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Is it possible to predict which bilingual speakers have switched language dominance? A discriminant analysis

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ABSTRACT

Linguistic research on bilinguals has sometimes focused on either first vs. second acquired language or dominant vs. non-dominant language despite situations in which the dominant and first language are no longer the same. Many bilinguals in the U.S. and other countries experience a change in language dominance from a home language to a majority language. The present study examined language history data from young Spanish-English bilingual adults living in the U.S. in an attempt to predict their dominant language. A statistical discriminant analysis was used to create a simple model that made accurate predictions of reported current dominant language at well above chance rates. The variables used were Age of Acquisition (AoA) for English and AoA for Spanish. The results showed that predicted English-dominant speakers learned English earlier and Spanish later, whereas, predicted Spanish-dominant speakers learned English at a relatively older age, and Spanish relatively earlier. This was confirmed by replication in a second sample from the same population. The results of this analysis imply that it is possible to successfully predict language dominance using English AoA and Spanish AoA. Future research should focus on longitudinal studies of dominance switches and cross-validation in other populations of bilinguals.

ARTICLE HISTORY

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KEYWORDS

Language dominance; heritage bilinguals; bilingualism; second language proficiency; discriminant analysis

Introduction

Although most Americans are monolingual (fluent in only one language), there are growing numbers of bilingual (two languages) or multilingual (two or more languages) speakers within the country. A strong interest in bilingualism has blossomed over the past few decades given the large number of world citizens who speak more than one language and the increasing representation of such speakers in the United States. As such, examining their linguistic features and the implications for other social and cognitive factors is of great importance within the fields of education, sociology, linguistics, and psychology (just to name a few). Research focusing on bilingual participants can often be complex, however, given the heterogeneity of their demographic information, language experience, proficiency, and language use. Bilinguals can vary on many factors, such as their current most proficient or dominant language, which language they acquired first, their proficiency in each language, the age at which they began speaking each language (Age of Acquisition, AoA), the learning situation for each language (e.g. home, school, childcare, etc.), and how often they speak each language. Thus, it is important to be fully aware of the linguistic background of any bilingual participants in studies that measure multilingualism as a participant characteristic.

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The current study focuses on language dominance, a concept that has been defined in several ways by previous research. Many of these definitions are, ‘… more or less vague …’ (Cantone et al. 2008) and there is ‘little consensus about what it means to be dominant’ (Gertken, Amengual, and Birdsong 2014, 210), but most narrow in on three general types of concepts: proficiency (fluency), language use, or other individual or environmental factors. Many researchers focus on proficiency or fluency as the main mechanism underlying language dominance (Bentahila and Davies 1992; Paradis and Nicoladis 2007; Schmeißer et al. 2016; Schmid and Yılmaz 2018; Unsworth, Chondrogianni, and Skarabela 2018), though they often specify that proficiency is an ‘essential component,’ but not equivalent to dominance (Gertken, Amengual, and Birdsong 2014, 211). Frequency of use measures are also considered as contributing to language dominance (Bedore et al. 2012; Dunn and Fox Tree 2009; Schmid and Yılmaz 2018; Unsworth, Chondrogianni, and Skarabela 2018). Other variables that are sometimes regarded as part of language dominance include language exposure, education, context of acquisition, which language the person identifies with, AoA, any restructuring of languages (discussed further below), or even a choice of which language the bilingual would keep if forced to choose only one (Dunn and Fox Tree 2009; Schmid and Yılmaz 2018; Unsworth, Chondrogianni, and Skarabela 2018). Within research on child bilinguals, it is common to compare across children the relative rate at which language proficiency develops (Cantone et al. 2008; Paradis and Nicoladis 2007) or amount of input (Argyri and Sorace 2007).

When looking across all of these ways of defining and measuring language dominance, it is clear that the concept is complicated and not easily described. However, nearly all of these boil down to a relative difference between the bilingual’s languages on the relevant factor and something that can hence only be conceptualised as occurring within bilingual and multilingual speakers (Montrul 2016; Trefers-Daller and Silva-Corvalán 2016). According to a definition favoured by the authors, ‘Linguistic proficiency is globally defined as linguistic ability and fluency in a language, whereas language dominance refers to the relative weight and relationship of the two languages in terms of language use and degree of proficiency’ (Montrul 2016, 16). The present study used participants’ self-rated ‘most fluent’ (proficient) language as a common and theoretically satisfying proxy for language dominance, therefore coming down on the side of proficiency as the key factor in assessing language dominance. However, it is the authors’ view that participants’ personal considerations of factors such as the other variables (e.g. language use, etc.) detailed above may also be implicitly part of their self-reflections. Regardless of controversy surrounding operationalisation, the fact remains that a working definition had to be selected for use in the current investigation, and based on popularity, practicality, and simplicity, we chose to use self-reported relative proficiency as our key measure of language dominance.

