The Effects of Regional Accents on Memory and Credibility

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Abstract

Accent, be it regional or foreign, is a very salient aspect of speech and it can be the first and most definitive sign that the person is not local. In the case of foreign accents, they hinder communication to some extent, affecting memory (Lev Ari & Keysar, 2012) and the credibility of the speaker (Lev Ari & Keysar, 2010). But, is this the case for regional accents? We addressed this question by assessing memory, credibility, and the illusory truth effect—as an indirect measure of the other two—comparing local and regional accents. Participants in Experiment 1 listened to sentences said by locals—Spaniards—or foreigners with regional accents—different Latin American countries. Subsequently, they were presented with new stimuli and were asked to judge the sentences as old or new, in a recognition task. In Experiment 2, participants heard unknown facts (e.g. "the national flower of Iraq is the rose") in either local or regional accents and were asked to assess how true the statement was. Finally, in Experiment 3, participants heard the same facts as in Experiment 2 in either local or regional accents and were then asked to independently rate the truth value of these phrases—some repeated and some new. Results showed no effect of regional accent on all three studies. This suggests that the effects we see in foreign accents might not be present with regional accents and that there is something inherently different between regional and foreign accents.

Keywords: accent, credibility, memory, illusory truth

Table of Contents

Table of Figures

The Effects of Regional Accents on Memory and Credibility

We consistently interact with a variety of people—people that look like us, people that do not, people that sound like us, people that do not. All speakers of a language have an accent, therefore we all have an accent. This accent can be regional or foreign and it gives those around us a lot of information about who we are. It lets people know where we come from—along with the stereotypes that may carry—and it can give them some idea of our linguistic competence in that language (Gass & Varonis, 1984). This can affect our interactions with people and our first impressions of them including how we judge their credibility, competence, and friendliness (Tsalikis, DeShields, & Latour, 1991).

Accent is also a critical cue of social categorization (Pietraszewski & Schwartz, 2014b). It has been suggested that it is even more robust than race (Pietraszewski & Schwartz, 2014a) and that we are evolutionarily predisposed to categorize people by their accent (Pietraszewski & Schwartz, 2014a,b). Furthermore, accent gives a very precise idea of the person's origins, which other immediately visible characteristics do not. For example, someone's accent can show that they come from Andalusia, Spain, whereas race—or the color of their skin and other visual attributes—would not be that precise. All of this evidence suggests that accent might have automatic effects on judgments and cognition—which the person is not aware of—and is an essential marker of group membership.

The effects of accent could have many ramifications for our interactions, as accent is an integral part of our verbal communications. Given how often people move between countries or encounter foreigners, this kind of communication between individuals of different regions is a very common phenomenon. This begs the question, does accent hinder communication? Do accents affect our memory and the trust we place on the other person? In more concrete terms, if an instructor with a different accent teaches a class, is the content remembered less? Will the students believe him the same? Will the students learn just as much from the class or will they benefit less from his instruction? For foreign accents the short answer is that it affects communication in a negative way: it reduces memory and makes it more vague (Lev Ari & Keysar, 2012), and undermines the credibility of the speaker (Lev Ari & Keysar, 2010). Although these questions have been addressed to some extent with foreign accents, fewer studies have focused on the effects of regional accents. This is particularly interesting because regional accents have a reduced effect of intelligibility and the linguistic competence of the speaker—possible causes of the effect—in that language is, in principle, equal to that of the listener. Therefore, for regional accents the answer is not so clear and, thus, will be the focus of this work.

Regional accents are of special interest because they allow us to disentangle some of the possible accounts for foreign accent effects. One of these explanations is that we experience processing disfluency together with a group bias, but it is hard to determine the relative influences of each factor. Regional accents give us the opportunity to decrease the impact of one—namely, processing disfluency—and retain group biases. Moreover, people theoretically will not extract individual (linguistic) competence through the accent, given that in this case the accent is a native one. If this is an important characteristic driving the effect, then the effect would be reduced in regional accents. These ideas will be addressed in more detail in the following paragraphs.

Differences between Regional and Foreign Accents

As already mentioned, accents can be regional or foreign, with the two groups differing and coinciding in various ways. For one, they both signal ingroup/outgroup status by marking the region (or approximate region) from which the interlocutor comes. They also both lead to variations in intelligibility and can be harder to process than local native accents, although to different extents (Floccia, et al. 2006; Munro & Derwin, 1995). Furthermore, Kinzler, Dupoux, and Spelke (2007) showed that even children show a preference for native speakers of their language. Children chose native speakers of their language as friends over accented speakers and preferred to look at and accepted toys form native speakers differentially. This points to a strong effect of accent that emerges early in life.

Another large difference between the two is that foreign (non-native) accents denote reduced linguistic ability in that language (Gass & Varonis, 1984), which regional accents do not necessarily signify. This could lead to a kind of Halo Effect (e.g. Dion, Berscheid, & Walster, 1972; Nisbett & Wilson, 1977), where one valenced characteristic—in this case accent or linguistic competence—leads to the assumption that other characteristics have the same valence. Perhaps native listeners extend this lack of native linguistic competence in foreign accented speakers to other kinds of competence, likability, trustworthiness, and comprehensibility. A study by Neuliep and Speten-Hansen (2013) found that when people evaluate an interaction with a foreign accented speaker (but not a native accented speaker), ethnocentrism correlated negatively with measures of physical and social attractiveness as well as with assessments of the task the speaker was describing. This suggests that, for many people, the effects of accent on their perception of the individual go far beyond what is conveyed by the accent itself. Furthermore, foreign accented speech is treated differently by native speakers of the language, leading to reduced phonetic expectations (Brunellière & Soto-Faraco, 2013) and often triggering "foreign talk" (Varonis & Gass, 1982). On the other hand, there are occasions when having

regional dialects an even be beneficial, especially when these have connotations of prestige. For example, having particularly positive regional accents leads to increased satisfaction ratings in interactions with salespersons (Mai & Hoffmann, 2011).

Overall, foreign accents are perceived negatively by native speakers in general, apart from the specific stereotypes that can be inferred from the origin of the person. These negative perceptions lead to diminished acceptability, reduced intelligibility, and overall a negative evaluation of the individual with an accent (Fledge, 1988)

Credibility and Foreign accent

We know that one of the effects of non-native foreign accents has on processing of spoken language is reducing the credibility of the speaker. A study by Lev Ari and Keysar (2010) found that people tend to believe individuals with a foreign accent less than those with a native accent, even if participants know that these are just the messengers—i.e. participants were instructed that the message came from the experimenter and the speakers had just been asked to read it out loud. The effect of having a foreign accent is further exacerbated by how strongly the accent is perceived or assessed, meaning that we believe people that have accents that are interpreted as stronger (and more marked) even less. According to Lev Ari and Keysar (2010), the effect could largely be caused by decreased processing fluency when listening to foreigners. However, it is difficult to determine whether this is the only relevant variable driving the effect (in this study), because the nationalities—and thus the accents—were not matched between the strong and weak accents, making them impossible to compare. In fact, in the abovementioned study it was not possible to establish the specific effects of accent, apart from those of intelligibility, and no other studies have addressed this question to date. Some of the unassessed variables, like the effects of perceived reduction in linguistic competence, apply only to specific regional accents but not to all, and others, such as group membership, apply to all.

