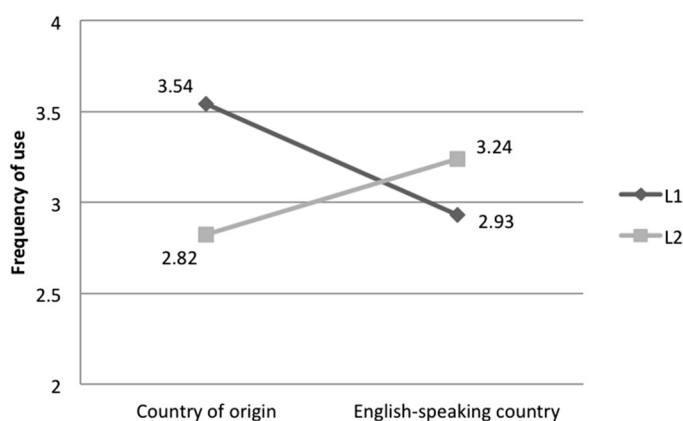


Figure 2. Mean frequencies of L1 and L2 inner speech use depending on current country of residence.

Table 3. Links between demographic variables and using L1 and L2 inner speech.

Language	<i>N</i>	<i>rho</i>	<i>p</i>
L1	167	-.205	.008
L2	167	.025	.750

Language	<i>N</i>	<i>p</i>	<i>U</i>	Wilcoxon- <i>W</i>	<i>Z</i>	<i>r</i>
L1	167	.057	2075.00	10203.00	-1.905	-.15
L2	167	.548	2391.00	3211.00	-.601	-.05

Language	<i>N</i>	χ^2	<i>df</i>	<i>p</i>
L1	162	6.467	4	.167
L2	162	3.350	4	.501

Self-reported frequency of use of the L1 and L2

A Kruskal–Wallis test showed significant differences in the frequency of using L2 inner speech depending on the self-reported use of the L2 (Table 4), reflected in gradually higher mean ranks (every week: 61.38, every day: 66.80, several hours a day: 90.11). A separate Kruskal–Wallis test showed the opposite pattern for L1 inner speech, reflected in a gradually lower mean ranks, the higher the use of English (every week: 99.46, every day: 86.00, several hours a day: 62.34). Figure 3 visualises these differences based on mean values.

AoA

A Spearman correlation showed a negative correlation between the starting point of acquiring English and the frequency of using the L1 in inner speech. However, no significant correlation was found regarding L2 inner speech (see Table 5).

Overall number of languages known

A Kruskal–Wallis test revealed that the values for self-reported frequency of L2 inner speech were significantly different depending on the overall number of languages known with a gradual increase in mean ranks the more languages a person knows (bilingual: 66.17, trilingual: 85.69, quadrilingual: 90.70, pentalingual 95.48). No effect was shown for the frequency of using L1 inner speech when running a separate Kruskal–Wallis test (mean rank bilingual: 88.96, trilingual: 81.71, quadrilingual: 81.18, pentalingual: 86.04) (see Table 5). Figure 4 visualises the patterns based on mean values.

Self-perceived proficiency

A series of Spearman correlations were conducted to see whether the overall of proficiency in the L1 or L2 shows any link with the reported frequency of using either language in inner speech. No

Table 4. Differences in frequency of using the L1 and L2 in inner speech based on self-reported frequency of using the L2.

Kruskal–Wallis tests				
Language	<i>N</i>	χ^2	<i>df</i>	<i>p</i>
L1	153	19.917	2	<.0001
L2	153	14.560	2	<.001