A related issue to defining language dominance in bilingual speakers is how to measure language dominance and whether it should be considered in a categorical or continuous sense. For adults, self-report is a commonly used measure and has been supported as generally accurate (see Li, Sepanski, and Zhao [2006] for an extensive reference list). Relatively high accuracy for self-report assessments of language dominance (Bahrick et al. 1994; Flege, MacKay, and Piske 2002; Gertken, Amengual, and Birdsong 2014; Gollan et al. 2012; Hakuta and d’Andrea 1992; Langdon, Wiig, and Nielsen 2005; Marian, Blumenfeld, and Kaushanskaya 2007) is particularly true if a categorical distinction is required (e.g. Which of your languages is the most fluent?) as opposed to a measure of degree of language dominance (e.g. Estimate how much more fluent you are in your most proficient language than your less proficient language [could be used with a sliding scale or ratio estimate]).

Various ‘objective’ laboratory measures are also frequently used to assess proficiency, such as naming accuracy and reaction time (Gollan et al. 2012; Kohnert, Hernandez, and Bates 1998; Langdon, Wiig, and Nielsen 2005), measures of lexical richness such as lexical diversity, lexical sophistication, lexical density, and frequency of errors (Trefers-Daller 2010; Trefers-Daller and Korybski 2016), category generation (Bahrick et al. 1994), direction of code-switching (Lanza 2004), and a classic, but less commonly used measure in modern research, speed of response to instructions (Lambert 1955). Several researchers have questioned the generalizability of laboratory measures,
however, as they tend to underestimate bilinguals’ abilities particularly if measures were designed for use with monolingual populations or if the tests for each language are not equally difficult (Gollan et al. 2012; Hamers and Blanc 2000; Kohnert, Hernandez, and Bates 1998). Additionally, a practical limitation can exist in studies based on time restrictions with a population of participants who can be difficult to recruit. For example, measures of lexical richness such as mean length utterance are particularly time consuming to qualitatively code and analyze (Unsworth, Chondrogianni, and Skarabela 2018; Yip and Matthews 2006).

Language dominance is a particularly interesting feature of bilingual speakers that can influence various domains of language behaviour. These include code-switching or rule-based shifts between a bilingual’s languages during discourse (Bentahila and Davies 1992; Heredia and Altarriba 2001), children’s skill at using the appropriate language with a monolingual interlocutor (Paradis and Nicoladis 2007), pronunciation and related cross-linguistic interference (Argyri and Sorace 2007; Bullock et al. 2006), self-directed silent speech (Dewaele 2004), speed of lexical access (Carroll and Luna 2011; Ivanova and Costa 2008), and semantic priming (Basnight-Brown and Altarriba 2007; Heredia 1997).

Bilingual researchers at universities in the U.S. most frequently sample bilingual participants who are international students, immigrants (often early immigrants, arriving in the U.S. prior to approximately age six), or heritage speakers. A heritage language speaker is a person who naturally acquires a language in the home from birth, but acquires a majority language outside the home and switches dominance from the home language to the majority language, or as Montrul and Ionin (2010) put it simply, ‘adult early bilinguals of minority languages.’ Heritage language speakers are an important group to study separately from those immersed in bilingual culture or acquiring a second language (chronologically speaking) later in life as they tend to have differentiated language acquisition profiles (Montrul 2016). The present sample of very early immigrants and second-generation Americans falls within this category of speakers.

As has been previously discussed, the dominant language definition used within this study is the language that has greater relative proficiency or fluency. Many bilinguals in the U.S. and other countries experience a change in language dominance from a home language to a majority language (e.g. Altarriba 1992; Basnight-Brown and Altarriba 2007; De Houwer 2011; Harris, Berko Gleason, and Aycicigi 2006; Heredia 1997; Heredia and Altarriba 2001; Kohnert, Hernandez, and Bates 1998). Periods during which bilingual speakers experience a marked change in specific language input, such as moving or a new school can instigate a process of restructuring (Dunn and Fox Tree 2009; Grosjean 1998; Schmid and Yilmaz 2018). Restructuring encompasses gains and losses within a bilingual’s two languages in relatively demarcated periods of life-span development. Individuals similar to the present population of university students may experience such changes. Smaller shifts in dominance have been seen even during shorter time frames in bilingual children exposed to a monolingual environment of their less-dominant language (Olsson and Sullivan 2005). It can be difficult to predict who will undergo this shift, however, because not all heritage bilinguals or immigrants experience a change in language dominance (Bahrick et al. 1994).