Memory and Foreign Accent

One of the effects of foreign accented speech is decreasing processing fluency—i.e. they are more difficult to process (Munro & Delwing, 1995), which, in turn, affects memory. Lev Ari and Keysar (2012) found that listening to stories with non-native accents affected the level of detail with which the story was remembered and recalled, compared to native accents. In order to disambiguate the effects of intelligibility and social categorization—as conveyed by accent—they compared a condition where coherence between phrases was expected and one where it was not. They found that when coherence and cohesion were not expected and the information was listened to for memorization, the effects of accent were reduced. They studied this by, in

one case, asking participants to listen to a well formed story for comprehension—in one experiment—and to memorize a jumbled up story—in another experiment. In each experiment, the stimuli—either the linear story or the out of order story—were presented aurally, read by native or foreign accented speakers. This manipulation kept intelligibility of the speakers constant between tasks—i.e. even though the text is no longer comprehensible as a whole, each sentence is just as understandable or difficult to understand as before. On the other hand, this reduces the expectation of coherence and cohesion and the effects of accent. Although the persistence of a difference points to intelligibility being a significant factor, it does not account for the full pattern of results. The explanation is that part of the foreign accent effect relates to the expectation of correct word use in context, so when you remove the context, you also get rid of this expectation. This leads them to conclude that the effects of accent they observed are explained by a combination of differences in intelligibility and in expectations between accents. This refers back to the effects of assuming reduced linguistic competence in foreign accented speakers and how this affects processing.

What about regional accents?

Although we know something about the effects of non-native accents on memory and credibility, we do not have the same information about regional accents. There is some evidence that standard accents—which entail greater prestige and are considered more correct—lead to greater consumer preference when compared to more familiar, less standard accents (Morales, Scott, & Yorkston, 2012). On the other hand, this more familiar accent (which was also less standard), led to an increase in memory, which means that one remembers things said with an accent similar to one's own better than with a different accent. But, in this case, accents differed in an important dimension other than familiarity and region of origin, namely prestige. Nevertheless, this does not address how group membership or the various other aspects of accent affect these judgments. Previous studies have shown that regional and foreign accents lead to a delay in word identification, which is not compensated by exposure to the accent (Floccia et al, 2009). Moreover, as shown by Goslin, Duffy, and Floccia (2012), regional accents cause increases in the Phonological Mapping Negativity (PMN), as compared to local accents, whereas foreign accents cause a reduction in PMN as well as in the N400 (Goslin et al, 2012). The implication is that regional accents allow for normalization and overcoming of the noise created by the accent, but foreign accents do not. This suggests that there are different normalization mechanisms for regional and foreign accents—the different processes hypothesis (Goslin et al, 2012). Furthermore, this implies qualitative differences in processing between the two kinds of accent.

Current Study

Prior studies have assessed foreign accent and determined that, because of decreased intelligibility, decreased processing fluency, and changes in expectations of coherence, they lead to more vague memory encoding and reduced credibility. However, few studies thus far have looked into how regional accent—specifically as a cue of ingroup/outgroup status or increased familiarity—affects basic aspects of communication such as memory and credibility. Using regional accents allows us to modulate certain characteristics of accents, such as intelligibility and linguistic competence, keeping constant social categorization and group membership. Therefore, on the one hand, regional accents could have the same effects as foreign accents, if the only relevant factors are ease of processing fluency, intelligibility, and ingroup/outgroup status. On the other hand, if the expectations caused by a perception of reduced linguistic competence and other assumptions rooted in this belief are the driving factors, then the effects of regional accent should be different or null.

In order to address this question and tease apart processing fluency—or intelligibility from the perspective of the listener—and other inferences about the speaker and their origins, we will carry out three studies: one assessing memory, another one credibility, and finally modulations of the illusory truth effect. In all three cases locally accented speech will be compared with regional accents from Latin America using obscure trivia-like facts. The accents were varied in order to reduce specific biases towards any particular group and that the only thing unifying the voices was that they were foreign (i.e. not local) and regionally accented.

The stimuli were chosen in such a way that they increased reliance on source assessments, i.e. on the speaker. Credibility was assessed indirectly as participants rated the veracity of the statements they were read rather than credibility of the speaker. In addition, the foils were made to be very similar to the statements in order to increase the importance of having a detailed memory trace, rather than a vague recollection of having heard something similar, which we know is a factor in foreign accented speech.

Experiment 1: Memory for Local and Regional accents

The purpose of Experiment 1 was to explore whether memory for local accents is different from that of regional accents. The expectation here is that, if the driving factor in foreign accent studies is decreased processing fluency or group bias, then participants will remember what was said with a regional accent less and more vaguely than with a local accent. This would lead to both less hits and more false alarms with the phrases heard in regional accents. If the main

driving factor of this effect has to do with reduced linguistic competence, then there should be no difference between accent groups.

Methods

Participants

Forty-four participants took part in this study, seven were male and the average age was 21.24 (SD=1.97). All participants were born and raised in Spain, specifically in Catalonia. Participation was voluntary and participants were compensated for their participation in the study. Participants were tested at the Center for Brain and Cognition Laboratory at Universitat Pompeu Fabra.

Materials

Sixty sentences (see Appendix A) were created by taking trivia facts that would not be preferentially known by people of one country or another—for example, geographic and historic trivia from Latin America and Spain were avoided. The sentences were worded such that the key word was the last word in the sentence. For example, “The French gave the name the apple of love to tomatoes” [Los franceses llamaban la manzana del amor a los tomates] and “In 1719, in North America, there first appeared potatoes” [En 1719 aparecieron en América del Norte las patatas].

These sentences were read out loud by 10 Spaniards and 10 Latin-Americans, five male and five female in each group. Recordings were made using Audacity at a rate of 44.1 KHz (32-bit float). All of the locals were from the Barcelona area with the exception of one female from La Rioja and one from Andalusia, who had been living in Barcelona for 5 and 6 years, respectively. The female regionally accented speakers were from Argentina (2), Chile (2), and Colombia (1). The male regionally accented speakers were from Argentina (1), Colombia (2), Cuba (1), and Peru (1).

