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Effect of Instruction Language on English-Spanish Bilinguals' Speech Perception

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Abstract

Throughout the years, researchers have investigated the various advantages that may exist of being bilingual; however, it is unknown how switching between languages affects a person's basic perception of speech sounds. The goal of this thesis was to determine whether Spanish-English bilinguals respond to auditory stimuli differently based on the language in which they receive task instructions. Participants were randomly assigned to receive instructions and complete the study entirely in English or Spanish, thus thinking in the language that they were assigned. In the study, participants listened to three different sets of recordings, which could be perceived as a word in English or a word in Spanish. After listening to each audio sample, the participants were asked to identify the beginning sound of the word that they heard (i.e., /b/ or /p/). We predicted that if participants were given instructions in English, they would be more likely to perceive the recordings as English words. However, if participants were given Spanish instructions, their responses would shift more towards Spanish word responses. The results of this study show that English-Spanish bilinguals' auditory perception is not affected by the language of the instructions, which can have implications for bilinguals who grow up as frequent informal translators as well as auditory comprehension in everyday conversations.

Keywords: bilingual, speech perception, voice onset time

Effect of Instruction Language on English-Spanish Bilinguals' Speech Perception

Over the years, researchers have been interested in the benefits, if any exist, in identifying as bilingual. Compared to monolinguals, bilinguals have faster reaction times for task switches (i.e., switching between two different tasks) and lowered restart costs (i.e., reaction times immediately after a repeat cue; Hernández et al., 2013). This suggests that bilinguals have the upper hand compared to monolinguals when it comes to certain tasks, particularly when it comes to switching between tasks. Because bilinguals are accustomed to switching between comprehending and speaking two languages, this gives them the opportunity to practice these switching habits. In turn, this can make the switching habits of bilinguals stronger than the switching habits of monolinguals. Thus, the ability to switch between different languages (i.e., language switch) is an important topic to understand as it affects other characteristics of bilinguals, such as task switching.

While research tends to compare bilinguals to monolinguals, it is important to understand that there are differences that exist within the bilingual population. To best describe these differences that exist, Bialystok (2021) used a metaphor that compared the bilingual population to a package of Swiss cheese. Bialystok (2021) states that the bilingual population is not binary - there are individual differences between bilinguals that create "holes" (i.e., different characteristic of bilinguals) in each piece of Swiss cheese (i.e., each bilingual) and these holes may be blocked by other slices (i.e., other bilinguals' individual experiences) of Swiss cheese.

By comparing bilingualism to a package of Swiss cheese, Bialystok strives to highlight the reality that different manifestations of each bilingual's experiences place these "holes" in different place. For example, some bilinguals may have learned their secondary language at a younger age than others and other bilinguals may not use their secondary language as often as

they use their primary language. Thus, no two bilingual individuals have the same experiences or characteristics. There is no such thing as a standard bilingual; understanding that differences between bilinguals exist is imperative to understanding why studies such as this one are necessary. Because there are differences between bilinguals, it is important to focus studies on the bilingual population, rather than focusing studies on comparing bilinguals to monolinguals. However, the question of speech perception arises: are some bilingual individuals better at speech perception than others since these differences exist? If bilinguals vary in characteristics such as comprehension, is there a possibility that there is a difference in ability to perceive speech?

There is little research surrounding the topic of bilingual speech perception. Most studies have investigated the effects of switching between spoken languages, particularly because of the emergence of "Spanglish". "Spanglish" is an English-Spanish bilingual phenomenon that occurs when bilinguals switch between English and Spanish frequently (Cox et al., 2020). When speaking "Spanglish", some bilinguals are able to effortlessly make rapid switches between the two languages to communicate.

When thinking about these rapid switches, it is important to understand how they are able to happen. Segal et al. (2019) found that because some bilinguals switch between languages more frequently, they are able to monitor which language they speak in. This means that bilinguals have the ability to consciously decide their responses and the language that they speak in. This ability to monitor which language bilinguals speak in may provide an explanation as to why bilinguals have the ability to speak "Spanglish" and how these rapid language switches are possible. These bilinguals are consciously processing what language they are speaking in. However, it is important to understand how bilinguals are able to comprehend the differences

between the two languages so effortlessly, which leads research to investigate how language comprehension is affected by factors such as language switching and task switching.

Gosselin and Sabourin (2021) found that bilinguals who switch between languages on a daily basis are less likely to have comprehension-related costs compared to bilinguals who switch between languages less frequently. This demonstrates that there is reason to believe that bilinguals' speech perception may be impacted depending on certain characteristics that they may possess, such as ability to switch between languages. If bilinguals who switch between languages more frequently have less comprehension-related costs, there is a possibility that their ability to perceive speech may be enhanced because of their language switching habits.