Reliable measures of language dominance and dominance switch would be extremely helpful to many areas of work with bilingual speakers. One such area would be emotion-related and clinical studies of multilinguals. Prior studies suggest that bilinguals may represent emotions and process emotional language more deeply in their L1 due to early and pervasive memories and associations to emotional terms (Pavlenko 2007; Santiago-Rivera and Altarriba 2002). This effect can extend to memory, such as the finding that personal episodic memories are more readily recalled in the language in which the individual experienced them (Knickerbocker and Altarriba 2011; Santiago-Rivera and Altarriba 2009).

Bilingual therapy has used language switching to take advantage of the unique emotional memories within each of a multilingual individual’s languages. Switching between a multilingual’s languages in therapy can be used to increase or decrease emotional distance to specific topics or experiences, or to enhance comprehension of discussion (see Lim et al. 2008; Santiago-Rivera
Previous work has also demonstrated that diagnosis and evaluation of symptoms for patients can be meaningfully inaccurate depending on the language in which the patient is evaluated (see Altarriba and Santiago-Rivera 1994 for a review of such examples). Diagnoses for diseases with cognitive symptoms, such as dementia or Alzheimer’s disease, can also vary by language of evaluation for bilingual patients (Gollan et al. 2010). In each of these cases, it is useful to know both the participant’s first language and their current dominant language. Techniques relying on closer relationships to a person’s L1 can be affected by whether that language is still currently dominant. As such, it is critical to investigate assumptions of language dominance and its relationship to previous language experiences.

The present study sought to examine the language histories of bilingual participants, including early immigrants and heritage speakers, for the purpose of predicting their current language dominance using measures of their past language experience. The authors examined language history data gathered via a self-report questionnaire used in previous studies such as Altarriba and Mathis (1997; see Appendix A) from Spanish-English bilinguals living in the U.S. in an attempt to predict their dominant language. Statistical discriminant analysis was used to create a simple model that could make predictions about participants’ reported dominant language at rates above chance by using information about their language history. The results of the discriminant analysis may shed light on factors that are important for inducing a language dominance switch and whether these factors can predict language dominance after a number of years of bilingualism.

The discriminant analysis tested whether current reported dominant language (i.e. group membership) could be predicted based on participants’ AoA for English and Spanish. These factors take into account previous experience with each language. It was predicted that AoAs for each language would be the best predictors in discriminant functions based on previous research that has asserted that AoA is the most influential factor in determining language proficiency outcomes (e.g. Flege, MacKay, and Piske 2002; Schmid and Yilmaz 2018; Unsworth, Chondrogianni, and Skarabela 2018), although such prior work did not utilise the statistical techniques used in the present study with the parsimonious simplicity of our predictor variables. A pilot analysis was done that also included years enrolled in U.S. schools as a variable, but it did not significantly improve the model, so that variable was eliminated.

Data used in these analyses were collected as part of two separate studies. The first sample was part of a larger study creating a norm of bilingual speakers’ perceptions of a set of Spanish and English word stimuli (Martin, Altarriba, and Pagano in preparation). Data from the second sample were collected as demographic information within Kazanas and Altarriba’s (2016) examination of emotion and emotion-laden word processing in Spanish-English bilinguals.

Sample 1

Methods

Participants
The participants in the data set used for the current analysis were a group of proficient Spanish-English bilinguals (N = 124) attending the University at Albany, State University of New York. These participants principally spoke Puerto Rican, Cuban, and Dominican dialects of Spanish. Forty-three reported Spanish as their current most proficient, or dominant, language and 83 reported English as their dominant language. All participants reported learning Spanish in the home (see Table 1 for descriptive statistics).

Data cleaning and outlier analysis
Prior to inferential statistical analysis, the data were cleaned and examined for outliers. The original data set contained 135 participants, six of whom were eliminated for missing data. From the remaining participants, five were eliminated during outlier analysis. Outliers were determined by assessing their z scores for each variable (see Table 1 for a list of variables); all participants with a z score
greater than 3.29 were eliminated. Multivariate normality was considered using Mahalanobis distances (three participants exceeded the critical chi-square value and were eliminated). Thus, the final data set included 124 participants. Elimination of outliers was considered necessary due to the sensitivity of discriminant analysis to outliers and acceptable because a large sample size remained after this step.

