**NON-INTERVENTIONAL/METHODOLOGICAL**

**RESEARCH PROTOCOL TEMPLATE**

**(HRP-503b)**

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| **STUDY INFORMATION**   * **Title of Project:**   Effect of withholding acoustic cues to English-Spanish codeswitching in Wh-questions   * **Principal Investigator Name**   Jiawei Shao, M.A. (investigator)  Dr. Joseph Casillas (faculty advisor)  Dr. Thomas Stephens (faculty advisor)   * **Principal Investigator Div. & Dept.**   Department of Spanish and Portuguese   * **Principal Investigator Contact Info:**   Office 5186, Academic Building West,  15 Seminary Place  Rutgers, NJ 08901  +1 (848) 264-9109  jiawei.shao@rutgers.edu   * **Protocol Version and Date:**   v1.10.22.2022 |

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**1.0 Research Design**

**1.1** **Purpose/Specific Aims**

The state of activation of each language of a bilingual person will change depending on the other part of the communication, and this change of behavior can affect both language production and language perception (Grosjean, 2013; Weinreich, 1966; Hasselmo, 1970; Baetens Beardsmore, 1986). The amount and type of mixed language used in one bilingual context can affect the language mode as the activation of each language will be altered, thus code-switching can serve as a scope to look into language mode. Code-switching is the linguistic phenomenon when more than one language is used in one utterance. A line of studies showed that there can be an additional cognitive cost for bilinguals in a code-switching context (Grainger & Beauvillain, 1987; Soares & Grosjean, 1984; Olson ,2017). Shen et al. (2020) showed that in English-Chinese code-switching tonal cues can help mitigate switch cost. The present study will be in line with Shen et al. (2020) study, examining the role of acoustic cues in auditory recognition of English-Spanish CS utterances, as the language pair under study in Shen et al. (2020) study is an intonational-tonal pair, the present study aims to fill the gap of an intonational-intonational pair (English-Spanish).

**A. Objectives**

The objectives of this study are the following:

1. To investigate if native speakers of English who are late learners of Spanish are able to make use of acoustic cues to cope with a higher cost on cognitive ability when a switch of language happens in a sentence that starts in English and ends in Spanish. More specifically, we are taking a further look at both the segmental level of the acoustics and also the suprasegmental level using the resynthesized audios: the spliced audios.
2. To investigate how are native speakers of English who are learners of Spanish make use of the two formerly mentioned levels of acoustics to mitigate the difficulty in a language mixing context. More specifically, we are testing if the acoustic cues are acting as anticipatory cues to upcoming switching.

**B. Hypotheses / Research Question(s)**

**Research Question 1**: When perceiving Wh-questions start in English and end with code-switched items in Spanish, are English speaking learners of Spanish able to make use of acoustic cues to cope with switch cost?

**Hypothesis 1**: Previous studies have reported segmental properties going through alternation when produced in CS context in both matrix language and switched items (eg, VOT in Fricke, Kroll and Dussias, 2016), and there were reported suprasegmental features involved in similar phenomenon (intonation in Piccinini & Garellek’s study, 2014); Shen et al.(2020) showed that in English-Chinese code switching withholding acoustic cues can cause slower recognition of switched item. In line with Shen et al. (2020) study, we hypothesize that English speaking learners of Spanish are able to make use of acoustic cues to cope with switch cost in English-Spanish code switching Wh-questions.

**Research Question 2**: Are the acoustic cues (segmental and suprasegmental) helping mitigate switch cost by providing anticipatory information?

**Hypothesis 2**: In line with previous studies, we hypothesize that our participants will make use of both types of acoustic cues (segmental and suprasegmental) to predict upcoming code switching, which will suggest the change of language mode, in other words, anticipatory activation of the other language.

**1.2** **Research Significance** **(Briefly describe the following in 500 words or less)**

Language mode is a model that tells the state of bilinguals’ activation of each of the languages they know. The language mode or activation of the languages can affect linguistic behaviors including language production and language perception (Grosjean, 2013; Weinreich, 1966; Hasselmo, 1970; Baetens Beardsmore, 1986). As stated by Grosjean (2013) the type and amount of use of languages in one context can alter the speaker’s language mode, therefore we can use code-switching contexts as a scope to study the activation of bilinguals’ languages.