Similarly, a study by Kattner et al. (2019) investigated the auditory mixing-costs between bilingual participants. Kattner et al. (2019) found that bilingual speakers who were placed in task-switching training groups (i.e., a group of participants who were trained with auditory categorization tasks) had reduced mixing costs (i.e., differences in performance) compared to those who did not receive training. These results suggest that bilingual individuals who switch between languages more often may show this reduced auditory mixing cost because they have more practice switching between languages. This reduced auditory mixing costs can help us understand why bilinguals are able to comprehend the switches that occur. The results of Kattner et al. (2019) provide insight on the comparison between bilingual speakers and the differences that exist between them. Additional training on task switching may translate to language switching, thus potentially impacting speech perception for these bilingual speakers.

Lisker and Abramson (1964) investigated the existing differences in speech perception between English and Spanish speakers. Lisker and Abramson (1964) found that there are differences in voice onset time (VOT; a measurement of phoneme sounds in ms) between

English and Spanish. VOT exists on a continuum, such that voiced phonemes in English (i.e., phonemes that when spoken, a person's lips are closed for a short amount a time) are located at approximately 0 ms and voiceless phonemes in English (i.e., phonemes that when spoken, a person's lips are closed for a longer amount of time) are at approximately +40 ms (Lisker & Abramson, 1964). However, for Spanish speakers, the VOT continuum is shifted such that the voiced phoneme is located at approximately -40 ms and the voiceless phoneme is located at approximately 0 ms (Lisker & Abramson, 1964). Therefore, the continuum shifts depending on the language that is being spoken (Lisker & Abramson, 1964). The shift in continuum poses a potential complication for bilingual speech perception.

Falandays (2021) further investigated the differences in language perception of bilinguals at the phoneme level. Falandays (2021) used a synthesizer to produce auditory stimuli ranging in VOT from -20 to +40 ms of stop consonants (i.e., phoneme sounds made by completely closing off sound as you say the consonant). Using stimuli that utilized the stop consonant pair of /b/ and /p/, the results of the Falandays' (2021) experiment suggested that bilinguals have phonetic categories for each language, meaning that bilinguals may have separate language components that allow them to communicate and comprehend speech based on the language that they are listening to and speaking in at the time. This suggests that bilinguals have the ability to activate these phonetic categories for each language based on the linguistic context that is presented to them.

The current study attempted to investigate the differences in speech perception depending on instruction language. To do this, the current study randomly assigned participants to complete the entire study in either English or Spanish. During the study, participants were presented with auditory stimuli which are both words in Spanish, but only one endpoint is a word in English

(e.g., being presented a continuum in which could be perceived as the Spanish word *basta* or the English word *pasta*). After listening to each stimulus, participants classified the starting phoneme sound of the stimulus that they heard (i.e., selecting either /b/ or /p/).

We predicted that if participants were given instructions in English, their responses would follow the pattern of the Ganong effect, which suggests that when presented ambiguous stimuli, we are more likely to use surrounding context to perceive the ambiguous stimuli as a word compared to a non-word (Ganong, 1980). Therefore, if participants were given English instructions, they would shift the boundary between /b/ and /p/ towards the voicing endpoint that is a word. For example, participants who were placed in the English instruction language group would provide more p responses for the basta/pasta continuum, since *pasta* is a word in English and *basta* is not. Alternatively, if participants were given Spanish instructions, their responses would shift more towards the voiced endpoint given the differences in VOT between Spanish and English speakers (Lisker & Abramson, 1964), thus, producing more p responses overall in all three continuums. Bilingual speakers who report more frequent language switching have more practice making a distinction between the two languages, so their speech perception may be better than those who do not switch between languages frequently.

Method

Participants

Participants were recruited through the Amazon Mechanical Turk (MTurk) platform. Participants of this study ranged in age from 18-59 years of age. Participants self-identified as English-Spanish bilingual speakers. A total of 38 participants engaged in the study; however, the data for two participants were omitted from the study due to failure to complete the entirety of

the study. Thus, the study analyzed the data for 36 participants. This study was approved by the University of San Diego Institutional Review Board.

Materials

Each continuum was produced by combining the ending sounds of the words (e.g., "-asta") as if they were spoken in Spanish, with either the beginning "B" sound of each word recorded in Spanish or the beginning "P" sound of each word recorded in English. To do this, each word was recorded as if it was a word in Spanish. Then, the beginning phoneme sound was identified and isolated from the remainder of the word. The phoneme sounds were spliced and combined to create a continuum for each word ending. A total of 24 audio recordings were produced and varied in voice onset time from -40 to 40 ms in steps of 10 ms. Recordings were spoken by a college-aged male volunteer who has native fluency in Spanish.

