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# Bilingual language use is context dependent: using the Language and Social Background Questionnaire to assess language experiences and test-retest reliability

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## ABSTRACT

Bilingualism is a multi-faceted experience and bilinguals differ in how they use their languages in daily life. Therefore, assessments of bilingualism that consider the role of (social) context are needed when describing bilinguals. In this study, we evaluated how (reliably) the Language and Social Background Questionnaire (LSBQ; Anderson et al. 2018) describes language experiences of bilinguals living in the UK. Across 163 participants, nine factors were found to describe their daily-life language experiences in different contexts or with different interlocutors. Factors describing language use also correlated with objective English (L2) proficiency. These findings emphasise the need for studies to characterise bilinguals' daily-life language use in more detail and with a focus on the multi-dimensionality of bilingualism. Test-retest reliability (assessed across two weeks) was moderate to substantial, showing that the LSBQ might be a reliable tool to capture these bilingual experiences.

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Language and Social  
Background Questionnaire;  
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## 1. Introduction

Language is an essential part of communication and communicating in multiple languages is very common, with at least half the world's population speaking two or more languages (Grosjean 2010). Given the large presence of bilingualism in our societies, a thorough understanding of bilingual communication is needed. Indeed, there is a vast literature studying bilingualism from different perspectives, including research on the cognitive and linguistic processes involved in speaking and comprehending multiple languages and the potential consequences of bilingualism for other domains, including cognitive control.

Within this large number of bilinguals, there is a large range of individual differences, including in terms of age of acquisition, proficiency, use, and switching (see e.g. Genesee 2016). Some bilinguals acquire two languages from birth while others acquire a second (or additional) language later in life. Some bilinguals have a native-like proficiency in both languages while others are more dominant in one than the other. Some bilinguals use both languages approximately equally often on a daily basis while others use one language more often. Some bilinguals frequently switch between languages while others use their languages in separate contexts without switching frequently. Here, we will use the term 'experiences' to refer to these aspects of bilingualism (e.g. age of acquisition, proficiency, use, and switching) that can differ between individual bilinguals.

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Recent years have seen an increased focus on the way individual bilingual experiences might shape both bilingual production/comprehension and potential consequences for other domains (e.g. Baum and Titone 2014; De Bruin 2019; Green and Abutalebi 2013; Gullifer and Titone 2020). In addition to research assessing the role of language proficiency and age of acquisition in tasks assessing language control and cognitive control (e.g. Meuter and Allport 1999; Luk, De Sa, and Bialystok 2011), the recent focus is on individual differences in the way bilinguals use their languages. This includes frequency of use (i.e. how often each of the languages is used on e.g. a daily or weekly basis) as well as type of use (e.g. whether a language is used in single-language or in dual-language contexts). Green and Abutalebi's Adaptive Control Hypothesis (2013) argues that language control, and consequently non-linguistic cognitive control, adapt to the demands posed by a specific interactional context (e.g. a single- or dual-language context). Use of one specific language in a single-language context would place different demands on control mechanisms than use of multiple languages in dual-language contexts. Language control and cognitive control are therefore argued to differ within bilinguals (depending on the context they are in) but also between bilinguals (depending on how they typically use their languages in daily life). Recent studies indeed suggest that language control can be modulated by contextual demands on language use within bilinguals (e.g. De Bruin, Samuel, and Duñabeitia 2018), as well as by differences in language use between bilingual groups (e.g. Beatty-Martínez et al. 2020). Furthermore, much research has focused on assessing if and how language experiences such as language use can modulate (non-linguistic) cognitive control. The evidence in this area remains mixed (see e.g. Gullifer and Titone 2021; Pot, Keijzer, and De Bot 2018; Prior and Gollan 2011), with recent meta-analyses highlighting the need for more detailed descriptions and measures of language experiences that allow for comparisons across studies (e.g. Gunnerud et al. 2020; Lehtonen et al. 2018).

These comparisons between bilinguals and different studies are made more difficult because journal articles frequently do not describe the participants' language profile in any or much detail (Surrain and Luk 2019). The absence of detailed assessments of language experiences makes it difficult to assess effects of individual differences between participants *within* a study, but also to compare findings *across* studies. In research areas that yield mixed results, such as the literature on bilingualism and cognitive control, understanding the language profile of the bilinguals that are tested (and potential differences in language profile between studies) can help to potentially explain the mixed results observed. This would be greatly facilitated by the use of a standardised measure that can be used to assess bilinguals from different backgrounds across the globe.

Such questionnaire should do justice to the heterogenous nature of bilingualism. When language use is reported, it is often assessed globally (e.g. by asking bilinguals how often they use or are exposed to language X). However, bilinguals can greatly differ in their language use depending on the contexts they might find themselves in (Green and Abutalebi 2013). That is, in some contexts, bilinguals might be more likely to use one language the whole time while in other contexts they might use two languages. A Mandarin-English bilingual studying in the UK, for example, might always use English in the classroom while both languages might be used when talking with Chinese friends in the UK. In addition, some topics or domains might be exclusively or more strongly associated with a specific language, for example as a consequence of how a language is acquired (Grosjean 2016). When talking with Chinese friends in the UK, a Mandarin-English bilingual might use English to talk about studying but Mandarin to talk about their family in China.

In order to better describe participants' language-use experiences in relation to different contexts, people, and topics, Anderson et al. (2018) developed the Language and Social Background Questionnaire (LSBQ). In a study of 408 young adults (both monolinguals and bilinguals), the researchers assessed demographic information, self-rated proficiency, and frequency of language use within different life stages (infancy, preschool, primary school, and high school), different contexts (e.g. home, work, school), with different people (e.g. parents, neighbours), and for different activities (e.g. social media, watching movies, browsing the internet). The questionnaire also included questions about code-switching in different contexts. Usage was assessed on 5-point Likert scales

where 0 represented 'All English' and 4 represented 'Only the other language'. Based on a factor analysis, the authors showed that their bilingual sample was best described by these two factors: (1) non-English language proficiency and use at home and (2) non-English language use socially. Finding different patterns of language use in different contexts (at home versus socially) highlighted that bilinguals do not always use their languages in the same way. Rather, language use appears to be context dependent.