Procedure

Participants were given written instructions (see Appendix B) and then were presented with all 60 statements aurally one by one with a 500ms silent pause between each. There was a fixation cross on the screen throughout the presentation of statements and pauses (see Figure 1 for a general outline of the task). Sentences were randomized with no more than three utterances from the same accent in a row—i.e. no more than three local or regional in a row. They also did not hear two utterances from the same speaker in a row. After listening to the sentences, participants were visually presented 30 statements and 30 foils one at a time and asked to

identify which phrases they had heard before (old) and which were new. These were randomized such that no more three in a row were repeated or new.

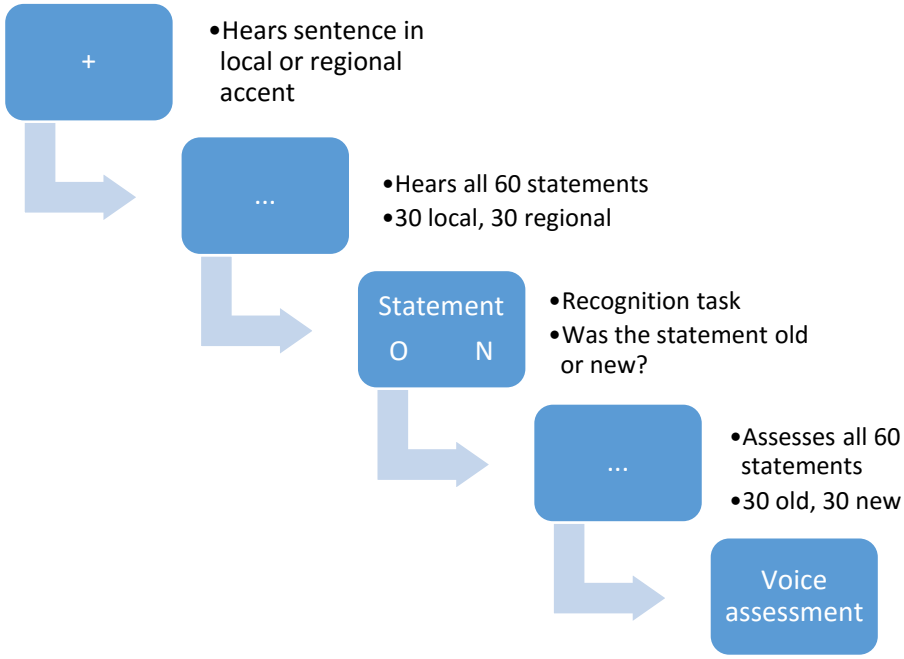

Figure 1: Outline of memory task.

After evaluating the phrases, participants heard one phrase said by each speaker and were asked to evaluate intelligibility (1 to 9—1 very difficult to understand, 9 extremely clear) and accent (1 to 9—1 Spanish, 9 Latin American) for each (see Appendix B for instructions and Figure 2 for a general outline of the task).

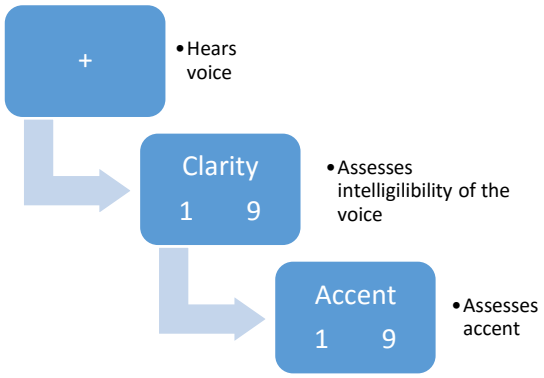

Figure 2: Outline of intelligibility and accent rating task.

Results

Out of the 44 participants, two were excluded for having a low recognition score (<60% correct recognition). Except for those two participants, recognition was quite high overall (*M*=83.26%, *SD*=8.26%)

Intelligibility for all of the voices was high, with an average intelligibility score of 7.90 (*SD*=.48) on a nine point scale (1 to 9). There was no significant difference in intelligibility between locally and regionally accented voices (*p*>.05), *M*=7.71 (*SD*=.57) and *M*=8.10 (*SD*=.293), respectively. Average intelligibility and average accent for each voice were not significantly correlated neither for all voices together nor for each type of accent individually, all *p's* > .05 (see Appendix C for average intelligibility and accent by voice).

The range of average accent scores for the regionally accented voices was 3.63 to 8.25 and for locally accented voices it was 1.95 to 4.48, on a scale from 1 to 9 (see Appendix C for average scores by voice).

D' was calculated for each participant for statements heard with regional and local accents in order to compare accuracy. We are able to calculate the D' for local and regional accents separately because they each had unique false alarms. This is because, even though participants had not heard the exact same sentence before, they had heard a very similar one—the same sentence but with a different last word. Therefore, the sentences for which a similar version had been said by a locally accented speaker were marked as local false alarms and those that had been said by a foreigner were marked as regional false alarms. For this reason, if memory traces are unclear or vaguer for one accent than the other—as the case with foreign accented speech (Lev Ari & Keysar, 2012)—, participants would have both less hits and more false alarms. Participants with 100% hits or 0% false alarms for either category were removed from this analysis. The paired samples t-test showed no significant effect of regional accent, *t*(20)=1.68, *p*=.11 (Figure 3). This suggests that recognition was no different for statements in a local or a regional accent.

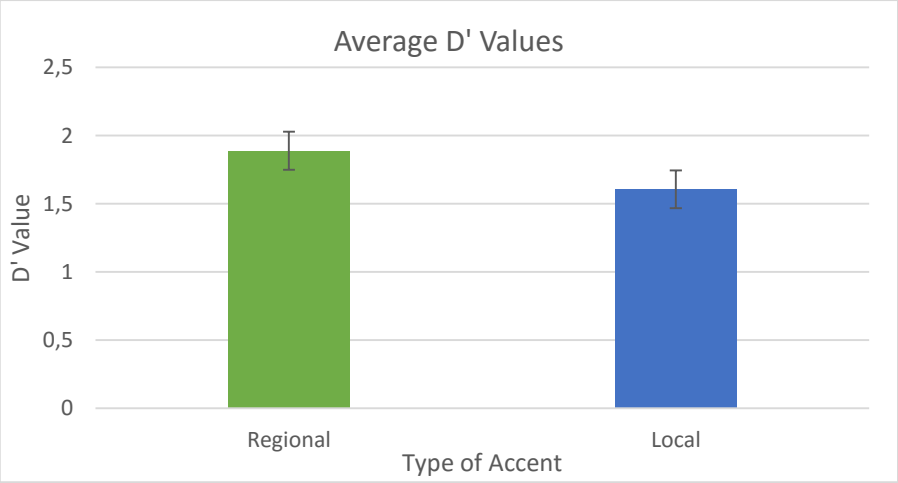

Figure 3: Average d' values by accent. Regional in green and local in blue. Error bars show +/-1 standard error.