Recordings for the instructions in English and Spanish were spoken by the researcher. This was done by recording each set of instructions separately. A transcript of the instructions was provided to the participants along with the recording that was presented to them. This transcript is available in the Appendix.

Procedure

Using their personal devices, participants were able to read a brief description of the study and select the study on MTurk if they wished to participate. A full transcript of the study in English and Spanish is available in the Appendix. Upon clicking the Qualtrics link to the survey, participants were automatically shown the consent form and had to accept the form before beginning the study. Upon clicking the Qualtrics link, participants were automatically randomly assigned to complete the entire experiment in English or Spanish. A full version of the experiment in both languages is available in the Appendix. To proceed with the study,

participants clicked “Accept” at the end of the digital consent form to indicate their consent to participate in the study. Participants were then presented with demographic questions. To signal the beginning of the experiment, participants were presented with the general purpose of the experiment and were told that the study was going to begin. Then, participants were asked three questions to ensure that they were wearing headphones: if they were wearing headphones, what brand of headphones, and a test tone. Next, participants listened to a recording with instructions on how to complete the survey. Participants were unable to proceed until they listened to the entirety of the recording with instructions. A transcript of this recording was also provided on the same page. Participants were then presented with 24 trial questions that included audio recordings. One sound file was presented per page. Participants listened to the sound once and were not able to replay the recording. Participants then identified the beginning sound of the recording that they had listened to as either a B or P sound. Upon completion of the trials, participants were presented with a debriefing page in English regardless of which language they were assigned to. The debriefing page stated the purpose of the study and provided contact information of the researchers. Additionally, participants were given a randomly assigned code to input on the MTurk platform. This code confirmed the participant’s participation and ensured that the participant was compensated via the MTurk Platform. Participants were given $3.00 via the MTurk platform for completing the study and were not penalized for not completing the study.

Design

This study utilized a between-subjects design where each participant completed the study in either English or Spanish. Participants were presented with 24 trials in which they were asked “What is the beginning sound of the word that you heard?”. Participants were able to select the

letter “B” or “P” as a response for each trial. Each trial consisted of a recorded continuum that played automatically. All participants received the same questions, were presented with the same stimuli, and were asked to report the starting sound of each word that they heard in either English or Spanish. Participants were randomly assigned to complete the survey in English or Spanish so that there was a relatively equal distribution of participants in each condition. This experiment was completed in approximately 30 minutes.

Results

Figure 1 represents the expected results of the experiment. The independent variables were the VOT of the stimuli ranging from -40 to +40 ms, increasing in steps of 10 ms, the instruction language (English or Spanish), and the word sets (i.e., belly/peli, basta/pasta, bolo/polo). The dependent variable was the proportion of voiceless responses (i.e., the amount of times participants identified the beginning sound of each stimulus as “P”). For the belly/pelli continuum, we expected that those who were selected to participate in the English instruction language would select more “B” responses because “belly” is a word in English and “peli” is not, thus, following the Ganong effect (Ganong, 1980). For the basta/pasta and bolo/polo continuum, we predicted that English instruction language participants would make more “P” responses because “pasta” and “polo” are words in English. Their categorical boundary between B and P should thus happen at a longer VOT than the belly/pelly continuum. For those who received Spanish instructions, we predicted that they would make more “P” responses overall compared to the English instruction language group because of the VOT shift in Spanish. Therefore, shifting their perception of the VOT continuum to reflect the shift that occurs when speaking Spanish.

Across the VOT continuum in general, we predicted that at the lower end of the VOT continuum (i.e., around -40 ms), both English and Spanish participants would give more “B”

responses. Toward the middle of the continuum (approximately -20 ms to approximately +20 ms), we predicted that that we would see the effect of the manipulation of the instruction language. This would mean that the Spanish language participants would begin to report more "P" responses and the English language participants would report more "B" responses. Lastly, at approximately +20 ms and beyond, we expected to see a similar proportion of "P" responses from participants who were given both instruction languages. This is because at the beginning and the end of the continuum, it would be more obvious what phoneme sound is supposed to be heard. Toward the middle, it would be harder to distinguish what participants "should" be hearing at this stage.