Others have used different methods to show that bilingual language use might depend on the context. Gullifer and Titone (2020) analysed the language history of bilingual/multilingual students in Canada. They calculated language entropy (time spent in more single-language vs more dual-language environments) to measure bilingual language use. They too showed that language use can differ between contexts, with participants showing more diverse dual-language use in social and work contexts than at home. Furthermore, their language entropy scores were associated with self-reported L2 abilities. In this particular study, the language-experience questionnaire included some different contexts (e.g. work versus home) but used more general questions to assess language use. Assessing more diverse contexts, Gullifer et al. (2021) recruited 87 Franco-Anglo bilinguals who lived in Montreal. Assessments of language proficiency (self-rated and objective), L2 age of acquisition, exposure, and language entropy across a range of contexts confirmed that language use is multi-dimensional with context-dependent patterns of language exposure.

### 1.1. Current study

While we are thus starting to see the development of questionnaires considering the role of context when assessing bilingual language experiences (e.g. Anderson et al. 2018; Gullifer et al. 2021), most of this research has focused on bilinguals living in Canada. Given the range of bilingualism in the world, and given the need for language-use measures that can be applied and compared across different bilinguals, it is important to assess how these types of questionnaires can describe language use in other bilinguals. Furthermore, to reliably examine individual differences between bilinguals and the potential role in e.g. language and cognitive control, we need to know the reliability of these self-ratings. The present study therefore assesses daily-life language use in different communicative contexts as measured through the LSBQ (Anderson et al. 2018) within a sample of bilinguals living in the UK who speak a native language other than English. Most participants were sequential bilinguals who acquired English after their native language during childhood or adolescence. These bilinguals were living in a country (UK) that for them either formed an L2-dominant environment (for the bilinguals who mainly used English) or a dual-language environment (for the bilinguals who continued to use their native language in the UK).

Our study had three main questions. First, given the need for an assessment of language use that can be used globally across different bilingual populations, we wanted to assess how the LSBQ (Anderson et al. 2018) described language use in different contexts in a different group of bilinguals. This first question addressed whether language use in these bilinguals living in the UK is comparable across contexts and activities or rather (similar to previous studies assessing bilinguals in Canada, Anderson et al. 2018; Gullifer et al. 2021) multi-faceted and best described by considering different contexts, interlocutors, and activities. Through factor analyses we therefore assessed the different language-use environments in these bilinguals.

Second, following Anderson et al.'s (2018) and Gullifer et al.'s (2020, 2021) finding that language use is associated with language proficiency, we examined whether this was also the case in this sample of bilinguals. We used a short lexical decision task as an objective measure of English proficiency. We examined whether language use in different contexts (as established by the factor analysis) was associated with English (L2) proficiency. In addition, we assessed whether there was a relationship between time spent in the UK (as a measure of time of L2 immersion) and the various language-use factors. The overall aim of this question was to examine how different aspects (language proficiency, L2 immersion, and language use) of a bilingual's profile relate to

each other. Assessing the strength of this relationship also allowed us to examine the importance of measuring and describing these different aspects of bilingualism when working with bilingual participants. If different language experiences (proficiency, L2 immersion, and use) are very strongly correlated, a detailed examination of all of these aspects might be less crucial. However, no or low correlations would show the need for detailed, comprehensive tests that do not just assess one aspect (e.g. proficiency OR use) but that assess multiple components.

Finally, it is important to assess the reliability of this questionnaire. Language use almost inevitably needs to be assessed through self-reported measures. The use of self-reports has been questioned when it comes to describing one's own proficiency (Tomoschuk, Ferreira, and Gollan 2019). Self-rated proficiency might, for example, depend on the reference point participants use (e.g. a Chinese-English bilingual who compares their English proficiency to that of a native speaker might give themselves a lower score than a Chinese-English bilingual who compares their proficiency to an English language learner; Tomoschuk et al. 2019). Considering the difficulty of assessing one's own behaviour, similar criticism might apply to self-reported language use. Asking a participant to indicate how often they speak English (or any other language) in general might lead to different participants using different reference points. For example, one participant might think of their time at university and might indicate they use English almost all the time. Their classmate (who uses English just as often), however, might mainly think of their time talking with their parents who do not speak English and might indicate they do not often use English. This leads to inconsistencies between bilinguals but can also lead to low reliability if the same participant uses different reference points depending on their most recent contact (e.g. the same bilingual might use a different reference point immediately after calling their parents versus immediately after studying for an exam). Asking about specific contexts might give participants a specific reference point to focus on and as such might lead to more consistent responses across and within bilinguals. In this study, we assessed the consistency of participants' responses by asking a subset of participants to complete the same questionnaire two weeks later. This way, we examined the test-retest reliability of their responses. While more research is needed to assess whether self-reported questionnaires capture actual daily-life behaviour, finding high test-retest reliability would provide support for consistency in the participants' responses, which is an important aspect of questionnaire reliability.