A two-way repeated measures ANOVA was performed on error type (hits versus correct rejections) and accent type (local versus regional accents) did not demonstrate a significant effect of accent type (regional vs. local) ($F(1,41)=2.35$, $p=.13$) or of error type (hits vs. correct rejections), $F(1,41)=.25$, $p=.62$. There was also no interaction between error type and accent type, $F(1,41)=1.47$, $p=.23$ (Figure 4). This suggests that the memory traces for the regional accents were not vaguer than the ones for the local accents.

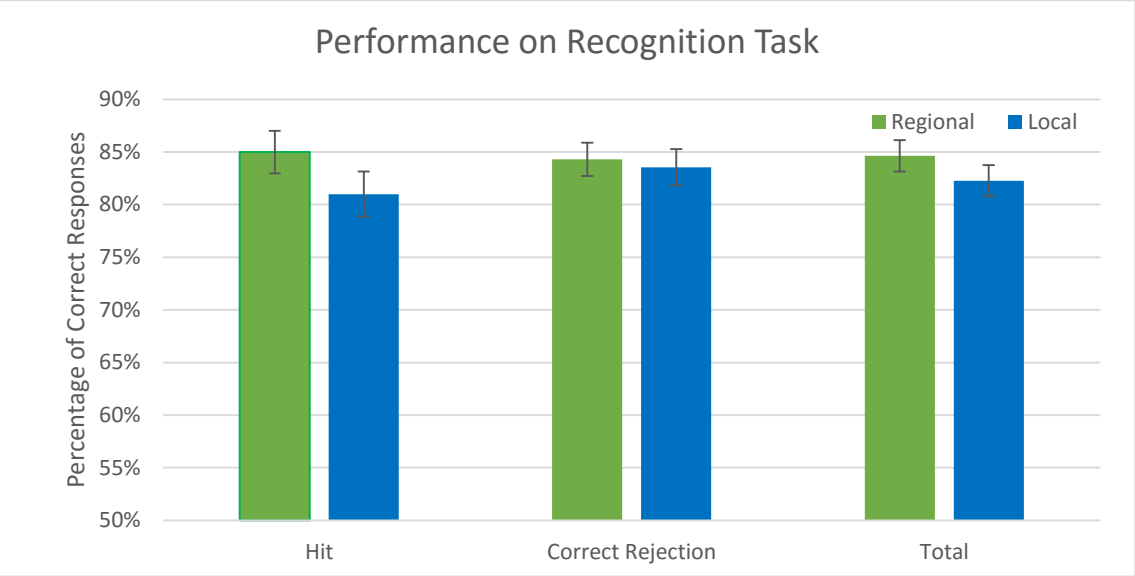

Figure 4: Correct response rate in percentage by accent--regional in green and local in blue--divided by hits, correct rejections, and overall . Error bars show +/- 1 standard error.

A logistic regression analysis was conducted to predict correct recognition from intelligibility, with participant as a random variable. A test of the model with intelligibility only against a constant only model was statistically significant, indicating that intelligibility had an effect on correct recognition, $X^2(1)=8.88$, $p=.003$ (Figure 5). Adding accent or the interaction between accent and intelligibility did not improve the model (all *p's* > .05). This suggests that intelligibility affected recognition but did not interact with accent and accent had no effect.

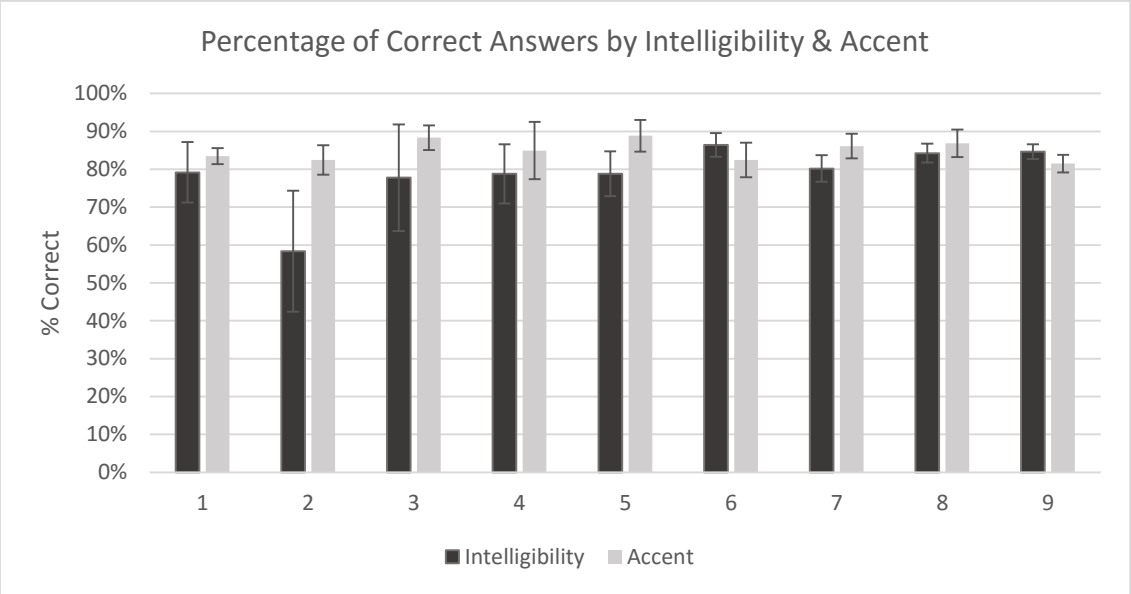

Figure 5: Percent correct by intelligibility and accent ratings. Because not all participants used all of the values when rating intelligibility and accent, the number of participants represented in each bar is different. Error bars show +/-1 standard error.

Experiment 2: Credibility for Local and Regional Accents

The purpose of study 2 was to assess whether there is an effect of accent on credibility by comparing local and regional accents on an indirect measure: truth rating of trivia statements. Specifically, we expect participants to believe regionally accented speech less than locally accented speech, if processing fluency or group affiliation have an effect. On the other hand, if linguistic competence was driving the effect in foreign language studies, then we expect no difference.

Methods

Participants

Twenty-five participants took part in this study, nine were male and the average age was 23.47 (SD=6.74). All participants were born and raised in Spain. Participation was voluntary and participants were compensated for their participation in the study. Participants were tested at the Center for Brain and Cognition Laboratory at Universitat Pompeu Fabra.