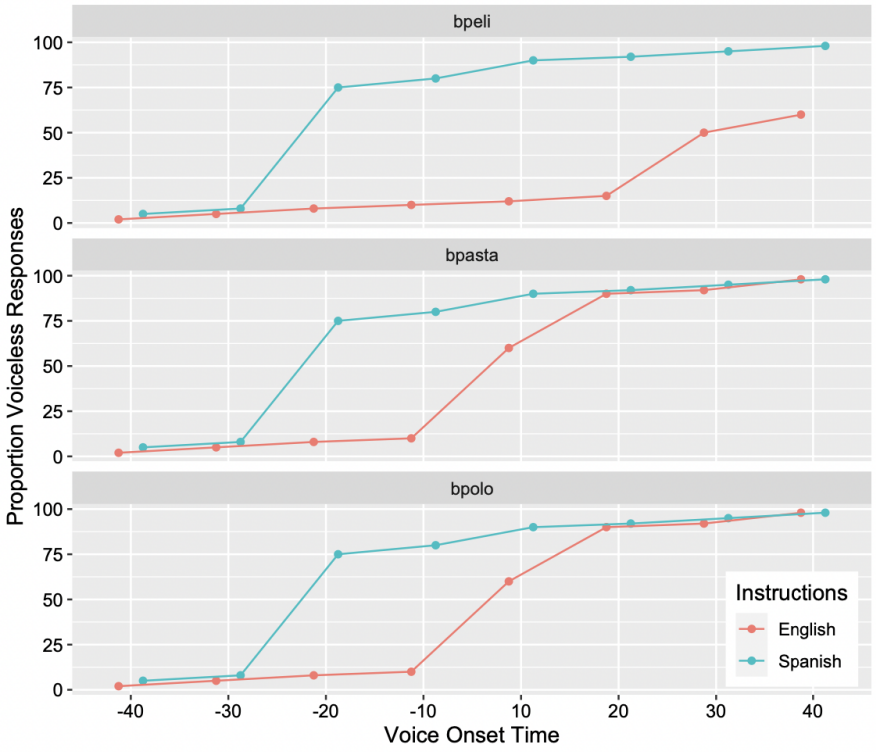

Figure 1. Predicted proportion of voiceless responses (i.e., /p/ responses) when participants were given English or Spanish instructions.

Actual responses showed that participants reported the highest proportion of voiceless responses for the bolo/polo continuum and the least for the basta/pasta continuum (Figure 2). For

the belly/peli continuum, English instruction language participants did not hear the word “belly” further into the continuum as predicted, meaning that English instruction language participants did not hear “belly” up until approximately +20 ms rather than Spanish instruction language participants, who were predicted to begin hearing “belly” at approximately -20 ms. Instead, English instruction language participants heard “peli” as soon as the Spanish instruction language participants did. For the bolo/polo continuum, both English and Spanish instruction language participants produced a higher proportion of voiceless responses. Across word sets, Spanish instruction language participants were no more likely to make “P” responses overall than English instruction language participants.

Across the VOT continuum, both English and Spanish instruction language participants reported hearing the same phoneme sound at each level of the VOT continuum. Despite the ambiguity at approximately -20 to +20 ms, participants reported hearing similar phoneme sounds, meaning that participants seemed to have heard a difference in VOT as the continuum progressed. At the beginning of the continuum (approximately -40 to -20 ms), both English and Spanish instruction language participants gave similar voiceless responses, meaning that they heard more “B” beginning sounds. At the end of the continuum (approximately +20 to +40 ms), participants heard more “P” sounds.