## 2. Methods

### 2.1. Participants

Participants were recruited using prolific.co, an online participant recruitment platform that allows researchers to advertise their online studies to a large group of participants. Participants were then redirected to a Qualtrics link, where they completed the study. Participants were only identifiable through their Prolific ID code and therefore remained anonymous. The study received ethical approval from the ethics committee in the Department of Psychology. We focused on bilinguals who speak a native language that is not English and who are currently living in the UK but were not born there. Using Prolific's screening questions (i.e. questions that participants are asked to complete when they sign up for Prolific), we invited participants aged between 18 and 40 years old who were living in the UK, did not have hearing or vision problems, and who spoke a native language other than English. Considering that the LSBQ has been designed for bilinguals (Anderson et al. 2018), we also wanted to filter out multilingual participants. We defined being multilingual as being fluent in English plus another two or more languages. Prolific's existing screening questions, however, did not work well to screen out multilinguals. We therefore first asked participants to complete a short screening survey that assessed our main inclusion criteria (being bilingual, speaking a language other than English as their native language, living in the UK, and not having a language, vision, or hearing disorder). This was completed by 385 participants. Multilingual participants who indicated being fluent in more than two languages (i.e. participants who spoke one or more

languages in addition to English and their native language) were not invited for the full survey ( $N = 166$  excluded). Furthermore, we excluded participants who indicated not being fluent in a third language but who did indicate using another language than English + their native language for more than 10% of their daily life within the last three-months ( $N = 36$ ) or who used a local dialect (e.g. a local Chinese dialect,  $N = 3$ ). In addition, we excluded participants with a reading, communication, or developmental disorder or a hearing issue ( $N = 10$ ). Lastly, we used the survey to make sure that participants resided in the UK and had not spent more than 3 months in another country within the last 12 months ( $N = 2$  excluded). One additional participant was excluded for reporting no time speaking English in the past three months. Four participants were excluded because the data were not saved correctly or because they did not complete the study/were not allowed to start the study because they gave no consent.

The full survey and proficiency measure were completed by 163 eligible participants. Participants' ages ranged from 18 to 40 years ( $M = 28.39$ ,  $SD = 5.65$ ). The participants' spoken languages were also recorded and 35 languages were spoken in addition to English (see Table 1). In all cases, participants acquired this language from birth and we consider this to be the native language. None of the participants were born in the UK and participants varied in number of years spent in the UK (see Table 1). A small set of participants ( $N = 6$ ) acquired English from birth in addition to another language but most participants acquired English during their childhood or adolescence (see Table 1). A subset of our participants ( $N = 36$ ) listed English as their most fluent language.

To examine the consistency and test-retest reliability of the questionnaire of interest (i.e. the LSBQ), we invited a subset of participants ( $N = 64$ ) to complete the LSBQ again. These participants were randomly selected from the participants who completed all LSBQ questions in the first testing moment. 56 invited participants took part (the other 8 people did not respond to the invitation). On average, they completed the LSBQ again after 12 days ( $SD = 2$  days; range = 9-16 days). English Age of Acquisition ( $M = 10.8$ ,  $SD = 5.7$ , Range = 0-27 years old) and time spent in the UK ( $M = 8.8$  years prior to study,  $SD = 5.5$ , Range = 1-24 years prior to study) of the retested group were representative of the total sample.

## 2.2. Tasks and procedure

Participants who were invited to take part in the full study completed an adapted version of the Language and Social Background Questionnaire (LSBQ; Anderson et al. 2018). This was used as the primary assessment of contextual language use. We adapted some of the questions to make sure the formulation made sense for our participants in the UK (e.g. questions referring to Canada in the LSBQ were reformulated to refer to the UK) and some questions that were not relevant for the current study were removed (e.g. questions about video-game playing). We also added some questions asking about time spent in the UK and when participants first moved to the UK. In addition, we asked participants to evaluate all questions in the context of the past three months,

**Table 1.** Language background (native languages spoken; English age of acquisition; English acquisition environment; years spent in the UK) of the participants.

Language background	Description
Native languages spoken	Afrikaans (1), Arabic (5), Bengali (1), Bulgarian (6), Cantonese (2), Chinese (5), Danish (1), Dutch (4), Farsi (1), Finnish (3), French (7), German (6), Greek (4), Hungarian (7), Indonesian (1), Italian (8), Japanese (1), Latvian (1), Lithuanian (5), Malay (1), Mandarin (1), Norwegian (1), Persian (1), Polish (33), Portuguese (11), Romanian (7), Russian (10), Slovenian (1), Spanish (13), Swedish (3), Tagalog (1), Tamil (1), Turkish (5), Urdu (2), Vietnamese (3).
English Age of Acquisition	$M = 10.0$ years old, $SD = 5.7$ years, Range = 0-32 years old.
Reported environments of English acquisition	Home; School; Wider Community; Listening to Music; Watching TV
Years spent in the UK (first move to the UK)	$M = 7.1$ years prior to the study, $SD = 4.9$ years, Range = 1-24 years prior to the study.



apart from questions that specifically asked about other times (e.g. childhood). For questions about language use in specific contexts or for specific activities (e.g. praying), we allowed participants to select the answer option 'NA' to indicate that they did not spend any time in that context.

The LSBQ questionnaire consisted of three parts. The first was Personal Background, which asked participants general background questions (e.g. age, occupation, etc.). In this section, we also assessed the countries the participant has lived in, for how long and when they moved to the UK, as well as the participant's parents' education and current occupation. The second part was Languages Spoken and Language Use, which assessed which languages the participants spoke and where they learnt these languages (i.e. at home, school, through the community or other environments). This part also asked participants to self-rate their proficiency (in speaking, reading, writing and understanding) in different languages on a Likert scale (0 = No Proficiency, 10 = High proficiency). In addition, the questionnaire asked participants about their frequency of language use (ranging from 'None' (1) to 'All' (5)). The final part focused on Language use in contexts and assessed how different languages were used in different contexts (e.g. home, school, social activities, religious activities) and language use in different life stages (e.g. infancy, high school) as well as with different interlocutors (e.g. parents, roommates). Participants were asked to indicate their language use ranging from 'Only the native language' (2; the value 1 was used to indicate that the context was not applicable) to 'Only English' (6). The final part of this section also asked participants whether and how often they switched languages. The response options ranged from 'Never' (1) to 'Always' (6). We added some additional language switching questions to the end of the survey. Given our focus on the LSBQ and language *use*, we will not include these extra language-switching questions in the analyses presented here.