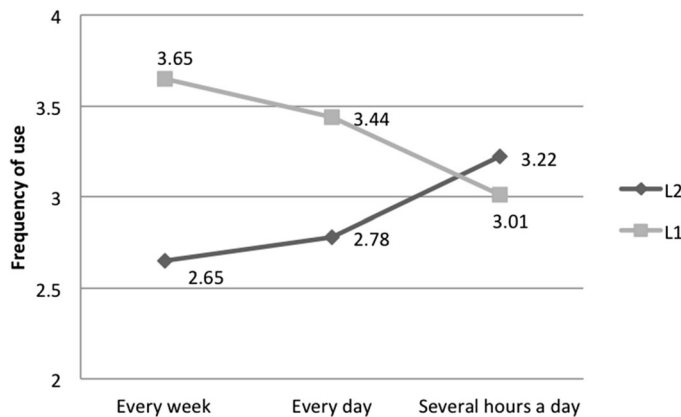


Figure 3. Mean frequencies of L1 and L2 in inner speech use depending on the self-reported frequency of using English.

Table 5. Links between language-related variables and the frequency of using the L1 and L2 in inner speech.**AoA** (Spearman Rank correlations)

Language	<i>N</i>	<i>rho</i>	<i>p</i>
L1	167	-.166	.032
L2	167	-.105	.179

Number of languages known (Kruskal–Wallis tests)

Language	<i>N</i>	χ^2	<i>df</i>	<i>p</i>
L1	167	.873	3	.832
L2	167	8.996	3	.030

Self-perceived proficiency L1 (Spearman Rank correlations)

Language	<i>N</i>	<i>rho</i>	<i>p</i>
L1	164	-.063	.423
L2	164	.120	.127

Self-perceived proficiency L2 (Spearman Rank correlations)

Language	<i>N</i>	<i>rho</i>	<i>p</i>
L1	164	-.305	<.0001
L2	164	.442	.011

Bilingualism index (Spearman Rank correlations)

Language	<i>N</i>	<i>rho</i>	<i>p</i>
L1	155	-.160	.047
L2	155	.303	<.001

Language dominance (Kruskal–Wallis tests)

Language	<i>N</i>	χ^2	<i>df</i>	<i>p</i>
L1	167	15.060	2	.001
L2	167	16.179	2	<.001

Context of Acquisition (Mann–Whitney tests)

Language	<i>N</i>	<i>p</i>	<i>U</i>	Wilcoxon– <i>W</i>	<i>Z</i>	<i>r</i>
L1	164	.657	2931.50	4584.50	-.445	-.04
L2	164	.021	2428.50	8206.50	-2.309	-.18

Western vs. non-Western L1 background (Mann–Whitney tests)

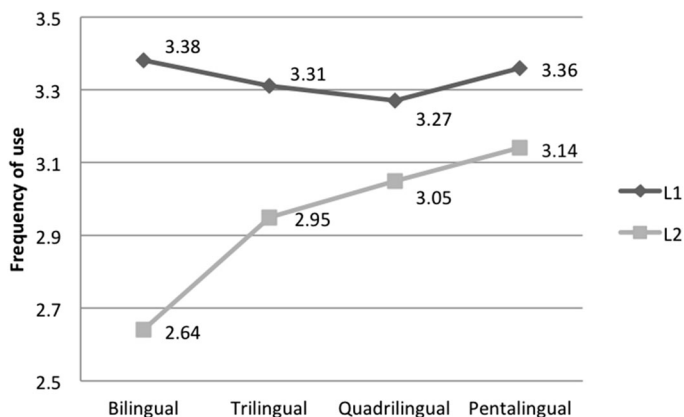
Language	<i>N</i>	<i>p</i>	<i>U</i>	Wilcoxon– <i>W</i>	<i>Z</i>	<i>r</i>
L1	167	.006	2478.50	8149.50	-2.740	-.21
L2	167	.026	2612.50	4503.50	-2.219	-.17

Type of L1 (Kruskal–Wallis tests)

Language	<i>N</i>	χ^2	<i>df</i>	<i>p</i>
L1	162	10.378	2	.006
L2	162	4.991	2	.082

Type of L1: Mean ranks

Language	German	Chinese	Thai
L1	73.64	94.47	97.07
L2	86.42	82.03	68.57

**Figure 4.** Mean frequencies of L1 and L2 inner speech use depending on the overall number of languages known.

correlation of the proficiency in the L1 with the aforementioned was shown. The overall proficiency in English showed highly significant correlations though: self-perceived proficiency in English correlated negatively with the use of the L1 in inner speech and positively with the use of English in inner speech. When acknowledging the mutual influence of the two languages in a speaker's mind, reflected in bilingualism index, the following is shown: it correlates negatively with the frequency of using the L1 in inner speech and positively with the frequency of using English in inner speech (see Table 5).