Code-switching (CS) is the linguistic phenomenon when in one utterance more than one language is used. In comparison to a monolingual discourse, it is reported in various studies that a more difficult process is involved in CS production, recognition and comprehension (Thomas & Allport, 2000; Soares & Grosjean, 1984; Olson, 2017). In Piccinini & Garellek’s study (2014) it is reported that the listeners may be able to rely on the anticipatory phonetic cues (voice onset time, VOT) to mitigate the increased processing cost. Also, Fricke, Kroll and Dussias (2016) report subtle shifts in voice onset time (VOT) before English-to-Spanish code-switch. However, other studies reported opposite results suggesting that there’s no difference between phonetic productions in monolingual versus code-switching utterances (Grosjean & Miller, 1994). The mixed results might be ascribed to the difference in language pairs as well as the direction of the switch. Olson’s study (2012) demonstrated that that insertional English-Spanish CS tokens are produced with a consistent and significant increase in pitch height and duration for CS tokens relative to non-CS tokens. Shen et al (2020) studied the effects of withholding acoustic cues to CS from English to Chinese, as the latter language shows lexical tone while the other not, and they concluded that bilingual listeners have access to acoustic cues, furthermore they discussed the implication of tonal aspect of the acoustic cues to code-switching based on their acoustic analysis.

In line with Shen et al. (2020) study, the present study will look into acoustic cues in English-Spanish code-switching in Wh-questions. The present study seeks to expand the conclusions made in Shen et al. (2020) by gathering evidences from a different type of language pair, as English and Spanish are both intonational language but shows different pattern in intonation in Wh-questions. Furthermore, the two experiments setting will provide with us more evidences of if acoustic cues help mitigate the higher cognitive cost in code-switching context by providing anticipatory information. Last but not least, the 4-version design of the stimuli can also provide us with preliminary understanding in how segmental and suprasegmental levels of acoustics work in such kind of bilingual context.

**1.3** **Research Design and Methods**

In order to investigate the two research questions, a quantitative two-task study that also includes a language proficiency test and a language history questionnaire is designed.

Two tasks gathering reaction time data will be used in the study: a visual world paradigm using auditory stimuli, during which participants listen to the stimulus (sentences) and make a choice between two pictures as soon as they hear the corresponding word in the audio. The choice and the reaction time will be collected. In the second experiment participants will listen to the stimulus (sentences) and make a choice of what language they are hearing and switch the choice as soon as they hear a change in language.

The language history data of the participants will be collected in the form of a survey, where the participants will be asked to complete an adapted questionnaire (LHQ) (Li et al., 2020), asking about their self-report language proficiency, age of acquisition of the second language, language use and language exposure, etc.

Language proficiency assessment will be conducted in the form of a language test, The researcher will administer the Lextale-Esp (Izura & Brysbaert, 2014) test to assess participants' Spanish proficiency.

The study is designed as a cross-sectional study, where the experimental group will be the native speakers of English who are learning Spanish as their second language, and given the evidence from previous studies, there will be no control group.

The principal investigator, Jiawei Shao will be responsible for all study related tasks (consenting participants, collecting and analyzing data etc.)

**A. Research Procedures**

All the research procedures will be conducted by the researcher in a conference room located at Academic Building, Rutgers University, New Brunswick. Before the participants start the trial, the researchers will prepare and have a test run on the facilities to make sure everything functions well and safely. The researchers will be with the participants the whole time to make sure that the experiment is carried out safely and effectively. Before and after each participant, the researcher will check and clean computer, keyboard, mouse, headphone and seat to ensure its safety and hygiene condition. The participants can stop the experiment at any time if they feel the need to do so.

The experiments will start with the researcher providing the consent form and explaining the procedure to the participants. Once the participants fully understand what they are supposed to do and have asked all the questions they wanted to ask, the researcher will help them set up computer and headset, and prepare the participants to start the trials.