In addition, participants completed a lexical decision task, used to assess objective English proficiency. The task was developed to be similar to the LexTALE (Lemhöfer and Broersma 2012), a frequently used lexical decision task to assess proficiency, but presented participants with 30 words and 30 pseudowords (contrary to the LexTALE, which includes 40 words and 20 pseudowords). In our assessment (which used slightly different stimuli than the LexTALE), participants saw the 30 English words and 30 non-words in a random order and were asked to decide whether the word was a real word or not by indicating 'Yes' or 'No'. The task was not timed and similar to the instructions used in the LexTALE, participants were free to use as much time as they liked on each trial. The full list of words and non-words can be found in Appendix 1. Words were chosen to have a low frequency but were somewhat higher in frequency and shorter in length than word stimuli used in the LexTALE. Proficiency was calculated as the  $I_{SDT}$  score proposed by Huibregtse, Admiraal, and Meara (2002) and also suggested as a scoring method for the LexTALE (Lemhöfer and Broersma 2012). This scoring method is based on signal detection theory and corrects for both guessing and individual biases towards yes or no responses.

A subset of participants was contacted again after approximately two weeks to complete the LSBQ again. We decided against a longer interval between testing points 1 and 2 to avoid participants undergoing changes in their language environment (e.g. moving to a new city or country) between the two testing points (which would have led to low test-retest scores as a consequence of actual changes in language experiences rather than low test-retest reliability).

All data are available on <https://osf.io/zn6mj>

### 3. Results

#### 3.1. Factor analysis

We started our analysis with the 47 items that form part of the LSBQ asking about self-rated language proficiency, use, and switching (Questions 16–22 in the LSBQ, Anderson et al. 2018). In addition, we included English Age of Acquisition. Other background variables (e.g. age, native language) were not included. Given that we allowed participants to indicate that a context/situation was not applicable,



several items included many missing values. For most cases, these missing values were not ‘forgot-ten’ answers but rather an indication of a certain context not applying to a specific participant. We removed items that had missing values for over half of the participants: religious activities (135 NAs), praying (133 NAs), school (120 NAs), with roommates (91 NAs). Most other items had some missing values; in these cases we opted to exclude missing values pairwise.

Next, we examined the correlation matrix between the different items. Correlations between items were lower overall than observed in Anderson et al. (2018). This might be related to the current study targeting a more heterogeneous group of bilinguals as well as the absence of mono-lingual participants. However, almost all items had correlations with other items of  $r > .3$  (see Sup-plementary Figure 1 for the correlational matrix including the items that were included in the final factor analysis). Two items (language use with grandparents and language use with other relatives) showed no or only one correlation of .3 with another item and were removed. None of the items showed high ( $r > .9$ ) correlations with another item.

We first ran an initial factor analysis using SPSS 26 to identify and remove items loading equally on more than one factor (difference between highest factor loadings being smaller than .4, in line with Anderson et al. 2018). We suppressed small coefficients ( $< .4$ ). We used Principal Component analysis – Varimax as the extraction method. The results from this initial analysis can be found in Supplemen-tary Table 1. The initial principal component analysis indicated that 11 factors had eigenvalues above 1 (with the last factor only including 1 item), with those 11 factors explaining 72% of the variance (see Supplementary Tables 1 and 2). However, eight variables were found to load into multiple com-ponents (Native time spent listening, English time spent speaking, English time spent reading, language use at work, language use for social activities, language use reading, language use notes, language switching family, see Supplementary Table 2), 1 item did not load into any com-ponent (language use social media), and 1 item formed a factor on its own (language use emails).

The factor analysis was then re-run without these variables; the new analysis showed another three items that loaded into multiple factors (language use texting, infancy language exposure, English time spent listening) and that were subsequently removed. The final analysis showed that there were nine factors with eigenvalues above 1, which explained 74% of the variance (see Table 2) with the finalised rotated component matrix shown in Table 3. The results reported used a varimax rotation but promax rotations showed the same nine factors with the same items. This factor analysis had a Kaiser-Meyer-Olkin Measure of Sampling Adequacy of .759 (exceeding the rec-ommended .6), and the Bartlett’s Test of Sphericity was also significant ( $\chi^2(406) = 1360.995, p < .001$ ). This confirmed that a factor analysis was an appropriate analysis. Furthermore, considering the low between-item correlations, we checked the KMO for each individual item to test whether they were above .5. All items apart from one (language switching with friends, .478) showed scores between .550 and .869, showing that they were suitable for inclusion in a factor analysis.

The following nine factors were found:

**Table 2.** Factors and variance explained in the final factor analysis.

Component	Total	Initial Eigenvalues	
		% of Variance	Cumulative %
1. English Language Proficiency	6.469	22.306	22.306
2. Native Language Proficiency	3.878	13.374	35.680
3. Language Environment Acquisition	2.805	9.674	45.353
4. Everyday Personal Language Use	1.876	6.470	51.823
5. Entertainment Language Use	1.781	6.142	57.965
6. Social language Use	1.411	4.866	62.830
7. Native Time Spent for Literacy	1.217	4.197	67.027
8. Language Switching	1.118	3.856	70.884
9. Family Language Use	1.026	3.539	74.423

Extraction Method: Principal Component Analysis.

**Table 3.** Item loadings on the nine factors in the final factor analysis (Rotated Component Matrix).

	Components								
	1	2	3	4	5	6	7	8	9
English reading proficiency	.871								
English writing proficiency	.859								
English understanding proficiency	.859								
English speaking proficiency	.828								
English time spent writing	.426								
Native language reading proficiency		.860							
Native language writing proficiency		.856							
Native language speaking proficiency		.841							
Native language understanding proficiency		.783							
Primary school language exposure			.851						
English age of acquisition			-.791						
Preschool language exposure			.752						
High school language exposure			.535						
Language use at home				.906					
Language use to partner				.821					
Native time spent speaking				-.768					
Language use movies					.860				
Language use TV/radio					.824				
Language use online					.656				
Language use commerce						.814			
Language use offices						.743			
Language use to neighbours						.580			
Language use hobbies						.508			
Native time spent writing							.824		
Native time spent reading							.819		
Language switching friends								.918	
Language switching social media								.865	
Language use to siblings									.822
Language use to parents									.772

Factor 1: English Language Proficiency. This included the participants' subjective ratings of their speaking, reading, writing and comprehension skills in English. It also included time spent writing English.