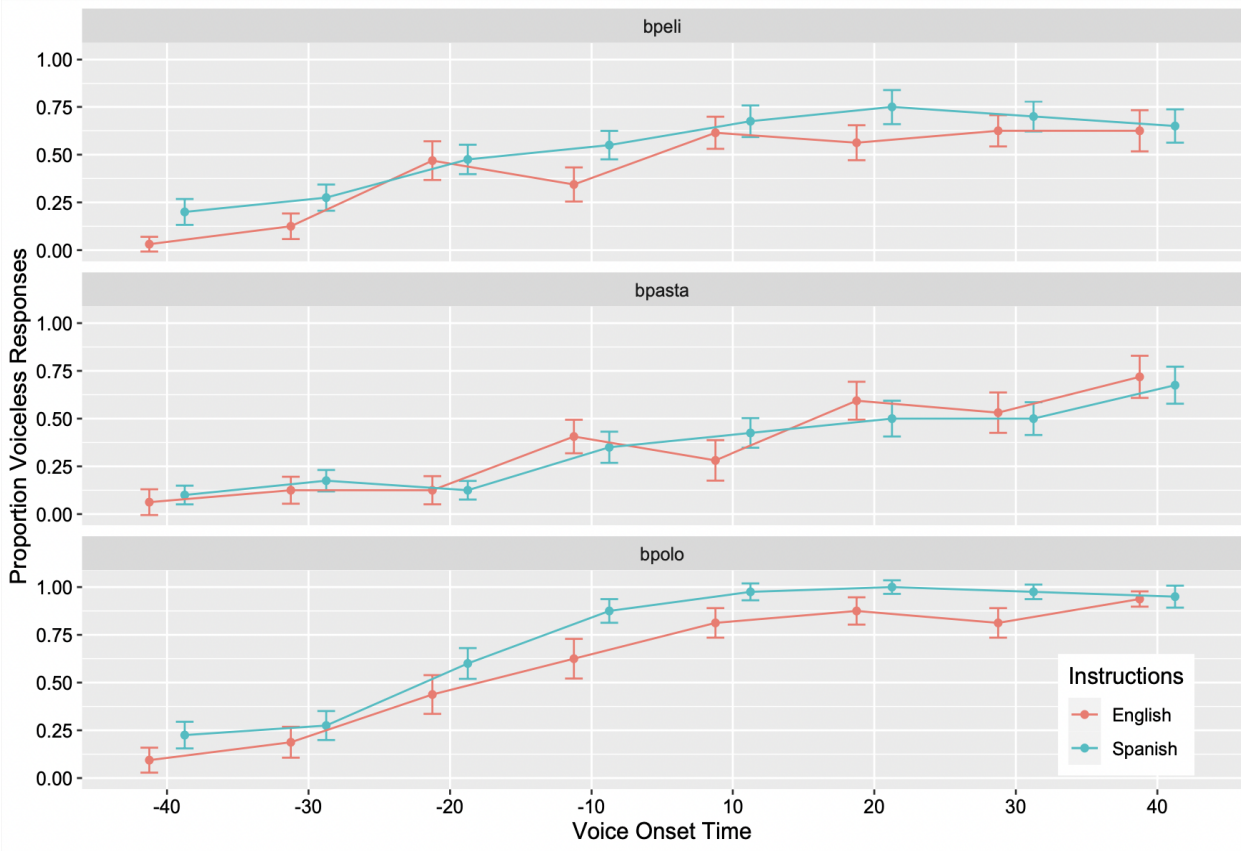

Figure 2. Actual results of experiment, which show the proportion of voiceless responses (i.e., /p/ responses) based on instruction language. Error bars represent 95% confidence intervals.

Discussion

We predicted that depending on the instruction language that the participants were given, the participants would be more likely to perceive the stimuli presented to them as a word in that language. For example, if a participant was assigned to complete the study in English, they would have selected "P" as the beginning sound when presented with the basta/pasta continuum because "pasta" is a word in English and "basta" is not a word in English. Conversely, if a participant were to be assigned to complete the study in Spanish, they would have selected the voiceless response as the beginning sound more than English instruction language participants

due to the differences in VOT between Spanish and English speakers (Lisker & Abramson, 1964). However, the present study found that there was no significant difference in speech perception when presented with English or Spanish instructions. Participants were no more likely to perceive the stimuli as one language versus the other based on the instruction language that they received.

There is little research that has been conducted surrounding the topic of English-Spanish bilinguals' speech perception. The findings of the present study partly support the Gosselin and Sabourin study (2021) since regardless of the instruction language or language switching habits, participants did not have differences in comprehension. The results of another study suggested that because bilinguals switch between languages frequently, they have more practice with monitoring which language that they speak in (Segal et al., 2019). This provides insight as to why bilinguals may have perceived the stimuli the way they did. The bilingual participants of this study may have been able to control the way they perceive the language that is being spoken to them.

One limitation of this study is the platform in which participants were recruited. Participants were recruited via MTurk, a study recruitment platform that is entirely in English. The overall English context of MTurk would suggest that the participants were initially thinking in English. Thus, this could have affected the responses for those who were selected to complete the study in Spanish because they had to begin the study thinking in English. This might provide an explanation as to why the participants selected to complete the study in Spanish perceived certain stimuli as words in English instead of Spanish as we had anticipated. The participants could have been able to make clear distinctions between the two languages because the

participants had previously been thinking in English before they were thinking in Spanish. Therefore, suggesting that the participants would have been thinking in English and Spanish.

Another limitation of this study was that all stimuli were recorded by a native Spanish speaker and were meant to sound as though they were spoken in Spanish. Thus, the words were spoken with a Spanish accent. This could have biased the participants' responses because they perceived the person who was speaking in the recordings as a Spanish speaker, thus potentially leading participants to believe the native Spanish speaker was more likely to be saying words in Spanish. This would lead participants to believe that the words that they were hearing were meant to be words in Spanish rather than a word in English with a Spanish accent. This could explain why some participants who were selected to complete the study in English were not more likely to follow the Ganong effect in this context.