Materials

The same stimulus sentences from study 1 were matched thematically—e.g. trivia about flowers, nationalities, or metals—to create the foils. The foils consisted of switching the key word between statements such that between the two phrases they utilized all of the words, yet both sentences were incorrect. E.g. if the two stimulus phrases were “Los franceses llamaban la

manzana del amor a los tomates" [The French gave the name the apple of love to tomatoes] and "En 1719 aparecieron en América del Norte las patatas" [In 1719, in North America, there first appeared potatoes], then the foils would be "Los franceses llamaban la manzana del amor a las patatas" [The French gave the name the apple of love to potatoes] and "En 1719 aparecieron en América del Norte los tomates" [In 1719, in North America, there first appeared tomatoes]. These phrases—both the correct statements and the foils—were read out loud by the same speakers as in Experiment 1 and recorded using the same equipment.

Procedure

Participants were presented 30 sentences and 30 foils aurally one by one and asked to identify how true the phrases were on a scale from 1 to 9 (1 being false and 9 being true) immediately after (see Appendix B for instructions and Figure 6 for an outline of the task). Sentence presentation was randomized such that no more than three utterances from the same accent appeared in a row, no more three statements were true or false in a row, and no two utterances in a row were from the same speaker.

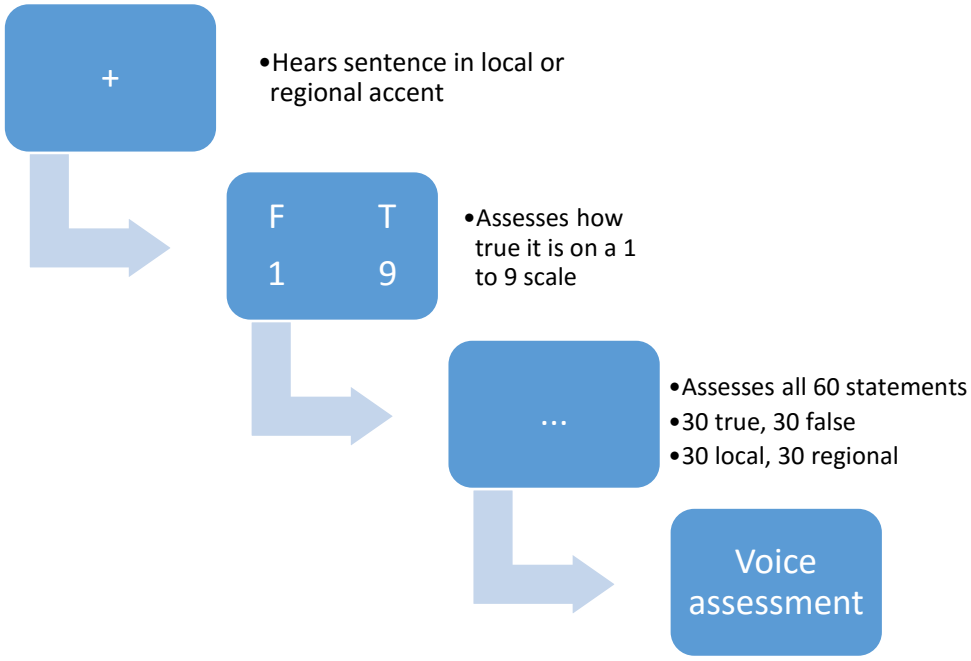

Figure 6: Outline of truth rating task.

After evaluating the phrases, participants rated intelligibility and accent in the same way as in Experiment 1 (see Appendix B for instructions and Figure 2 for an outline of the task).

Results

Intelligibility for all of the voices was high, with an average intelligibility score of 7.93 (*SD*=.48). There was no difference in intelligibility between regionally and locally accented voices

(p >.05), 7.86 (SD=.54) vs. 8.01 (SD=.44), respectively (see Appendix C for average intelligibility and accent ratings by voice). The range of average accent scores for the regionally accented voices was from 4.08 to 8.84 and for locally accented voices it was from 1.32 to 3.32, on a scale from 1 to 9.

There was no correlation between intelligibility and accent overall nor for local or regional accents individually, all p's >.05.

A two-way repeated measures ANOVA was performed on gender of the speaker and accent (regional vs local). There were no significant main effects or interactions, all p's > .05.

A stepwise linear regression was run predicting truth rating from accent and intelligibility ratings, with participant as a random effect. The model with accent shows a marginally significant improvement over the constant only model ($X^2(1)=3.75$, $p=.05$), but adding intelligibility did not significantly improve the model. This suggests that there might be an effect of perceived accent, but not of intelligibility. Interestingly, this possible effect of accent seems to be positive, with higher (more regional) accent scores correlating with higher truth scores (see Figure 7 for average truth rating by accent).

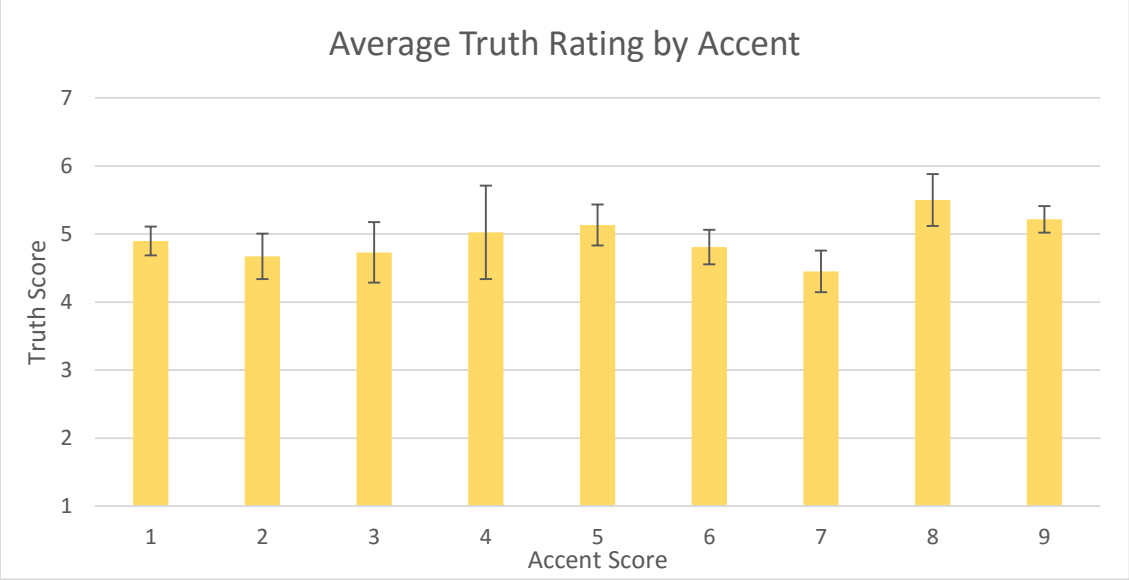

Figure 7: Average truth rating by accent score (on a 1 to 9 scale). Statements were divided by the accent rating the participant gave the particular speaker and their truth ratings were averaged within participant. Then, they were averaged between participants. Not all participants used the full range or all the values, so not all bars include data from all participants. Error bars show standard error.