Factor 2: Native Language Proficiency. Much like Factor 1, this factor reflected the participants' subjective ratings of their own capabilities for speaking, reading, writing, and comprehension in their native language.

Factor 3: Language Environment Acquisition. This factor included English age of acquisition and language exposure at primary, preschool and high school. This factor reflects when English was acquired and the environment it was acquired in.

Factor 4: Everyday Personal Language Use. This factor included Language Use at Home, Language Use to Partner, and time spent speaking their native language. This factor reflects how participants used their languages in their personal home spheres.

Factor 5: Entertainment Language Use. This factor included language use while watching movies, TV/ Radio, and language use online. This factor reflects how participants use their language around personal and technological entertainment.

Factor 6: Social Language Use Outside the Home. This factor included language use in offices (including healthcare services and banks), commercial areas (including shopping and restaurants), neighbours, and during hobbies and sports. This factor reflects how participants use language within wider social circles beyond the home environment and in official environments such as offices for necessity rather than personal preference.

Factor 7: Native Time Spent for Literacy. This variable included time spent writing and reading in their native language. This reflects how participants interact with text and literature while using their native language.

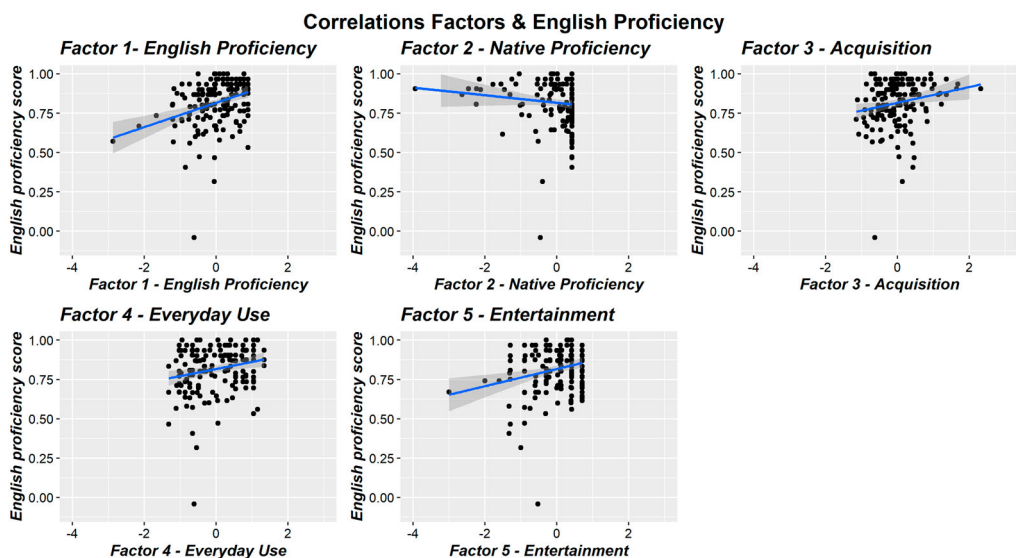
Factor 8: Language Switching. This factor reflects language switching in both included contexts (with friends and while using social media).

Factor 9: Family Language Use. This variable includes language use to siblings and parents.

### 3.2. Correlation analysis

Following the factor analysis, we conducted two sets of correlational analyses. First, we examined whether there was a relationship between the language-use factors and objective language proficiency. The proficiency score used was the  $I_{SDT}$  score from the lexical-decision task. Initial analyses used accuracy (total number of correct responses, not corrected for bias or guessing) as the proficiency score and showed highly similar results. Next, we examined whether there was a relationship between the language-use factors and time spent in the UK (i.e. time immersed in L2). While objective English proficiency and time spent in the UK were positively correlated ( $r = .183$ ,  $p = .019$ ), the correlation was not strong and suggested that proficiency and time of L2 immersion reflect different constructs. Following the derivation of the factor structure, factor scores were calculated for each participant. We only included the larger factors that explained over 5% of the variance each (i.e. the first five factors). We first standardised raw scores and multiplied these by the factor weights for each item for each participant. The weighted standardised scores for each item were then averaged to produce a factor score for each participant on each factor.

We first report the correlations between the objective English proficiency scores and the first five factors (using a Bonferroni corrected  $p$  value of .01). The five correlations are shown in Figure 1. There was a significant correlation between the objective proficiency test and the first factor, reflecting self-rated English proficiency ( $r = .333$ ,  $p < .001$ ). This result demonstrates that participants who rated their English language use as higher also had a higher objective English proficiency score. However, there was no significant relationship between self-rated Native Language Proficiency (Factor 2) and objective English proficiency ( $r = -.118$ ,  $p = .135$ ). There was a positive relationship between English