The first set of trials are conducted in a visual world paradigm; participants will listen to auditory stimuli. In the set of trials participants will listen to the stimulus (sentences) and make a choice of what language they are hearing and switch the choice as soon as they hear a change in language. When participants finish the first two sets of the trials, they will take a 5-minute break. After the break, the participants will complete the language history questionnaire and the language proficiency test on a computer or on a printed questionnaire as they prefer.

**B**. **Duration for Study and Each Subject**

The duration of the whole study will be around 60 minutes, which includes discussion of the consent form, preparation of the participant for the experimental tasks, the two tasks, one break, the Language History Questionnaire, adapted with additional items from Bilingual Switching Questionnaire (Li et al., 2020) and Bilingual Language Profile (Gertken et al., 2012) and the language proficiency test. Specifically, the preparation will take about 5 minutes. The first set of tasks will last approximately 15 minutes. The second set of tasks will take 15 minutes to complete. The break will last 5 minutes. The LHQ (Language History Questionnaire) will take 10 minutes. The Lextale-Esp (Izura & Brysbaert, 2014) test will take 10 minutes.

**1.4** **Preliminary Data**

N/A

**1.5** **Sample Size Justification**

The present study proposes a total enrollment of 60 subjects that form a single group. Each and every one of the subjects are adult native speakers of English who started learning Spanish after 12 years old and are still learning Spanish.

The proposed sample size aligns with larger than that of previous studies in the field (e.g., Shen et al., 2020).

**1.6** **Study Variables**

**A. Independent Variables, Interventions, or Predictor Variables**

There are no interventions in the present study. The primary independent variable is stimulus condition:

1. Unilingual utterance in English
2. Naturally produced codeswitching utterance
3. Resynthesized codeswitching utterance without intonational alteration
4. Resynthesized codeswitching utterance with intonational alteration

Additionally, subjects’ proficiency level in Spanish will be a secondary independent variable.

**B. Dependent Variables or Outcome Measures**

Given that this study employs an visual world paradigm methodology, the dependent variables are reaction time and accuracy of matching visual and auditory stimuli.

**1.7** **Specimen Collection**

N/A

1. **Primary Specimen Collection**

N/A

* **Types of Specimens**:

N/A

* **Annotation**:

N/A

* **Transport**

N/A

* **Processing**

N/A

* **Storage**:

N/A

* **Disposition**

N/A

1. **Secondary Specimen Collection**

N/A

* **Types of Specimens**:

N/A

* **Annotation**

N/A

* **Transport**

N/A

* **Storage**

N/A

* **Disposition**:

N/A

**1.8** **Data Collection**

1. **Primary Data Collection**

* Location:

Data collection will take place at a conference room located at Academic Building, Rutgers University, New Brunswick.

* **Process of Data Collection**:

The principal investigator will be administering tasks and collecting data. Faculty advisors will monitor the research study. The principal investigator will be present during data collection from each subject in order to ensure that all the devices are functioning properly.

* **Timing and Frequency**:

Data will be collected during the Fall 2022 academic semester. Data from each subject will be collected during one session lasting 60 minutes in total.

* **Procedures for Audio/Visual Recording**:

Participants will not be recorded.

* **Study Instruments**:

Participants will need access to internet and a working computer paired with an active noise cancelation headphone. Each participant will complete the following instruments:

1. Adapted Language History questionnaire (LHQ). This tool assesses the linguistic background and language proficiency of participants. It provides us with greater insights to participant’s language proficiency. The LHQ was develop based on the commonly asked questions in research studies (Li et al., 2020) adapted with additional items from Bilingual Switching Questionnaire (Rodriguez-Fornells et al., 2012) and Bilingual Language Profile (Gertken et al., 2012)
2. A proficiency assessment in Spanish (i.e., the adapted DELE test)
3. Experimental Tasks
   1. Concept Monitoring Task where the participants will need to listening to the auditory stimuli, and react to the visual stimuli. The reaction time will be recorded to analyze language process rate.
   2. Switch Prediction Task where the participants will need to listening to the auditory stimuli, and react to the visual stimuli based on their prediction on the upcoming content. The reaction time will be recorded to analyze prediction behavior of the participants.

* **Ethnographic Studies, Interviews, Or Observation**:

N/A

* **Subject Identifiers**:

In order to protect participant’s identifiable information (e.g., name, contact) data will be separated from personal identifiers through use of a code system. Each participant will be assigned two letters and two numbers. A coding system for each.