Lastly, a third limitation of this study is the use of slang words and overall differences in dialect between Spanish speakers. Particularly, the word *peli* in the belly/peli continuum is short for the Spanish word *pelicula*, meaning movie. There are many factors that contribute to the different words that Spanish speakers use and may be familiar with. Originating from different regions may produce a difference in dialect. Participants who speak Spanish may vary in the dialect that is unique to their country of origin. For example, the Spanish that is spoken in Mexico can be different from the Spanish that is spoken in a different country, such as Puerto Rico or Spain. The words that one person uses to describe one thing can be different depending on where they are from. Another difference is the generational difference. As time passes, each generation has their own unique slang words or sayings that they may adopt. Therefore, words such as *peli* would not be easily perceived as a word in Spanish because it is so obscure.

While it was difficult to come up with stimuli for this study overall, future studies may want to consider these limitations to make a clearer distinction in speech perception based on the instruction language given to participants. In order to resolve the issue of slang words, future research should attempt to control for the country of origin in which Spanish speakers originate from. This would mean limiting the study significantly to those who speak the Spanish dialect of one country, such as only using participants who know the Mexican dialect of Spanish. To resolve the possible effects of recruitment platform language that may have been presented, recruiting participants from both English and Spanish language platforms could control for the issue of the initial bias for those who were selected to complete the study in Spanish. Additionally, further manipulating the VOT so that there is more variability within the stimuli or having a native English speaker record the same stimuli could minimize factors that could influence participants' perception of what language the stimuli is supposed to be perceived as.

Future research should further investigate other voiced and voiceless minimal phoneme pairs. The current study only investigated the voiced and voiceless phoneme pair of /b/ and /p/. However, other voiced and voiceless minimal phoneme pairs include /d/ and /t/ as well as /g/ and /k/. While the findings of this study may not be exclusive to the /b/ and /p/ minimal phoneme pair, it may be important to investigate if there is a difference that exists between other minimal phoneme pairs, showing that there may be a distinction in language comprehension for certain minimal pairs. Additionally, conducting research on minimal phoneme pairs that exist in Spanish rather than using only those that exist in English may provide further insight.

Future research should also seek to recreate this study in a variety of settings. For example, instead of completing the study in an entirely virtual environment, having participants complete the study in the lab would ensure that participants were thinking in one language over

the other, without external factors distracting the participant in another language. Then, future researchers on the same or similar topics may be able to manipulate the setting to a strict Spanish-only environment or English-only environment. Doing so could minimize the external factors that could have affected participants responses in a virtual study setting (i.e., background noise in another language) compared to a face-to-face environment.

While the study did not yield significant results, the findings of this study suggest that regardless of what language a bilingual speaker may be thinking in, their speech perception will not be affected. Thus, it would not be difficult for bilingual speakers to be able to distinguish what language is being spoken by another person. Bilingual speakers would be able to comprehend what is being said to them regardless of what language they are thinking in. This implies that regardless of the situation (e.g., everyday conversations), bilingual speakers would be able to make a distinction of what is being said to them. Further, those who grew up as frequent informal translators will not be affected in their auditory comprehension. Bilinguals who grew up as frequent informal translators would be able to easily understand what is being said to them without needing further context to understand. The implications of this study could provide a reason as to why "Spanglish" may be easy for bilinguals to speak without any disruptions in their comprehension. This also explains why bilinguals are able to easily comprehend brief and frequent switches between languages, given that "Spanglish" relies on these switches. Being able to understand what is being said without needing further context to know what language is being spoken is especially beneficial in emergency situations, such as those where a bilingual must abruptly switch languages. If a bilingual speaker were to be thinking in their dominant language and witness an emergency situation in which a victim is

asking for assistance in another language, the bilingual speaker would not have difficulties understanding what the speaker is saying.

Understanding that there are no differences in speech perception between English-Spanish bilinguals suggests that bilinguals may be better at catching variations in VOT. While the placement on the VOT continuum for English voiced phonemes and Spanish voiceless phonemes is the same (Lisker & Abramson, 1964), we must recall that VOT exists on a continuum. Since bilinguals must shift the VOT continuum depending on what language that they may speak (Lisker & Abramson, 1964), they would have more practice understanding this shift that occurs. This would mean that bilinguals may not depend on surrounding context as much as monolinguals, meaning that they may not be as susceptible to utilizing the Ganong effect (Ganong, 1980). Because of this, bilinguals may have enhanced speech perception.

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Appendix

Questions Included in Qualtrics Survey

English Version

Consent

Purpose of the research study

Alexa Andrade is a student in the Honors Program at the University of San Diego. You are invited to participate in a research study he/she is conducting. The purpose of this research study is: to investigate the differences in language perception between English-Spanish bilinguals.

What you will be asked to do

If you decide to be in this study, you will be asked to: listen to a set of recordings that consist of words in English and/or Spanish. Then, decide the starting sound of what you heard. Additionally, you will be asked to provide demographic questions, such as "How would you describe your hearing?" and "What language do you speak at home?" Your participation in this study will take a total of (30) minutes/hours.