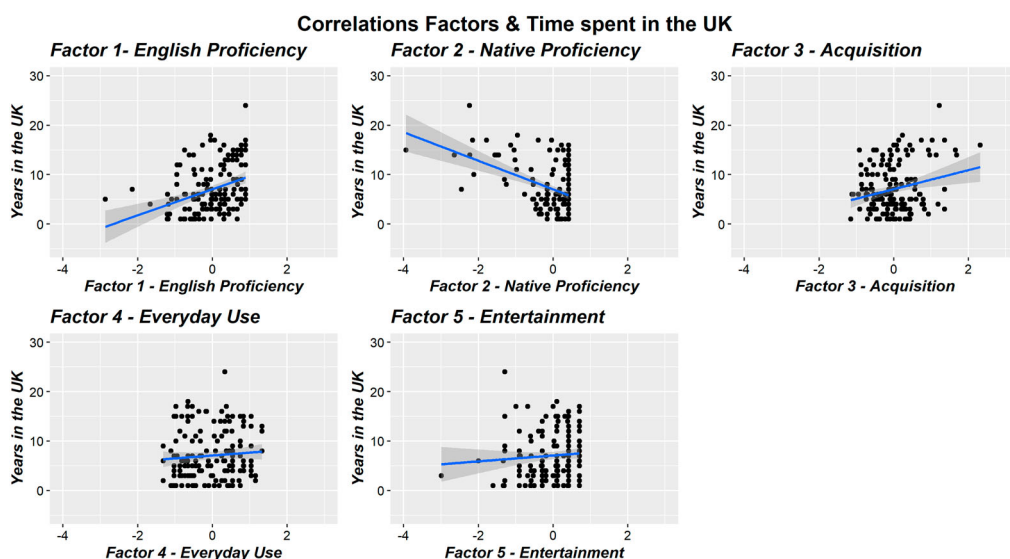
**Figure 1.** Scatterplots showing the correlations between Objective English Proficiency and the five main factors describing language background (English Proficiency, Native Proficiency, Language Acquisition, Everyday Personal Use, Entertainment Language Use). Higher English proficiency scores reflect higher Objective English Proficiency. Higher Factor scores reflect higher self-rated English proficiency (Factor 1); higher self-rated native proficiency (Factor 2); more English language use (Factors 3–5).

proficiency and Language Environment Acquisition (Factor 3;  $r = .198, p = .011$ ). This result demonstrates a positive correlation between time and place of English language acquisition and objective English proficiency. Higher factor scores reflected using more English early in life, indicating that participants who acquired English earlier had a higher English proficiency score. There was also a positive relationship between English proficiency and Everyday Personal Language Use (Factor 4,  $r = .219, p = .005$ ). This result indicates a positive correlation between language use in people's personal lives at home and objective English proficiency, reflecting that participants who used English more at home had a higher score in English proficiency. Lastly, there was a positive relationship between proficiency and Entertainment Language Use ( $r = .242, p = .002$ ), reflecting that participants who used English in the context of media consumption had a higher English proficiency.

Next, we assessed whether there was a significant correlation between these five factors and time spent in the UK (see Figure 2). There was a positive correlation between time spent living in the UK and Subjective English Language Proficiency (factor 1,  $r = .348, p < .001$ ). This result shows that those who spent more time in the UK had a higher English proficiency. In contrast, there was a negative association with Native Language Proficiency ( $r = -.433, p < .001$ ). This result shows that the longer the time spent living in the UK, the lower the perceived native proficiency is. There was a positive correlation with Language Environment Acquisition ( $r = .232, p = .003$ ), demonstrating that participants who moved to the UK longer ago also had more English exposure in their early-life environment. However, time spent in the UK did not correlate significantly with language use as described in either Factor 4 or 5 (Everyday Personal Language Use:  $r = .087, p = .270$ ; Entertainment Language Use:  $r = .080, p = .311$ ).

### 3.3. Test-retest reliability

To examine response consistency, 56 participants completed the same questionnaire again approximately two weeks later. As a sanity check, we assessed whether all participants provided the same language as their native language in both testing moments. This was indeed the case for all



**Figure 2.** Scatterplots showing the correlations between Time Spent in the UK and the five main factors describing language background (English Proficiency, Native Proficiency, Language Acquisition, Everyday Personal Use, Entertainment Language Use). Higher “Years in UK” scores reflect more time spent in the UK. Higher Factor scores reflect higher self-rated English proficiency (Factor 1); higher self-rated native proficiency (Factor 2); more English language use (Factors 3–5).

participants. We examined test-retest reliability for the items that were included in the factor analysis (see Table 3). For each individual item, we only included a participant if they provided a score at both testing moments (i.e. an item for which a participant indicated 'not applicable' at either Time 1 or 2 was not included). The number of participants included for each item is provided in Table 4. We report correlations (Spearman's rho) as an indication of the overall relationship between Time 1 and 2 (e.g. whether participants who rated their English speaking proficiency as high at Time 1 also gave themselves a high score at Time 2). We also report both unweighted and weighted kappas. While unweighted kappas give an indication of exact agreement (i.e. scoring English proficiency as 8 at Time 1 and 2), weighted kappas take into consideration that a score of 8 at Time 1 and 7 at Time 2 is more consistent than a score of 8 at Time 1 and 2 at Time 2. As can be seen in Table 4, there was only one item with a low correlation between Time 1 and 2 (language use in offices such as health care offices, government offices, and banks). All others items showed correlations between 0.4 and 1, showing moderate to strong associations between Time 1 and 2. All unweighted Kappa values (apart from language use in offices) were above 0.2, showing fair to substantial agreement. This improved when weighted Kappa scores were considered, which all fell above 0.33 (apart from