* Advanced Male Learners = AM01
* Advanced Female Learners = AF01
* Intermediate Male Learners = AM01
* Intermediate Female Learners = AF01

After all identifiers are removed, there will no personal identify that will be directly linked to the data.

1. **Secondary Data Collection**

N/A

* **Type of Records**

N/A

* **Location**:

N/A

* **Inclusion/Exclusion**:

N/A

* **Data Abstraction Form(s):**

N/A

**1.9** **Interviews, Focus Groups, Surveys, and/or Observations**

N/A

**A. Administration**

N/A

* **Timing and Frequency**

N/A

* **Location**

N/A

* **Procedures For Audio And Visual Recording**

N/A

* **Person Identifiers**

N/A

**B. Study Instruments**

* + **Evaluation Instrument Details**

N/A

* **Study Instruments For Ethnographic Studies**

N/A

* **Oral Histories Or Interviews General Framework**

N/A

* **Referral Information**

N/A

**2.0** **Project Management**

**2.1** **Research Staff and Qualifications**

The principal investigator is a Ph.D. student in the Department of Spanish and Portuguese at Rutgers University, New Brunswick, who holds CITI certificate in Human Subjects Research. In addition, the study will be overseen by Dr. Thomas Stephens and Dr. Joseph Casillas, who hold CITI certificates in Human Subjects Research and has extensive experience with experimental design.

* 1. **Research Staff Training**

The principal investigator will be in charge of collecting data, so there is no need to train additional research staff.

2.3 Resources Available

All data recorded will be coded to identify participants. Participants will be proficient in English and will not require translation or support services will be needed.

**2.4** **Research Sites**

Spanish and Portuguese Department, Rutgers, Academic Building-CAC 15 Seminary Place, New Brunswick, NJ 08901

**3.0** **Multi Center Research**

**4.0** **Subject Considerations**

**4.1** **Subject Selection and Enrollment Considerations**

1. **Method to Identify Potential Subjects**

Participants will be recruited from various settings. A research poster will be distributed to universities, educational settings and other social media platforms in order to recruited target group of participants: native speakers of English from northeastern America and late learners of Spanish at intermediate to advanced level of proficiency.

1. **Recruitment Details**

We aim to recruit a total of 60 participants of native speakers of English and late learners of Spanish. The first group, late L2 learners of Spanish with English as their first language, will be recruited from classes in the Department of Spanish and Portuguese with permission from the Graduate Program Director, the Spanish undergraduate coordinator, and individual instructors. Participation is completely voluntary, and participants will either receive course credit or a $15 electronic gift card for their participation. For participants who are not Rutgers students, we will post the document on Facebook pages of professional organizations for Spanish educators. In addition, a flyer will be posted in language centers recruiting participants for this study. Participants will be compensated at a rate established by the researchers’ institution ($15). Recruitment will occur on a weekly basis in various locations in order to obtain a diverse pool sample.

1. **Subject Screening**

Participants will be screened and will be required to meet the criteria set by this study. If participants are not eligible, they will be informed by the investigators. Participants who present potential challenges in finishing the study (such as visually or hearing impaired) may not qualify.

* **Inclusion Criteria**

We aim to recruit a total of 60 participants. Spanish learners who are native speakers of English will be recruited for this study. Participants will have to meet the following criteria:

* Adults, 18-65 years of age, able to consent in English
* Native speaker of northeastern American English
* Currently still actively learning/using Spanish
* Demonstrate a language level from intermediate to advanced
* Currently work full time as an educator
* Currently teach a subject (e.g., Language Arts, Social Studies, Foreign language)

The language level will be determined by both a language proficiency test DELE, and in the language course in which the participants are enrolled.

* **Exclusion Criteria**

Participants at beginning levels will be excluded due to their low proficiency skills in Spanish. Participants who have started learning Spanish at an early age will be excluded. Additionally, participants with any sort of visual or aural impairment will be also excluded. This study will not exclude any participant because of race, gender or sexual identity, ethnicity, or religion.