These results suggest a marginal effect of accent rating—i.e. not the dichotomy of regional or local but the perceived intensity of the accent—and, unlike prior literature, no effect of intelligibility on truth rating.

Experiment 3: Effects of Accent on Illusory Truth

In the first two experiments we have not seen effects of accent and, if anything, there is a positive trend for regional accent and credibility. Perhaps looking at these effects in a more indirect way might provide more conclusive results as the comparison between accents becomes less obvious and, thus, participants might be less inclined or able to hide prejudices.

One indirect way of assessing memory and credibility is the illusory truth effect, which can be created by repeating a statement. It has been suggested that, basically, the fluency created by having heard a statement before leads to increased assessments of veracity—especially in direct comparison to new statements. This was first observed by Hasher, Goldstein, and Toppino (1977). Prior exposure not only affects credibility but also other factors such as how much we like something—as shown by the mere-exposure effect (Zajonc, 1968, 2001). This effect of having heard something before has been replicated many times and is quite robust (see Dechêne et al 2009 for a review).

A study by Fazio et al. (2015) showed that there is an illusory truth effect even in cases where statements were known to be false. This means that even in cases where we know the correct answer we mark incorrect answers as less wrong because we are affected by having read the sentence before. If regional accents have an effect on memory or credibility, they might modulate this effect. Assessing this modulation can be an indirect, less conspicuous way of measuring these effects and their influence in a larger context. The hypothesis here is that if intelligibility is not the only predictor of credibility and outgroup status—as marked by regional accents—affects credibility, then participants should have a smaller or negative illusory truth effect with regional accents.

Methods

Participants

Twenty-five participants took part in this study, 10 were male and the average age was 24.92 (*SD*=9.21). All participants were born and raised in Spain. Participation was voluntary and participants were compensated for their participation in the study. Participants were tested at the Center for Brain and Cognition Laboratory at Universitat Pompeu Fabra.

Materials

The same materials from Experiment 2 were utilized for this experiment.

Procedure

Participants were presented 30 statements and 30 foils aurally one by one with 500ms of silence between each sentence (see Appendix B for instructions). There was a fixation cross on the screen throughout stimulus presentation and silence (see Figure 8 for an outline of the task). Sentence presentation was randomized with no more than three utterances from the same accent in a row —i.e. no more than three local or regional in a row—, no more than three in a row were true or false, and no two utterances in a row were from the same speaker. Subsequently, participants were presented with 30 statements and 30 foils—15 repeated sentences, 15 new sentences, 15 repeated foils, 15 new foils—visually and asked to identify how true the phrases were on a scale from 1 to 9 (1 being false and 9 being true), ignoring the prior stimuli. These were randomized such that no more three in a row were repeated or new and no more than three in a row were true or false (see Appendix B for instructions).

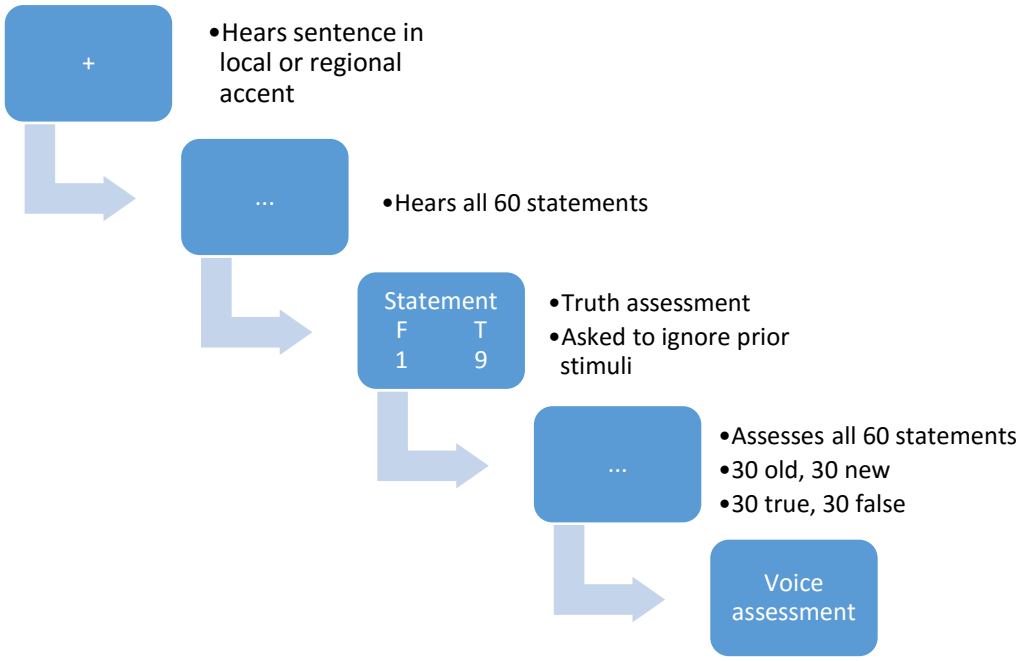

Figure 8: Outline of illusory truth task.

After evaluating the phrases, participants rated intelligibility and accent as in experiments 1 and 2 (see Appendix B for instructions and Figure 2 for an outline of the task).

Results

Intelligibility for all of the voices was high, with an average intelligibility score of 8.03 (SD=1.44). There was no difference in intelligibility between regionally and locally accented voices ($p > .05$), 7.84 (*SD*=.74) and 8.21 (*SD*=.53), respectively. Average intelligibility and average accent score for each voice were not significantly correlated neither for all accents together nor

for each type of accent individually, all *p's* > .05 (see Appendix C for average intelligibility and accent scores by voice).

The range of average accent scores for the regionally accented voices was 4.12 to 8.68 and for local voices it was 1.24 to 2.92, on a 1 to 9 scale (see Appendix C).

A three-way ANOVA was run on truth rating with repetition (old vs new), accent (regional vs local), and gender of the speaker as independent variables. There was a significant effect of repetition ($F(1, 24)=11.37$, $p=.003$), but no effect of gender, accent, or any interactions, all *p's*>.05.

A stepwise linear regression was run predicting truth rating from repetition, the interaction between repetition and intelligibility, and the interaction between repetition and accent, with participant as a random effect. The model with repetition is an improvement over the constant only model ($X^2(1)=140.98$, $p<.001$), but adding the other factors did not significantly improve the model. This reinforces the idea that repetition affected the truth assessment (as predicted by the illusory truth effect) but the other factors—accent and intelligibility—did not modulate this illusory truth effect.