**Discriminant analysis**

A direct discriminant analysis was conducted using IBM SPSS statistics software’s discriminant procedure and entering both variables simultaneously (IBM corp. 2013). Cross-validation was conducted via the jack-knifing procedure which removes one case from the analysis and classifies it by the function obtained using all other cases besides that case. All 124 cases were used in this analysis. Although the Box’s $M$ assessing homogeneity of variance–covariance produced a significant $F$ value, $F(3,199481) = 13.481, p < .05$, the sample size is relatively large, so analysis proceeded with a note of caution for interpretation of results.

**Results**

**Discriminant analysis**

Discriminant analysis produced one discriminant function (given the variable Dominant Language only included two groups) that significantly predicted group membership with a Wilk’s lambda of .862, assessed via $\chi^2(3) = 17.945, p < .001$. This was assessed to be a moderate effect size, squared canonical correlation = .371. The classification results showed that 70.2% of cases were correctly classified in the initial analysis and 69.4% using the jack-knife cross validation procedure, both of which are above chance for this data set (67.8% based on initial group size and using the calculations recommended by Tabachnick and Fidell [2013]).

Taking a closer look at the discriminant function, the standardised canonical discriminant function coefficients (used as regression weights) show that the AoA for English was weighted .929 and AoA for Spanish was weighted $- .525$. This is interpreted as separating language dominance by producing English-dominant speakers with a low predicted value from the discriminant function (they learned English at an early age and Spanish at a later age) and producing Spanish-dominant speakers as having a high predicted value from the discriminant function (they learned English at an early age and Spanish at a later age). It is important to note that although the relative age that they learned each language differed across our groups, they both learned Spanish before they learned English. However, only those who learned English at an earlier age reported at the current time that they are relatively more proficient in English. This was confirmed by the average discriminant score of each group given by the functions at group centroids: Spanish-dominants $= .544$ and English-dominants $= -.289$. The results of this analysis imply that it is possible to predict current language dominance for the bilinguals in this sample at a rate well above chance simply using the predictors AoA of English and AoA of Spanish.

<table>
<thead>
<tr>
<th>Table 1. Descriptive statistics for Sample 1, separated by participants' reported dominant language.</th>
</tr>
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<tbody>
<tr>
<td>English-dominant ($n = 83$)</td>
</tr>
<tr>
<td>Mean age ($SD$)</td>
</tr>
<tr>
<td>Mean English proficiency ($SD$)</td>
</tr>
<tr>
<td>Mean Spanish proficiency ($SD$)</td>
</tr>
<tr>
<td>Proportion of day speaking English ($SD$)</td>
</tr>
<tr>
<td>English AoA ($SD$)</td>
</tr>
<tr>
<td>Spanish AoA ($SD$)</td>
</tr>
<tr>
<td>Years enrolled in U.S. schools ($SD$)</td>
</tr>
</tbody>
</table>

1. AoA = Age of Acquisition. $SD$ = standard deviation.
Sample 2

Methods

Participants
The participants in Sample 2 ($N = 54$) were drawn from the same overall population as Sample 1 at a different time as part of the larger study within Kazanas and Altarriba (2016). Within this group, 28 participants reported Spanish as their current most proficient or dominant language, and 26 reported English as their dominant language. All participants reported learning Spanish in the home (see Table 2 for descriptive statistics).

Discriminant analysis
A direct discriminant analysis was conducted using the same procedures as for Sample 1.

Results
Discriminant analysis for Sample 2 produced one discriminant function that significantly predicted group membership with a Wilk’s lambda of .868, assessed via $\chi^2(3) = 7.229, p = .027$. This was a moderate effect size similar to Sample 1, squared canonical correlation = .364. The classification results showed that 66.7% of cases were correctly classified in the initial analysis and 63.0% using the jack-knife cross validation procedure, both of which are well above chance for this data set (27.0% based on sample size and again using the calculations recommended by Tabachnick and Fidell 2013).