**Table 4.** Test-retest reliability analyses per item, organised by factor.

	Spearman's rho	Kappa	Weighted Kappa	N
<b>Factor 1</b>				
English reading proficiency	0.795	0.384	0.561	54
English writing proficiency	0.824	0.272	0.562	54
English understanding proficiency	0.871	0.505	0.675	54
English speaking proficiency	0.818	0.432	0.608	54
English time spent writing	0.658	0.365	0.395	56
<b>Factor 2</b>				
Native reading proficiency	0.750	0.447	0.615	55
Native writing proficiency	0.761	0.349	0.681	55
Native speaking proficiency	0.823	0.509	0.654	56
Native understanding proficiency	0.698	0.423	0.477	56
<b>Factor 3</b>				
Primary school language exposure	1	1	1	56
English Age of Acquisition	0.924*	X	X	56
Preschool language exposure	0.677	0.623	0.658	56
High school language exposure	0.779	0.543	0.642	56
<b>Factor 4</b>				
Language use at home	0.807	0.425	0.648	54
Language use with partner	0.821	0.654	0.766	44
Native time spent speaking	0.441	0.268	0.339	56
<b>Factor 5</b>				
Language use movies	0.478	0.410	0.462	56
Language use TV/radio	0.646	0.428	0.520	49
Language use online	0.763	0.567	0.657	56
<b>Factor 6</b>				
Language use commerce	0.752	0.675	0.656	52
Language use offices	0.184	0.203	0.176	45
Language use neighbours	0.689	0.528	0.513	49
Language use hobbies	0.753	0.509	0.674	36
<b>Factor 7</b>				
Native time spent writing	0.594	0.394	0.413	56
Native time spent reading	0.610	0.442	0.502	56
<b>Factor 8</b>				
Language switching with friends	0.728	0.362	0.525	56
Language switching social media	0.783	0.379	0.574	56
<b>Factor 9</b>				
Language use with siblings	0.723	0.629	0.741	45
Language use with parents	0.540	0.485	0.537	56

Notes: The table provides Spearman's rho as a measure of association and both unweighted and weighted Kappa values as a measure of agreement. The last column provides the number of participants included for that item.

\*English AoA is not ordinal, so kappa values are not reported and Pearson's *R* is reported instead of Spearman's rho.

language use in offices). The majority of weighted kappa scores were between 0.5 and 0.7, showing moderate to substantial agreement between Time 1 and 2.

## 4. Discussion

In this study, bilinguals living in the UK and speaking English in addition to one other language were asked to complete the Language and Social Background Questionnaire (Anderson et al. 2018). Our study had three aims. First, we wanted to assess the use of the LSBQ in a new sample of bilinguals living in a different country (UK). We examined which factors described individual differences in language use to assess whether language use in this bilingual sample was context-independent or rather best described by different types of contexts, interlocutors, and activities. Factor analyses showed that there were nine underlying factors tapping into proficiency (English + native language); language acquisition environment; everyday language use in the home environment; entertainment language use; social language use outside the home environment; time spent using the native language for reading/writing; language switching; and language use with family (parents/siblings). The second aim was to assess potential correlations between daily-life language use and language proficiency. Objective English proficiency was found to correlate with the main factors describing language use, such that participants who used English more often in their daily-lives also showed higher proficiency scores. However, language use as described in these factors did not correlate with time immersed in the L2. The third aim was to examine test-retest reliability of the LSBQ. Most examined items showed moderate to high test-retest reliability, demonstrating that the LSBQ provides reliable and consistent self-ratings of daily-life use.

### 4.1. Factors describing language use

Nine different factors were found to describe the participants' proficiency, use, and switching. Most variance was accounted for by the first five factors reflecting proficiency (English and native), type of language acquisition, everyday language use (at home and with partner), and entertainment language use (tv, movies, and online). The other four factors (social language use outside the home environment; native language used for reading and writing; language switching; and language used with family) each explained less than five per cent of the variance. These findings strongly suggest that language experiences are not the same across all aspects of our lives. Rather, they depend on the exact interactional context a bilingual finds themselves in, including the activity, environment, and interlocutor. The specific factors also suggest that there might be differences between contexts that require use of a specific language (e.g. language use outside the home environment with e.g. neighbours or at an office often requires English in the UK) and contexts that might allow for a more personal preference (e.g. choice at home and when choosing e.g. a movie or music). Language switching was found to be a separate factor not associated specifically with amount of language use in different contexts. This could suggest that reasons for language switching might differ from reasons for using specific languages and that reasons for switching might apply to different contexts (in this case, friends and social media).

The finding that language use is not the same across all contexts but rather depends on the environment, interlocutor, and activity is in line with Anderson et al. (2018), who observed that language use can be described by two factors referring to different contexts: non-English use at home versus non-English use in social settings. We observed a similar division, with separate factors describing everyday language use at home and with the partner; with family (siblings and parents); and for social language use outside the home environment. This confirms that language use patterns are not uniform across contexts, with bilinguals potentially using their languages in different ways at home as compared to social settings outside the home environment. In addition, we identified several other factors related to types of activity (e.g. language use for entertainment such as tv and online browsing versus for reading and writing). This suggests that it is not just



important to consider different contexts (home versus social) but also different activities that can take place within those contexts. Our study resulted in a larger number of factors than previous work (e.g. Anderson et al. 2018). There might be various reasons for this. First, we only included bilinguals and no monolinguals. This might have allowed us to detect additional differences between bilinguals that might have been less salient when comparing bilinguals with monolinguals. Second, our sample of bilinguals might have been more heterogenous than previously studied samples. We included bilinguals anywhere in the UK and with a large range of backgrounds and languages. This might have diminished the presence of larger, common underlying factors.

Overall these findings support the importance of considering context-dependent language use (cf. Grosjean 2016) and they are in line with frameworks stressing the importance of context when studying bilingualism and individual differences between bilinguals (e.g. Adaptive Control Hypothesis, Green and Abutalebi 2013). The identification of multiple factors diverging in context, interlocutor and activity show that it might not be enough to ask for global language use/exposure scores when examining individual differences between bilinguals. While it is known that language experiences differ between and within bilinguals (e.g. De Bruin 2019; Genesee 2016), most research on bilingualism does not describe language use at all or uses global questions (Surrain and Luk 2019). Questions asking about overall exposure to or use of a certain language will mask these context-specific patterns of language use. In addition, global questions are likely to result in the use of different frameworks (e.g. one bilingual might be thinking about their use at home while another might be thinking about their use at work). If different bilinguals use different reference points when answering global questions about language use, it becomes very difficult to study individual differences and potential associations with language control or cognitive control. Our study emphasises the need for more detailed assessments of language use (such as the LSBQ) and furthermore shows that these measures can be used successfully to describe language use in a wider range of bilinguals. Previous research has focused on bilinguals living in Canada (e.g. Anderson et al. 2018). We show that the measure can also be used (with moderate to substantial test-retest reliability) in bilinguals living in the UK.