Self-reported language dominance

Depending on participants' self-reported language dominance, significant differences were also found between those who reported being dominant in their L1, those who reported being dominant in their L2 and those who stated being multi-dominant (i.e. they listed both the L1 and L2 as dominant languages). Kruskal–Wallis tests showed that the differences between these groups are highly significant in the extent to which the L1 and L2 are used in inner speech: those who stated that they were dominant in the L1 were most likely to report using the L1 in inner speech (mean rank: 94.47) and those who mentioned an L2 dominance were least likely to do so (52.15, multi-dominant: 77.61). Regarding the frequency of L2 inner speech the pattern was reversed: those mentioning being dominant in the L2 most frequently reported using it in inner speech (mean rank: 108.12), whereas those dominant in the L1 did so least frequently (71.32, multi-dominant: 95.78) (see Table 5). Figure 5 illustrates these patterns based on mean values.

Context of acquisition (CoA)

A Mann–Whitney test showed that the frequency of using English in inner speech differed significantly depending on whether a person learned English in an instructed setting or in a mixture of instructed and naturalistic contexts. A comparison of mean ranks shows that those having learned English in an instructed setting tend to use it less frequently in inner speech (76.70) than the latter (93.39). With regard to the L1, no effect of CoA could be identified (see Table 5).

Western vs. non-Western L1 background

Finally, it was also interesting to see if differences in L1 and L2 inner speech are observable between those participants who grew up in the Western world and those with non-Western L1 backgrounds

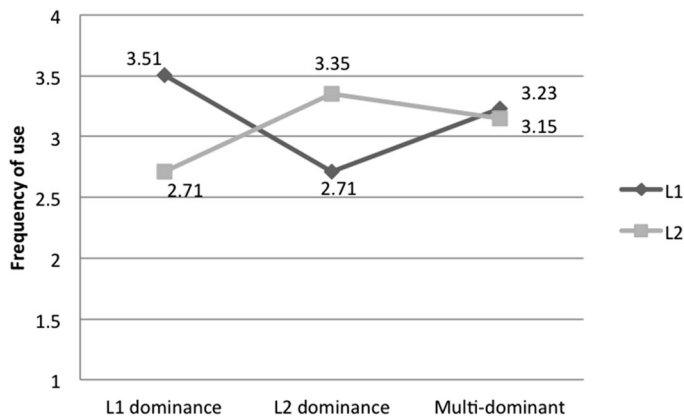


Figure 5. Mean frequencies of L1 and L2 inner speech use depending on self-reported language dominance.

(group 1: L1 = German; group 2 = Asian background). Mann–Whitney tests showed highly significant differences in this respect. In group 2, multilinguals reported using the L1 significantly more often in inner speech (mean rank: 96.37) than participants with L1 German (mean rank: 76.88). Group 1 reported using English in inner speech significantly more frequently (89.85) than group 2 (73.83). Figure 6 visualises the differences using mean values. This finding was also supported for L1 inner speech when comparing L1 German, L1 Chinese and L1 Thai participants separately by means of a Kruskal–Wallis test. Others had to be discarded due to group size. In the case of the L2, a similar tendency was observable, which was not significant (see Table 5).