The discriminant function for this sample produced standardised canonical discriminant function coefficients that weighted AoA for English at 1.000 and AoA for Spanish at $-0.031$. This again produced a low predicted value for English-dominant speakers from the discriminant function (they learned English at an early age and Spanish at a later age) and producing Spanish-dominant speakers as having a high predicted value from the discriminant function (they learned English at a later age and Spanish at an early age). This was confirmed by the average discriminant score of each group given by the functions at group centroids: Spanish-dominants = .369 and English-dominants = $-0.397$. Once again, although the participant groups acquired Spanish and English in the same order, the relative difference in time at which they acquired their second language varies with their current language dominance. The results from Sample 2 confirm that similar patterns of results for new samples from the same population can be produced using AoA for English and Spanish to predict language dominance in discriminant analysis.

Discussion
The results of this analysis imply that it is possible to predict current language dominance for bilinguals at a rate well above chance using the predictors English AoA and Spanish AoA. It is critical that appropriate statistical techniques are used to test whether these factors are significant predictors of

Table 2. Descriptive statistics for Sample 2, separated by participants’ reported dominant language.

<table>
<thead>
<tr>
<th></th>
<th>English-dominant ($n = 26$)</th>
<th>Spanish-dominant ($n = 28$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (SD)</td>
<td>19.04 (1.22)</td>
<td>19.71 (2.20)</td>
</tr>
<tr>
<td>Mean English proficiency (SD)</td>
<td>29.12 (2.00)</td>
<td>28.82 (2.34)</td>
</tr>
<tr>
<td>Mean Spanish proficiency (SD)</td>
<td>26.00 (3.37)</td>
<td>27.75 (3.34)</td>
</tr>
<tr>
<td>Proportion of day speaking English (SD)</td>
<td>.83 (.15)</td>
<td>.80 (.15)</td>
</tr>
<tr>
<td>English AoA (SD)</td>
<td>3.75 (1.94)</td>
<td>5.86 (3.33)</td>
</tr>
<tr>
<td>Spanish AoA (SD)</td>
<td>1.60 (1.13)</td>
<td>1.57 (0.95)</td>
</tr>
<tr>
<td>Years enrolled in U.S. schools (SD)</td>
<td>13.92 (1.29)</td>
<td>12.05 (3.12)</td>
</tr>
</tbody>
</table>

1. AoA = Age of Acquisition. SD = standard deviation.
present language dominance. Although some bilinguals experience a shift in dominance in a majority language environment and others do not, the present success at predicting current dominance provides evidence for systematic, non-random similarities among the minority language speakers who switch dominance to the majority language as compared to those who do not. It is also encouraging that these accurate predictions could be made using variables that are simple and practical to obtain from bilingual participants, particularly when compared to other evaluation techniques such as lexical richness that are very time-consuming and require experts to interpret (Treffers-Daller 2010).

One limitation that could have influenced the present participants was that the study was conducted in a generally 'English mode,' with English-speaking laboratory assistants and all instructions given in English (Bullock et al. 2006). This was done due to practical limitations, but also to make the participants comfortable as they were used to interacting with faculty and staff at the university in English. However, it is possible that the participants were influenced to over-report their English skills or to under-report their Spanish proficiency. Future works should seek to evaluate bilinguals using tasks conducted in each of their languages in order to avoid influencing their self-assessments.

Future research should cross-validate this function in other samples of U.S. bilinguals including those at other universities or those who are not currently enrolled in college. It is possible that the population from which these samples were drawn may differ in important ways from other young bilinguals who did not choose to attend a majority English-speaking university or were not accepted to such an institution and as such may not have experienced the same level of restructuring (Dunn and Fox Tree 2009) that the present sample likely has experienced during such a highly active stage of linguistic development. The greater amount of L2 exposure and use by our population within an English-speaking university compared to those still in a bilingual or L1 context could have 'crowded out,' to some extent, the practice necessary to maintain their L1 in this environment, possibly leading to greater L1 attrition. Many of the current participants had matriculated a number of years prior to their participation and may have been impacted by their experience separately from their general exposure to English speaking culture in the U.S. A fascinating addition that is unfortunately beyond the scope of the present study would be to follow up with our participants in a few years when their environment and language context may have settled after they have finished university and entered their adult lives. It would also be an excellent contribution to compare the present findings using the same methods to a different population of bilingual speakers (such as was done in Treffers-Daller [2010] with French speakers from different bilingual populations).

The present study provided an exciting snapshot of young adult bilinguals, some of whom have switched language dominance. The next important step is for longitudinal studies to follow similar bilinguals through childhood and adolescence to track dominance shifts as they occur. Such studies would enable closer investigations of the mechanisms involved in dominance switches that have been proposed to date, including frequency of use (Heredia and Altarriba 2001), ease of acquisition of the second language, or language acquisition context (Langdon, Wiig, and Nielsen 2005). Other researchers have also strongly recommended a longitudinal approach (e.g. Bahrick et al. 1994) that can capture the important and complex process of linguistic development (Schmid and Yılmaz 2018; Treffers-Daller and Silva-Corvalán 2016), but the large investment of resources necessary has left this avenue relatively unexplored, especially in adult bilingual speakers.