General Discussion

In Experiment 1 we looked at the effects of regional accents on memory by asking participants to recognize sentences they had heard in different accents. In the second Experiment we looked at the effects of accent on credibility, asking participants to judge how true sentences were that had been said by different speakers—some with regional accents, some with the local accent. Finally, Experiment 3 tried to assess these two effects more indirectly, looking at how people rated sentences after having heard them immediately before—or not.

As a whole, the results of the three studies suggest that regional accents—unlike non-native foreign accents—do not have a negative effect on memory or credibility. This is the case both directly (Experiments 1 and 2) and indirectly (Experiment 3).

In the case of memory, there is no difference between regional and local accents. This disagrees with prior research, which had found a negative effect of accent on memory (Lev Ari & Keysar, 2012 in foreign accented speech; Morales et al., 2012 in regional accents). The difference in results might be due to the population that was sampled. Participants were from a population that has high familiarity with regional and foreign people, as they were from a city with a high number of Latin American immigrants and tourists (10% of the population is from America and the province has 15 to 20 thousand tourists a year, according to IDESCAT, 2015).

This increase in familiarity produces a decrease in processing costs (Adank et al., 2009), which might account for the equal memory in this case. As observed in the results, intelligibility negatively affects memory. As accent and intelligibility were not correlated, it was possible to observe the effects of each factor individually. Furthermore, this difference in results might be due to a difference in methodology, as both prior studied—Lev Ari and Keysar (2012) and Morales et al. (2012)—used recall to some extent. Perhaps these effects relie on recall rather than recognition memory.

With respect to the illusory truth effect, the results of Experiment 3 showed that it is not affected by accent and intelligibility. It has been suggested before that source credibility—as assigned by the experimenter—does not affect the illusory truth effect (Begg, Anas, & Farinacci, 1992). These results are now extended to social categorization, which appear not to influence this robust effect. Interestingly, intelligibility did not modulate the effect, even though it affected memory. This might have been due to the overall high intelligibility or perhaps the effects of intelligibility and repetition simply do not interact, perhaps having only additive effects when they are both present.

Furthermore, there is a suggestion of possible effects of accent on credibility, but these relate to how the accent is assessed and perceived rather than simply whether the regional accent is present or absent. This relates to what Lev Ari and Keysar's (2010) suggest, which is that the strength of the accent is linked to credibility. Nevertheless, these results contradict those of that study as, first, there is an effect of accent that does not relate to intelligibility and, second, there is a suggestion of a positive effect of accent on credibility. Furthermore, there is no effect of intelligibility, although, as suggested before, this might be due to the high intelligibility ratings overall leading to a reduced range and low variability. There is a possibility, as suggested earlier, that there are other variables causing or influencing this effect in Lev Ari and Keysar's (2010) study. One possible factor is reduced linguistic competence in foreign accents which might also influence the assessment of other characteristics of the person such as competence or trustworthiness (Tsalikis et al., 1991), as well as lowering social attractiveness (Neuliep & Speten-Hansen, 2013). If that is the case, it follows that there would be no effect of regional accent on credibility, as linguistic competence should be assumed to be high, also removing possible Halo effects caused by accent.

Naturally, these results have social implications. Although individuals with regional accents can still be identified as foreigners and considered outgroup members—probably leading to differential treatment as well—it seems that at least this does not affect memory and credibility. When we encounter someone, we develop attitudes and assess education,

confidence, and many other variables based on little information. For people with a foreign accent, their linguistic competence in that foreign language serves as a proxy for other kinds of knowledge and competence and, thus, is judged to be less trustworthy. This, by definition, cannot be done with regional accents because individuals are generally assumed to have the same linguistic competence, as it is the first language for both. Nevertheless, there is significant modulation in assumed linguistic competence given by associations with particular accents, such as socio-economic status and education levels.

It is worth noting that, in this study, the effects of stereotypes of other regions—namely, those in Latin America—were diminished by combining several nationalities and having the speakers read from a set script. Perhaps choosing particular nationalities or accents that carry with them negative—or particularly positive—stereotypes might affect the results, but, as it stands, this study suggests that regional accents—unlike foreign accents— by themselves do not negatively affect memory or lead to reduced credibility of the speaker.

As mentioned before, one important limitation of this study is that it was carried out in a location where there is extensive contact with foreigners—Barcelona. The results might be tainted by this experience and, thus, should be replicated in regions with less exposure to foreigners in order to assure that the results are generalizable. This study could also be expanded to include foreign accents in order to make a direct comparison between the three—local, regional, and foreign—within the same population.

Future studies should test how the intensity of the accent might have an effect, meaning that perhaps stronger regional accents might elicit different responses. Furthermore, because not all regional accents are the same—each of them carry their own stereotypes, some negative and some positive—, the effects of different regional accents should also be studied. This is particularly relevant in Spanish, where there is little to no literature on how different regional accents are perceived. For example, British accents have been assessed in terms of aesthetic, communicative, and status content (Giles, 1970) and North American accents have been compared with New Zealand accents with respect to power and social attractiveness (Vornik, Sharman, & Garry, 2003), but no such data exists on Spanish accents. In addition, the expressed linguistic competence of the different speakers could be manipulated to assess its effects.

To provide further clarification for the effects of accent on memory and credibility—and to address the possibility of a Halo Effect—voices with different accents could be assessed on an array of personality traits and competence assessments. This way, regional and foreign accents can be compared on how they affect people's perceptions of the speaker.

Conclusion

In conclusion, the results of the experiments discussed in this work support the idea that foreign and regional accents are treated differently. When a person has a foreign accent, we make a large effort to adapt, for example allowing for more tolerance of less precise language (Lev Ari & Keysar, 2012), which makes the information remembered less precise and the person less credible, but this is not the case with regional accents. Regional accents seem not to affect memory and credibility for what the person is saying, even though they are outgroup members. This is perhaps due to increased linguistic competence in the language they are speaking.