1. **Privacy Protections**

All solicitation and signups will be conducted in person. The investigators will provide their information so that interested participants can contact them. After participation, any information collected will be stored in an Excel spreadsheet and will be saved on the main computer, which is password-protected. Additionally, each participant will be assigned an alphanumeric code that will be associated with the information collected.

**4.2** **Obtaining Identifiable Information About Non-Subjects**

4.3 Number of Subjects

**A. Total Number of Subjects**

This study seeks to enroll 60 participants.

**B. Total Number of Subjects If Multicenter Study**

N/A

1. **Feasibility**

The principal investigator seeks to recruit about 60 participants during the Fall 2022 semester.

**4.4** **Consent Procedures**

**A. Consent Process**

* **Location of Consent Process**

As part of the recruitment process (i.e., advertising the study through language instructors), potential participants will be provided with the principal investigator’s email address and asked to email them if they wish to participate in the study. Upon contacting the investigators, participants will arrange an appointment at a mutually convenient time in order to complete the study.

Once they arrive at the data collection location, participants will be given the consent form. The principal investigator will orally go over the consent form and explain the procedures. The subjects will have time to read the consent form and ask any potential questions. If and when participants agree to participate in the study, they will be asked to sign the consent form. Participants will receive a copy of the consent form which they can keep for their records.

* **Ongoing Consent**

N/A

* **Individual Roles for Researchers Involved in Consent**

The principal investigator will design the consent form. The principal investigator will be present at all time during data collection, and will be involved in giving the consent form to the participant and discussing it.

* **Consent Discussion Duration**

Investigator will obtain voluntary and informed consent from each participant. Each participant will be given the consent form in both Spanish and English at the beginning of the study. They will be given unlimited time to fully read and review the document. The investigator will be available for further questions.

* **Coercion or Undue Influence**

Participants will be reminded by the investigator in all materials that they are free to stop participating or opt-out of the study without questions.

* **Subject Understanding**

The investigators will take additional steps to ensure that the participants have a full understanding of key terms included in the consent form.

The consent form will be designed with participants in mind, using terms that are familiar to the general public. Furthermore, the investigators will answer any questions that the participants might have about the study.

* + **Protecting Privacy**

Participants will be given the consent form in a private room. They will read it with no time constraints and will be able to ask the investigators as many questions as they want.

Furthermore, the investigators will digitize the signed consent forms and save the digital copies in a password-protected laptop, which will be kept in a locked room located at Room 5186, 15 Seminary Place, New Brunswick, NJ 08901. Only the investigators will have access to this room. After digitizing the consent forms, the physical copies will be destroyed.

1. **Waiver or Alteration of Consent Process** 
   * **Waiver or Alteration Details**

N/A

* + **Destruction of Identifiers**

N/A

* + **Use of Deception/Concealment**

N/A

1. **Minimal Risk Justification**

N/A

1. **Alternatives**

N/A

1. **Subject Debriefing**

N/A

1. **Documentation of Consent**

* **Documenting Consent**

Consent will be obtained prior to beginning the experimental sessions. The participants cannot begin the study if they have not provided consent.

* **Waiver of Documentation of Consent (i.e., will not obtain subject’s signature)**

N/A

**4.5** **Special Consent/Populations**

N/A

1. **Enrolling Minors-Subjects Who Are Not Yet Adults**

* **Parental Permission**

N/A

* **Non-Parental Permission**

N/A

* **Assent Process**

N/A

* **Documentation of Assent**

N/A

* **Reaching Age of Majority During Study**

N/A

1. **Enrolling Wards of the State**

N/A

* **Research Outside of NJ Involving Minors**

N/A

1. **Enrolling Non-English-Speaking Subjects**

N/A

* **Process for Non-English-Speaking Subjects**

N/A

* **Short Form Consent for Non-English Speakers**

N/A

1. **Enrolling Adults Unable to Consent / Decisionally Impaired Adults**

N/A

* **Assessing Adult Capacity to Consent**

N/A

* **Selecting a Surrogate & Consent Process**

N/A

* **Subject Assent**

N/A

* **Selecting a Witness** **to the Surrogate Consent Process**

N/A

* **Removing a Subject**

N/A

1. **Special Consent Considerations**

N/A

**4.6** **Economic Burden and/or Compensation for Subjects**

**A. Expenses**

There are no expenses that the subject will incur as a result from participating in the research.