The formidable task for investigations of language dominance, then, is to provide explanatory models capable of mapping out how the predictor variables may interact and determine the intensity and direction of developmental changes for any given aspect of language proficiency over time (Schmid and Yılmaz 2018, 2).

Such future dedication would carry forward the conclusions brought by studies such as the present investigation into an even more comprehensive view of the bilingual experience.
Acknowledgements

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Disclosure statement

No potential conflict of interest was reported by the authors.

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Notes on contributors

Jennifer M. Martin is an advanced doctoral student at the University at Albany, where she received her Master’s degree in 2015. Her work is published in several peer-reviewed journals as well as appearing at conferences and in an edited book. Her research interests include bilingualism, second language acquisition, emotion, memory, metacognition, and attention.

Jeanette Altarriba is the Founder and Director of the Cognition and Language Laboratory at the University at Albany, a Full Professor of Psychology, as well as serving as the Interim Dean of the College of Arts and Sciences. She is the author of numerous peer-reviewed articles as well as editing/co-editing seven books. Her research interests include a wide variety of topics broadly associated with language, emotion, and memory.

Stephanie A. Kazanas received her doctorate at the University at Albany in 2016 and is now an Assistant Professor at Tennessee Technological University and Director of their Cognition Laboratory. Her work has been presented at many conference venues and in a variety of peer-reviewed journals and edited books. Her research interests include multilingualism, adaptive memory, emotion processing, and creativity.

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References


Appendix A

Language History Questionnaire

Part I: Language Background


4. Years in U.S.: _______ 5. Years in U.S. Schools: _______

6. What countries other than the USA and your native country have you visited for longer than a month? How long were you there?

7. How many languages do you know? ________________

8. List, from most fluent to least fluent, all of the languages you know. Specify the age at which you began to learn the language and where you learned it (i.e., home, school, church, etc.). For example, if English was your first language you would indicate this by writing ‘English, Birth, Home’ under the appropriate headings below. Include languages to which you have been exposed although you may not have received any formal training in them and may not be able to speak or read them.

<table>
<thead>
<tr>
<th>Language</th>
<th>Age</th>
<th>Learning Situation</th>
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9. What language do you speak at home with your family most frequently? (List languages spoken in your home in order of frequency).

10. What languages were spoken in your home when you were a child?

11. At what age did you begin speaking English? ___________

12. At what age did you begin reading English? ___________

13. If English is not your first language, and if you have studied English in a classroom setting, indicate the number of years in:

   jr. high: ___________  high school: ___________
   college: ___________  other: ___________________
Part II: Fluency

14. Please rate your English skills on a ten-point scale.
Comprehension of English spoken at a native speaker pace:
1 2 3 4 5 6 7 8 9 10
very all
little

Comprehension of written English:
1 2 3 4 5 6 7 8 9 10
very all
little

Conversational skills in English:
1 2 3 4 5 6 7 8 9 10
little native-like
ability fluency

15. Please rate your Spanish skills on a ten-point scale.
Comprehension of Spanish spoken at a native speaker pace:
1 2 3 4 5 6 7 8 9 10
very all
little

Comprehension of written Spanish:
1 2 3 4 5 6 7 8 9 10
very all
little

Conversational skills in Spanish:
1 2 3 4 5 6 7 8 9 10
little native-like
ability fluency

16. During the course of a typical day, I speak:

_______% English

_______% Spanish

_______% Other language:_____________

_______% Other language:_____________

17. Do you mix words or sentences from two languages in your own speech?

___ Yes
___ No

If you answered ‘Yes,’ what percentage of the time does that occur on a typical day?

_______%
Part III: Spanish Background

18. At what age did you begin speaking Spanish? _____________

19. At what age did you begin reading Spanish? _____________

20. If Spanish is not your first language, and if you have studied Spanish in a classroom setting, indicate the number of years in:
   jr. high: _____________  high school: _____________
   college: _____________  other: _____________

   If you have college courses in Spanish as a second language, please list the courses you are currently enrolled in and/or took most recently:
   ______________________  _______________________

21. Does any member of your family speak Spanish? Who?

22. List any additional comments on your language background below and on the back of this questionnaire.