Foreseeable risks or discomforts

This study involves no more risk than the risks you encounter in daily life.

Benefits

While there may be no direct benefit to you from participating in this study, the indirect benefit of participating will be knowing that you helped researchers better understand existing differences between English-Spanish bilinguals.

Confidentiality

Any information provided and/or identifying records will remain confidential and kept in a locked file and/or password-protected computer file in the researcher's office for a minimum of

five years. All data collected from you will be coded with a number or pseudonym (fake name). Your real name will not be used. The results of this research project may be made public and information quoted in professional journals and meetings, but information from this study will only be reported as a group, and not individually. The information or materials you provide will be cleansed of all identifiers (like your name) and may not be used in future research.

Compensation

If you participate in the study, the researcher will give you $3.00 in the following way: via Amazon Mechanical Turk (MTurk). You will receive this compensation even if you decide not to complete the entire experiment.

Voluntary Nature of this Research

Participation in this study is entirely voluntary. You do not have to do this, and you can refuse to answer any question or quit at any time. Deciding not to participate or not answering any of the questions will have no effect on any benefits you're entitled to, like your health care, or your employment or grades. You can withdraw from this study at any time without penalty.

Contact Information

If you have any questions about this research, you may contact either:

Contact information of researchers was provided

I have read and understand this form, and consent to the research it describes to me. I affirm that I am at least 18 years of age. Please take a screenshot now if you would like a copy of this consent form for your records.

In order to participate in this research study, you must click ACCEPT below.

Accept

Demographic Information

1. mTurk ID (this will not be linked to your data and is only used in case you have issues completing the experiment).
2. How old are you?
3. Are you right or left handed?
    a. Right
    b. Left
    c. Both
4. How would you describe your hearing?
    a. Normal
    b. Deaf or Hard-of-Hearing, and I use an assistive device
    c. Deaf or Hard-of-Hearing, and I do not use an assistive device
5. Have you had hearing issues in the past?
    a. Yes
    b. No
6. Please select your birth language
    a. English
    b. Spanish
    c. Both
7. At approximately what age did you learn your second language? Please answer by providing a whole number. Please do not state an age range.

8. Do you consider yourself a native bilingual in English and Spanish?
    a. Yes
    b. No
9. What language do you normally think in?
    a. English
    b. Spanish
10. What language do you normally speak at home?
    a. English
    b. Spanish
11. How often do you switch between languages on a daily basis? Please think about any instances in your daily conversations such as those that you have at home and at work.
    a. Sometimes
    b. Often
    c. Always
12. What is your dominant language?
    a. English
    b. Spanish

Transition

The purpose of this study is to understand bilingual language perception. You will listen to a set of recordings that consist of words in English and/or Spanish. Then, decide the starting sound of what you heard.

We will now begin the study. Please remember to wear headphones.

Headphone Check

1. Are you wearing headphones to complete the experiment?
    a. Yes
    b. No
2. What brand of headphones are you wearing?
3. Click to play the test tone. Please adjust the volume to a comfortable level and then press Continue.

Instructions

In this experiment, you will listen to a variety of audio recordings. These recordings consist of words in English and/or Spanish, and we would like to know what you hear. You will listen to this recording once. After listening to the recordings, you will decide the starting sound of what you heard. Your responses will not be timed. It is important to be as accurate as possible in reporting what you heard. Thank you for your participation.

Trials (24 trials were presented, each with their own continuum playing in the background once)

What is the beginning sound of the word that you heard?

a. B
b. P

Spanish Version

Consent

Propósito del estudio de investigación:

Alexa Andrade es un estudiante en el programa de Honor en la Universidad de San Diego. Estas invitado a participar en un estudio de investigación que ella está realizando. El propósito de este estudio de investigación es: para investigar las diferencias entre los bilingües inglés-español.

Que vas a hacer en este estudio:

Si decides participar en este estudio, le pedimos que: Escucha grabaciones que consisten de palabras en inglés o español. Luego, vas a decidir cuál fue el primer sonido que escuchaste. Además, se le pedirá que proporcione preguntas demográficas, como "¿Cómo describiría su audición?" y "¿Qué idioma hablas en casa?" Su participación en este estudio va a tomar un total de 30 minutos.

Riesgos o molestias previsibles

Este estudio no tiene más riesgos que los riesgos de la vida diaria. IV. Beneficios Es posible que no obtenga un beneficio directo de participar en este estudio, el beneficio indirecto de participar será saber que ayudó a los investigadores a comprender mejor las diferencias existentes entre los bilingües inglés-español.