Interview extracts

The interviews revealed the dynamics and complexity underlying language use for inner speech in highly proficient multilinguals living in the UK. Almost all of them mentioned the context-dependence of which language they use when talking silently to themselves. To put it in Lars' (L1 German, L2 English, L3 Italian, L4 Spanish, L5 French) words: 'this depends ... on the context, the situation and also on the people I'm with'. A majority of both Mandarin Chinese and German-speaking interviewees stressed the influence of external language use on language use in inner speech. Kate (L1 Mandarin, L2 English, L3 Cantonese, L4 Fujian), for instance, explained: 'well, when I am back home, I will of course think in Mandarin. If I am here and I am with friends who are English speaker[s], then I will express it in English'. This leads some multilinguals to explain that they mostly use the L2 in inner speech these days given they live in an English-speaking country. Anna (L1 German, L2 English) nicely summarises the main tenor when saying: 'in the German context, I would probably think in German but in my current everyday life, I'd think it in English'. The relevance of taking a holistic approach to multilingualism research (Cook 2016) and accepting their unique ways of internal and external language use became even more apparent in explanations, such as Mimi's (L1 Mandarin, L2 English, L3 Taiwanese): 'I'm thinking in a Chinese way, but ... actually ... it sounds English'. She explained that she is very much shaped by the Chinese culture – also when talking silently to herself. The 'identifiable linguistic code' (Pavlenko 2011b, 242) is English though. This very much resembles the constant struggle Ye (2004) explains too. In some cases such as Jasmin's (L1 German, L2 English, L3 Italian, L4 French), L2 use and the length of residence in an English-speaking context changed inner speech completely to the L2. She described herself as highly acculturated in the L2 society, which is, according to her, partly shown in her having only L2-speaking friends and a British husband. She also stressed her distance to the L1-speaking context in the interview and, consequently, concluded: 'with thinking, yes ... I definitely do that in English!'.

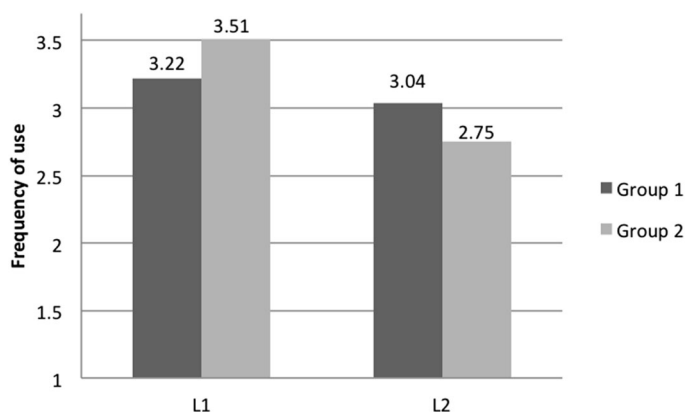


Figure 6. Mean frequencies of L1 and L2 inner speech use: Western and non-Western L1 background.

That a clear L2 dominance in inner speech can change again is shown in Emma's (L1 German, L2 English, L3 French) explanation: while inner speech had shifted entirely to English after having lived in the UK for 10 years, raising her daughter bilingually (German and English) has affected her language use in inner speech:

Generally, my thoughts tend to be in English – regardless of topic. However, what has a big influence is who I am speaking to, as I find myself switching back to thinking in German when speaking to friends or family from Austria. This tendency has increased ever since the birth of my daughter, because I make a conscious effort to expose her to as much German as possible to aid her bilingual development. While her responses may be limited at this stage, I catch myself thinking in German more so than in English when interacting with her.

This extract nicely illustrates that external and internal language use changes dynamically over time. Additionally, her words stress the importance of perceived emotionality of the languages concerned (Dewaele 2015) in these processes.

The dynamic underlying language use for inner speech was mentioned by many interviewees and was often linked to naturalistic exposure and living in an English-speaking country. Xiaomeng (L1 Mandarin, L2 English, L3 Cantonese), for example, explained the change of language use in inner speech with having relocated in the UK: 'well, I think, now it changed a little bit. I mean, now I'm living in UK, in London, so ... when I am happy, for example, I will think in English'. This is also reflected in Eva's (L1 German, L2 English, L3 Spanish, L4 French) description. While she had only been exposed to the L2 in instructed settings before moving to the UK, she had lived in Spain and Mexico, which led her to using her L1 and L3 in her thoughts. English has gained importance now that she lives in the UK though and she also uses it in inner speech:

When I first moved to London about six years ago, my Spanish was much stronger than my English, so I used to speak to myself in either German or Spanish. And I'd say at some point, I actually started speaking to myself in either German, English or Spanish ... the latter still played a role in my life because I shared flats with a Spanish native speaker. After I moved out of this flat [...], Spanish became less and less important and these days the only thing I still do in Spanish [...] is count – that's what I'd trained or kind of forced myself to do for about ten years as I wanted to be a contradiction to the theory that bilinguals continue using their first language when counting.

Interestingly, Eva stated that she sometimes counts silently in an LX. Like Mona (L1 German, L2 English, L3 French), all other interviewees mentioned it being an exception as they 'would find it significantly harder in English' and usually do so in the L1. The interviewees furthermore explained dreaming in both languages, but could not determine to what extent (see also Cook [1998]; Grosjean [1982]).

Discussion

The results from the web survey showed that sequential L2 users, overall, reported using the L1 more frequently in inner speech than the L2. This supports the general, 'well-established pattern that languages that have been acquired earlier in life are used more frequently' (Dewaele 2015, 14; see also Cook [1998]; Dewaele [2010, 2011]), possibly due to language embodiment (Pavlenko 2005, 2012). Furthermore, participants who lived in English-speaking countries reported using English significantly more often in inner speech than those living in the country of origin. They, on the other hand, reported using the L1 significantly more often in inner speech. This supports Dewaele's findings (2015) and might be linked to Hammer's (2017a) study, the results of which 'showed that acculturation level had a significant effect on frequency of language use in [...] inner speech domains' (Hammer 2017a, 13). Even though living in an English-speaking country does not automatically imply high acculturation and bilinguals living in the L2 environment were shown to differ on the level of extent of acculturation (Hammer 2017a, 2017b), it is likely that living in an LX-speaking country is generally beneficial in internalising an LX and using it for inner speech. The interviews additionally showed that naturalistic exposure supports dynamic changes in language internalisation and frequently leads multilinguals 'to think verbally' (Hammer 2017b, 73; see also Guerrero [2009]) in the LX. This furthermore stresses the need for investigating multilinguals holistically (Cook and

Singleton 2014), with the languages being activated to different extents in different contexts (Grosjean 2010). Additionally, we need to be aware of the following: language development and use are dynamic processes and change over time and 'the current state is a function of previous states and in turn is the basis for future states' (Peltzer-Karpp 2012, 62). This was clearly stressed by the interviewees too. However, the web survey measured a 'current state' only. Further research into the dynamic development of language use for inner speech is much needed.

Age, showing a negative correlation with the self-reported frequency of using L1 inner speech, was the only influential demographic variable. Further studies would be needed to investigate if a general decrease in using the L1 in inner speech with growing age is observable indeed throughout the lifespan.

Interesting links could be revealed between language-related variables and language use for inner speech: while the AoA of English is negatively correlated with the use of the L1 in inner speech, no link to the frequency of using the L2 was shown. This contradicts findings from previous studies (Dewaele 2015; Larsen et al. 2002). However, these studies operationalised the variable in different ways and investigated inter-group differences rather than possible correlations, which might be an explanation for this divergence. A greater number of participants would have been needed in this study to be able to do so too.

The overall number of languages a person knows showed a significant effect: the more languages a multilingual knew, the more frequently they reported using English in inner speech and the less frequently the L1 was used. This might be linked to a broader acceptance of the self as multilingual the more languages a person knows and their multilinguality being more part of and integrated into their selves. Possibly, the self becomes more dynamic with every language learned. Additionally, the more languages a person knows, the easier it usually is to attain new ones. This ease with which additional languages are added to their repertoire and a 'better feel for languages' (Cook and Singleton 2014, 7) might also affect the likelihood of internalising an LX.