1. **Compensation/Incentives**

Participants will receive compensation in one of the following ways: (1) through course credit or extra credit for a course, as approved by language instructors in the Department of Spanish and Portuguese, or (2) through receiving monetary compensation in form of gift cards. The compensation for this study is higher than the minimum wage rate in the State of New Jersey, namely $12/hour, so that participants who complete the study will receive $15.

**C. Compensation Documentation**

In the case of participants who choose to receive course or extra credit, we will email their instructors informing them that their students have completed our study and should receive credit for their participation.

Participants who choose to be compensated monetarily will receive their compensation right after completing the study and will be asked to sign a receipt which will state the amount of compensation, the date, and participants’ signature.

**4.7** **Risks of Harm/Potential for Benefits to Subjects**

1. **Description of Subject Risks of Harm**

There are minimal risks and harm to participants, such as

* + - 1. Discomfort from sitting in one position or 50 minutes;
      2. Risk of minor skin irritation from wearing headphones;
      3. Discomfort in eyes or ears from watching/reading/listening activities in the experiment;
      4. Risk exposure to COVID-19 with the study being done in-person

Precautions for COVID-19 are included below:

All participants involved in the study will follow safety procedures as indicated by Rutgers University. The following precautions include: a) wearing a nose and mouth covering mask, b) required vaccination for researchers, c) observing social distance​​ protocols established by New Jersey State, 3 feet apart, d) using hand sanitizer before touching any of the equipment used in the study (e.g., keyboard). All efforts to protect confidentiality and privacy will be made.

All efforts will be made to keep personal information of the participants in your research record confidential. If information from this study is published or presented at scientific meetings, personal information will not be used.

* **Existing Condition/Disorder**

N/A

* **Additional Considerations**

N/A

* + - **Minimizing Risks**

The risk of confidentiality will be minimized by following strict protocols established prior to the start of the study which includes but not limited to securing participants’ information and de-identify the data. In addition, only data that is absolutely necessary for this research will be collected.

Participants will be given a debrief at the end of the study that explains the goal of the study and will include resources for services in the area if they experienced any distressed during the completion of any of the tasks. They will also have the contact information of the IRB and PI in the consent form if they need to report any concerns or harm, they may have experienced.

The data will be labeled with a unique code and stored in a password-protected computer. Only the investigators will have the password.

* + - **Certificate of Confidentiality**

N/A

* + - **Risks of Harm to Non-Subjects**

N/A

1. **Potential Direct Benefits to Subjects**

N/A

**5.0** **Special Considerations**

**5.1** **Health Insurance Portability and Accountability Act (HIPAA)**

N/A

**5.2** **Family Educational Rights and Privacy Act (FERPA)**

N/A

**5.3** **Code of Federal Regulations Title 45 Part 46 (Vulnerable Populations)**

N/A

1. **Special Populations**

N/A

**5.4** **General Data Protection Regulation (GDPR)**

N/A

**5.5****NJ Access to Medical Research Act (Surrogate Consent)**

N/A

**6.0** **Data Management Plan**

**6.1** **Data Analysis**

PsychoPy and Microsoft Excel the investigator will assess reaction time data reported in ms.

First, when analyzing reation times and regressions out of or into a region, we’ll remove from analyses all trials for which the answer chosen by participant does not align with the item/language in audio. Also, reaction time that shows negative value from the first set of trials will be removed under the assumption that such data is not indicative of any meaningful cognitive behavior. In addition to using absolute cutoffs to remove extreme values, researcher will also use the standard deviation method (calculated separately by subject and by item) to remove values in a given condition that exceed 2 standard deviations above or below the participant or item mean for each condition. Once outliers are removed, the data for each dependent variable are analyzed using ANOVAs and t tests, which are conducted separately for each region of interest, once by subjects and once by items. For further analysis, Bayesian model of regression will be used to measure the correlation between participants language proficiency and linguistic performance in the experiments.