Confidencialidad

Cualquier información y/o registros de información permanecerán confidenciales y se mantendrán en un archivo cerrado y/o en un archivo informático protegido con contraseña en la oficina del investigador durante un mínimo de cinco años. Todos los datos recopilados de usted serán codificados con un número o seudónimo (nombre falso). Tu nombre real no será usado. Los resultados de este proyecto de investigación pueden hacerse públicos y la información puede

citarse en revistas y reuniones profesionales, pero la información de este estudio solo se informará como grupo y no individualmente. La información o los materiales que das se eliminarán de todos los identificadores (como su nombre) y no se podrán utilizar en futuras investigaciones.

Compensación

Si participas en el estudio, las investigadoras te van a dar $3.00 a través de MTurk. Vas a recibir esta compensación incluso si decides no completar todo el experimento.

Naturaleza voluntaria de esta investigación

La participación en este estudio es totalmente voluntaria. No tienes que hacer esto, y puedes negarse a responder cualquier pregunta o renunciar en cualquier momento. Si no quieres participar o responder ninguna de las preguntas no afectará los beneficios a los que tiene derecho, como su atención médica, su empleo o sus calificaciones. Puede retirarse de este estudio en cualquier momento sin penalización.

Información del Contacto

Si tienes preguntas sobre este estudio de investigación, puedes contactar una de estos dos personas:

Contact information of researchers was provided

He leído y entiendo este formulario, y doy mi consentimiento para la investigación que me describe. Afirmo que tengo al menos 18 años de edad. Tome una captura de pantalla ahora si desea una copia de este formulario de consentimiento para sus registros.

Para participar en este estudio de investigación, debe firmar con su nombre y hacer clic en ACEPTAR a continuación.

ACCEPTO

Demographic Questions

1. mTurk ID (esto no estará vinculado a sus datos y solo se usa en caso de que tenga problemas para completar el experimento).
2. Cuántos años tienes?
3. ¿Eres diestro o zurdo?
    a. Diestro
    b. Zurdo
    c. Ambidextro
4. ¿Cómo describiría su audición?
    a. Normal
    b. Sordo o con problemas de audición, y uso un dispositivo de asistencia
    c. Sordo o con problemas de audición, y no uso un dispositivo de asistencia
5. ¿Ha tenido problemas de audición en el pasado?
    a. Sí
    b. No
6. Seleccione su idioma de nacimiento:
    a. Inglés
    b. Español
7. ¿A qué edad aproximadamente aprendiste tu segundo idioma? Por favor responda proporcionando un número entero. Por favor, no indique un rango de edad.
8. ¿Te consideras un nativo bilingüe en inglés y español?
    a. Sí
    b. No

9. ¿En qué idioma piensas normalmente?
    a. Inglés
    b. Español
10. ¿Qué idioma hablas normalmente en casa?
    a. Inglés
    b. Español
11. ¿Con qué frecuencia cambia de idioma a diario? Piense en cualquier instancia en sus conversaciones diarias, como las que tiene en casa y en el trabajo.
    a. Casi nunca
    b. Con frecuencia
    c. Frecuentemente
12. ¿Cuál es tu idioma dominante?
    a. Inglés
    b. Español

Transition

El propósito de este estudio es comprender la percepción del lenguaje bilingüe. Escucharás un conjunto de grabaciones que consisten en palabras en inglés y/o español. Luego, decide el sonido inicial de lo que escuchaste.

Ahora vamos a comenzar el estudio. Por favor, recuerde usar auriculares.

Headphone Check

1. ¿Estás usando audífonos para completar el experimento?
    a. Sí
    b. No

2. ¿Qué marca de audífonos estás usando?
3. Haga clic para reproducir el tono de prueba. Ajuste el volumen a un nivel cómodo y luego presione Continuar.

Transition

En este estudio de investigación, vas a escuchar una variedad de grabaciones de audio. Estas grabaciones consisten de palabras en Inglés y/o Español, y nos gustaría saber qué escuchas. Vas a escuchar estas grabaciones una vez. Después de escuchar las grabaciones, vas a decir que oíste. Tómese todo el tiempo que necesites, es importante ser lo más preciso posible al informar qué palabra escuchaste. Gracias por tu participación.

Trials (24 trials were presented, each with their own continuum playing in the background once)

¿Cuál es el sonido inicial de la palabra que escuchaste?

a. B
b. P

English and Spanish Group Debriefing

The study has now concluded. Thank you for participating in this study. The goal of this study was to test the auditory perception of bilinguals based on the language of instructions that they were given. We predicted that you would respond to each recording by selecting the beginning sound that would correspond to a word in the instruction language. For example, if you were given English instructions, you may be more likely to choose P as the starting sound for the words that ended in "-asta". Thus stating that you heard the English word "pasta" instead of the Spanish word "basta". Once again, thank you for your participation. If you have any further questions please contact Alexa Andrade and/or Dr. Laura Getz.