An increase in the overall frequency of using English leads to a gradual increase in L2 inner speech and a decrease in L1 inner speech. This also supports findings from previous studies (Cook 1998; Dewaele 2015) and is in line with Cook's (1998) conclusion that '[t]he same person who is using the L2 in public is likely to be using the L2 in private in their heads'. Furthermore, the findings demonstrated that a certain degree of proficiency is required for an L2 to become internalised and used in inner speech: the self-reported proficiency level in the L2 showed a highly significant positive correlation with the frequency of using the L2 in inner speech, which supports Dewaele's (2015), Guerrero's (2005) as well as Larsen et al.'s (2002) findings. The reversed pattern was shown with regard to using the L1. The bilingualism index supported these patterns.

Moreover, multilinguals perceiving themselves as L1 dominant reported using the L1 significantly more frequently when silently talking to themselves than those dominant in both the L1 and L2. Multilinguals describing themselves as dominant in the L2 did so least frequently. They, in return, reported using the L2 more often in inner speech than others, which mirrors Dewaele's (2004) findings. The interviewees mentioned again the shape-shifting nature of language use and showed that an LX might become the dominant language too after having relocated in an LX-speaking context. This might lead to an L2 preference for inner speech and in some cases even to a replacement of L1 inner speech in LX-speaking contexts. This can clearly be seen as an indicator of cognitive restructuring (Pavlenko 2011b, 2014). Still, as described by the interviewees, the L1 is usually not completely replaced and even if, this might change again if the L1 re-gains emotionality.

Additionally, it seems that naturalistic exposure boosts the use of an LX for inner speech indeed, which was also shown in previous studies (Dewaele 2015).

Finally, the analyses also revealed significant differences in the frequency of language use for inner speech in participants from the Western world and Asian L1 backgrounds. While the former reported using L2 inner speech significantly more frequently, the latter reported using L1 inner speech more frequently. This shows that more systematic research into non-Western contexts (Pavlenko 2014) focusing on more evenly distributed participant numbers but also more homogenous L1

backgrounds is much needed indeed. It might be the case that the more distinct the respective languages, the more difficult their attainment and, consequently, automaticity and internalisation. The interviews showed that L2 internalisation is eventually possible in both cases though.

Conclusion

This study identified influential variables in multilinguals' use of L1 and L2 inner speech. By focusing on L1s which had not been analysed systematically before and a homogenous group of L2 users of English it was shown that also in these cases findings from previous studies were mostly supported: overall, L2 users of English reported using the L1 more frequently for inner speech (see Cook 1998; Dewaele 2015). Still, a number of variables can boost the use of the L2 for inner speech: the frequency of using the L2, living in an English-speaking country and, linked to it, being exposed to the language in naturalistic contexts led to a significant increase in L2 use for inner speech as did self-reported L2 dominance, a great overall number of languages known, high self-reported L2 proficiency and a high bilingualism index. The interviews demonstrated the dynamics underlying language use for inner speech in multilinguals and showed that language use for inner speech can even be shifted from the L1 to English in case of frequent and proficient use in LX-speaking countries (Dewaele 2015). A comparison of L2 users from Western and Asian L1 backgrounds furthermore showed differences in frequency of using the L1 and L2 for inner speech. The underlying reasons are not clear: possibly, cognitive restructuring (Dewaele 2015; Pavlenko 2011b, 2014) takes longer in case of greater (typological and cultural) distance of the L1 and L2 and language use for inner speech might eventually be linked to automaticity (Ortega 2009; Segalowitz 2003) of LX use in general. Further research is still needed to be able to disentangle possible confounds sufficiently.

Data availability statement

The data that support the findings of this study are available from the corresponding author, P.R., upon reasonable request.

Disclosure statement

No potential conflict of interest was reported by the author.

Notes on contributor

Pia Resnik is a Senior Lecturer in the Department of English at the University of Vienna, Austria. Her research interests include all aspects surrounding LX users of English, with a particular focus on emotions in multilingual contexts. She is the author of the forthcoming book *Multilinguals' Verbalisation and Perception of Emotions*.

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