#### **4.2. Correlations with language proficiency**

Several previous studies (e.g. Anderson et al. 2018; Gullifer and Titone 2020) have observed correlations between language use and proficiency. In line with that work, the current study too observed correlations between language use in different contexts and objective English proficiency. For most participants, English was a non-native language that was acquired during childhood. Objective English proficiency correlated with the first factor reflecting self-rated English proficiency. In line with previous work (e.g. De Bruin, Carreiras, and Duñabeitia 2017; Marian, Blumenfeld, and Kaushanskaya 2007), this suggests that self-rated proficiency does correlate with objective measures. This shows that participants could – to some extent – estimate their own proficiency scores, although the strength of the correlation also suggests that self-ratings are not sufficient to capture the multi-dimensional nature of proficiency (cf. De Bruin, Carreiras, and Duñabeitia 2017). Objective English scores did not correlate with self-rated *native* language proficiency. English proficiency did correlate with the factors of acquisition and language use that we included. Earlier acquisition and more English use in early school years, more English use in the home context, and more media-related use of English were all associated with higher English proficiency. These correlations could reflect that participants with a higher proficiency use English more in daily life and/or that participants who use English more in daily life reach a higher proficiency. Correlations with the various language-use factors were of a similar strength, suggesting that associations between proficiency and acquisition and between different types of language use were comparable. While our proficiency scores did include a range (going from  $I_{\text{sdt}} -0.04$ , or 48% correct to  $I_{\text{sdt}} 1$ , or 100% correct), most participants were at the higher end of the continuum (see Figure 1). Future research will



need to assess the relationship between LSBQ language-use scores and proficiency across a wider range including bilinguals with a lower proficiency in their second language.

Interestingly, time spent in the UK correlated with the factors of proficiency and acquisition but not with language use. Participants who moved to the UK longer ago showed a higher proficiency in English and a lower proficiency in the native language. Time spent in the UK was also associated with the age of English acquisition. However, there was no significant correlation with language use patterns at home or related to media use. This suggests that participants who have spent more time in the UK were not more likely to actually use English at home or for entertainment. This finding highlights that language use can be a highly individual choice. While it is sometimes dictated by the circumstances (e.g. a specific language that needs to be used when going to the bank), it is often also a personal choice (e.g. choosing to watch a movie in English or your native language). Our findings show that these personal use choices might be associated with proficiency but that they might not be dictated by circumstances such as time immersed in an L2-environment.

In addition, most correlations only reflected a small-to-medium association. This highlights the need for comprehensive assessments of bilingualism that tap into various aspects of bilingual language profiles, including proficiency and use. Assessing the relationship between language proficiency and language or cognitive control might be modulated by differences in language use (or vice versa, by proficiency differences when only use is measured). Together, these findings support Gullifer et al.'s conclusions (Gullifer and Titone 2020; Gullifer et al. 2021) that language experiences are highly individual and multidimensional and show that we need to consider and describe the various aspects of an individual's bilingual profile.

### **4.3. Test-retest reliability**

An important aspect of questionnaires is their reliability. Anderson et al.'s assessment of their data suggested that the LSBQ has a high reliability. In this study, we assessed test-retest reliability to examine the consistency of participants' responses across time (two weeks). Participants were asked to consider the previous three months while responding to these questions. Furthermore, participants were tested in the summer of 2020 and their movements were restricted due to COVID-19. As a consequence, it was very unlikely that the participants' language experiences had changed dramatically during the two-week interval. Test-retest reliability was moderate to substantial for most items included in the factor analysis. These findings support the reliability of these responses. It suggests that participants are at least moderately consistent in their scores of daily-life experiences.

The five lowest-scoring items after language use in offices (weighted kappas below .5), with the exception of language used to watch a movie, referred to more general activities: time spent writing in English, time spent writing in the native language, time spent speaking in the native language, and proficiency understanding the native language. This could suggest that these more generic questions (that ask about speaking or writing time in general, without referring to a more concrete example) are less reliable across the two testing points. This is also confirmed by looking at the three highest scoring items (weighted kappa above .7). These three items refer to very specific interlocutors, namely partner and siblings, or a very specific time, namely language exposure at primary school. Questions about specific activities or interlocutors might provide more reliable responses than questions asking about language use more globally. Future research will need to examine whether responses are not just consistent but also a valid measure of actual daily-life experiences.

## **5. Conclusion**

This study examined how bilinguals in the UK use their languages in different contexts. It shows that in addition to proficiency and age of acquisition, bilinguals vary in their language use and that these patterns of language use can furthermore differ depending on the context, interlocutor, and activity. These individual contextual language-use patterns are associated with L2 proficiency. Given the

increased interest in individual language experiences and their role in language comprehension, production, and cognitive control, it is becoming increasingly necessary to define and measure bilinguals' language background. To do this, it is crucial to view bilingualism as a non-categorical experience that varies depending on the interactional context a bilingual finds themselves in. Studying language use in relation to context, activity, and interlocutor can give a more detailed assessment of language experiences.

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Appendix

Appendix 1. Stimuli used in the English objective proficiency test.

Words	Nonwords
Abide	Abergry
Arrested	Blewraht
Bay	Boaconic
Bent	Bumola
Chamber	Burder
Compass	Destription
Console	Digisol
Dainty	Glowl
Devices	Grynn
Dissemble	Interfate
Doom	Johackle
Door	Jovaphile
Esteem	Kermshaw
Forego	Luwest
Founder	Magrity
Goggle	Modgone
Harbour	Nedril
Hence	Plaudate
Igloo	Proom
Keen	Pruvia
League	Pudour
Loathe	Roinad
Mere	Safome
Moonlet	Sorson
Outrage	Swopom
Pinch	Swuoquix
Profound	Tomash
Rent	Tribepop
Shallow	Vallume
Wardrobe	Unelind