**6.2** **Data Security**

There are various steps that will be taken to protect and secure the data and identify of each participant. As soon as participants sign consent form, they will receive a unique subject number (i.e., participant ID number) in order to maintain confidentiality. The data will be kept in a password-protected computer that will be kept at the researcher’s private office: Room 5186, 15 Seminary Place, New Brunswick, NJ 08901. The only person with access to this data and the location where the computer is kept will be the principal investigator. At a time that the data are no longer needed, printed records will be shredded, and computer files will be deleted. At no time will anyone not associated with the project have access to any information on subjects.

**6.3 Data and Safety Monitoring**

N/A

1. **Data/Safety Monitoring Plan**

N/A

1. **Data/Safety Monitoring Board Details**

N/A

**6.4** **Reporting Results**

1. **Subject Results Reporting**

N/A

1. **Aggregate Results**

N/A

1. **Professional Reporting**

The results of this study will be shared with members of the academic community at Rutgers and beyond at different conferences.

1. **Clinical Trials Registration, Results Reporting and Consent Posting**

N/A

**6.5** **Secondary Use of the Data**

N/A

**7.0** **Research Repositories – Specimens and/or Data**

N/A

**8.0** **Approvals/Authorizations**

No approvals at this time.

**9.0** **Bibliography**

Baetens Beardsmore, H. (1986). Bilingualism: Basic principles. Clevedon, England: Multilingual Matters.

Fricke, M., Kroll, J. F., & Dussias, P. E. (2016). Phonetic variation in bilingual speech: A lens for studying the production–comprehension link. Journal of memory and language, 89, 110-137.

Gertken, L. M., Amengual, M., & Birdsong, D. (2014). Assessing language dominance with the bilingual language profile. Measuring L2 proficiency: Perspectives from SLA, 208, 225.

Grainger, J., & Beauvillain, C. (1987). Language blocking and lexical access in bilinguals. The Quarterly Journal of Experimental Psychology Section A, 39(2), 295-319.

Grosjean, F., & Miller, J. L. (1994). Going in and out of languages: An example of bilingual ​flexibility. Psychological science, 5(4), 201-206.

Grosjean, F. (2013). Bilingual and monolingual language modes. The encyclopedia of applied linguistics, 489-493.

Hasselmo, N. (1970). Code-switching and modes of speaking. In G. Gilbert (Ed.), Texas studies in bilingualism (pp. 179–210). Berlin, Germany: De Gruyter.

Izura, C., Cuetos, F., & Brysbaert, M. (2014). Lextale-Esp: A test to rapidly and efficiently assess the Spanish vocabulary size. Psicológica, 35(1), 49–66.

Li, P., Zhang, F., Yu, A., & Zhao, X. (2020). Language History Questionnaire (LHQ3): An

enhanced tool for assessing multilingual experience. Bilingualism: Language and

Cognition, 23(5), 938-944.” https://doi:10.1017/S1366728913000606

Olson, D. J. (2017). Bilingual language switching costs in auditory comprehension. Language, Cognition and Neuroscience, 32(4), 494-513.

Olson, D. J. (2012). The phonetics of insertional code-switching: Suprasegmental analysis and a ​case for hyper-articulation. Linguistic Approaches to Bilingualism, 2(4), 439-457.

Piccinini, P. E., & Garellek, M. (2014). Prosodic cues to monolingual versus code-switching ​sentences in English and Spanish. In Proceedings of the 7th Speech Prosody ​Conference (pp. 885-889).

Rodriguez-Fornells, A., Krämer, U. M., Lorenzo-Seva, U., Festman, J., & Münte, T. F. (2012). Self-assessment of individual differences in language switching. Frontiers in Psychology, 2, 388.

Shen, A., Gahl, S., & Johnson, K. (2020). Didn't hear that coming: Effects of withholding phonetic cues to code-switching. Bilingualism: Language and Cognition, 23(5), 1020-1031.

Soares, C., & Grosjean, F. (1984). Bilinguals in a monolingual and a bilingual speech mode: The effect on lexical access. Memory & cognition, 12(4), 380-386.

Thomas, M. S., & Allport, A. (2000). Language switching costs in bilingual visual word recognition. Journal of memory and language, 43(1), 44-66.

Weinreich, U. (1966). Language in contact: Findings and problems. The Hague, Netherlands: De Gruyter.