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Appendix A—Sentences

Statements

1. Una vez al año, algunas especies migran, incluyendo las ranas.
2. Los animales más amenazados en Camerún son los gorilas.
3. Cindy Crawford logró un título universitario de psicóloga.
4. El inventor de la silla eléctrica era dentista.
5. John F. Kennedy fue asesinado en Dallas.
6. El acuario más grande de Estados Unidos está en Atlanta.
7. Las ardillas no ven el color rojo.
8. Cuando se empezó a producir, el color de la Coca-Cola era el verde.
9. Uno de los colores de la bandera gabonesa es el azul.
10. La transpiración del hipopótamo es de color rosa.
11. La fobia a las gallinas se llama alektorofobia.
12. La fobia a los gatos se llama ailurofobia.
13. Las abejas pueden percibir frecuencias ultravioletas.
14. Los gatos pueden percibir frecuencias ultrasónicas.
15. En el año 4 A.C. aparecen las primeras escrituras sobre el cultivo de frambuesas.
16. El género de arbustos vaccinium incluye a la planta que da arándanos.
17. En 1777, Samuel Miller inventó la sierra circular.
18. En 1835 se patentó la primera llave inglesa.
19. La masa de la Tierra está compuesta principalmente por hierro.
20. El metal más común en la corteza terrestre es el aluminio.
21. El material de la Estatua de la Libertad en Estados Unidos es el cobre.
22. El material con el segundo punto de fusión más alto es el tungsteno.
23. Yves Saint Laurent (el diseñador Francés) vendió por 28 millones de dólares una silla.
24. En la Universidad de Oxford se encuentra el ejemplar la más viejo de estantería.
25. El ataque de Pearl Harbor se produjo en diciembre.
26. Según el calendario gregoriano, Moisés nació en junio.
27. En los colegios daneses, el curso escolar empieza en agosto.
28. La flor estatal de Nueva Jersey es la violeta.
29. En la cultura occidental, la flor que simboliza pasión es el girasol.
30. La flor nacional de Iraq es la rosa.
31. El número de veces que los machos de algunas aves llegan a cantar por día es dos mil.
32. El número de especies de piojos está cerca de los tres mil.

33. El número de tentáculos que tiene un calamar es diez.
34. El número de letras en el alfabeto Hawaiano es doce.
35. Bruce Lee murió a la edad de treinta y tres.
36. En años, la esperanza de vida en África es de cincuenta y cinco.
37. El primer producto de la compañía Nintendo fueron cartas.
38. La compañía Colgate empezó fabricando velas.
39. Una afición habitual del Dalai Lama es la reparación de relojes.
40. La empresa Hewlett-Packard empezó fabricando calculadoras.
41. El dios Egipcio Ra es el dios del cielo.
42. En la mitología romana, Saturno es el dios del tiempo.
43. En lo que a política se refiere, Togo es una democracia.
44. Respecto a la política, Gandhi seguía los principios del anarquismo.
45. El croissant se inventó en Austria.
46. El país que posee el récord mundial de los 400 metros lisos en mujeres es Alemania.
47. La nacionalidad del hombre que inventó el sello es escocesa.
48. Todos los miembros del grupo de música A-ha son noruegos.
49. El pez más rápido en el mar es el pez espada.
50. Cleo, en la historia de Pinocho, era un pez dorado.
51. El pez más venenoso es el pez piedra.
52. El pez más rápido es el pez vela.
53. Las almendras forman parte de la familia de los melocotones.
54. Los platos típicos en Túnez llevan trigo.
55. El jefe de Estado en Luxemburgo es un duque.
56. En Groenlandia, el poder máximo del estado pertenece a un rey.
57. Los únicos osos polares que hibernan son hembras.
58. Si una tortuga gruñe se sabe que es macho.
59. En 1719 aparecieron en América del Norte las patatas.
60. Los franceses llamaban "la manzana del amor" a los tomates.

Foils

1. Una vez al año, algunas especies migran, incluyendo los gorilas.
2. Los animales más amenazados en Camerún son las ranas.
3. Cindy Crawford logró un título universitario de dentista.
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50. Cleo, en la historia de Pinocho, era un pez espada.
51. El pez más venenoso es el pez vela.
52. El pez más rápido es el pez piedra.
53. Las almendras forman parte de la familia de los trigos.
54. Los platos típicos en Túnez llevan melocotones.
55. El jefe de Estado en Luxemburgo es un rey.
56. En Groenlandia, el poder máximo del estado pertenece a un duque.
57. Los únicos osos polares que hibernan son machos.
58. Si una tortuga gruñe se sabe que es hembra.
59. En 1719 aparecieron en América del Norte los tomates.
60. Los franceses llamaban "la manzana del amor" a las patatas.

Appendix B—Instructions

Instructions for study 1

"Instrucciones:

A continuación vas a escuchar algunas oraciones verdaderas sobre datos que probablemente no conozcas.

Por favor presta atención, ya que luego te vamos a preguntar cuales has oído.

Presiona cualquier tecla para comenzar."

[All 60 statements were presented]

"Instrucciones:

Por favor responde cada pregunta marcando si ha oído la oración o no.

Presiona m (dice "sí" en el teclado) si la has oído y z (dice "no" en el teclado) si no la has oído.

Por favor responde a todas las oraciones. Si no estás seguro/a, trata de adivinar.

Por favor avisa si tiene preguntas.

Presiona cualquier tecla para comenzar."

[Statement is presented on the screen]

Presiona z para no y m para sí

Instructions for intelligibility and accent assessments (same for all 3 studies):

"Instrucciones:

A continuación vas a escuchar algunas personas de nuevo.

Por favor presta atención y evalúa cuán fácil es de entender cada una y hasta qué grado su acento no es de España.

Va a haber una escala del 1 al 9; para cada una presiona el número que corresponda dentro de esa escala.

Presiona cualquier tecla para comenzar."

[after each sentence]

"Claridad

Muy poco entendible extremadamente claro/a

(1) (9)

Acento

Español/a claramente extranjero/a (no español/a)

(1) (9)"

"Muchas gracias por participar.

Por favor avisa que has terminado para seguir con la próxima parte."

Instructions for study 2

"Instrucciones:

A continuación vas a escuchar algunas oraciones sobre datos que probablemente no conozcas. Algunas verdaderas y otras falsas.

Por favor presta atención, ya que luego te vamos a pedir que las evalúes.

Presiona la barra de ESPACIO para comenzar."

[They listen to all 60 sentences]

"Instrucciones:

Ignorando lo que has oído antes,

Por favor responde cada pregunta según cuán verdadera te parece la oración, 1 siendo totalmente verdadera y 9 siendo totalmente falsa.

Puedes utilizar cualquier número entre 1 y 9.

Por favor responde a todas las oraciones. Si no estás seguro/a, trata de adivinar.

Por favor avisa si tienes preguntas.

Presiona la barra de ESPACIO para comenzar."

[Each sentence is presented on the screen and then assessed one by one]

"Totalmente Verdadera Totalmente Falsa

(1) (9)"

Instructions for study 3

"Instrucciones:

A continuación vas a escuchar algunas oraciones sobre datos que probablemente no conozcas. Por favor presta atención a la oración y luego determina cuán verdadera te parece, 1 siendo totalmente falsa y 9 siendo totalmente verdadera. Puedes utilizar cualquier número entre 1 y 9. Por favor responde a todas las oraciones. Si no estás seguro/a, trata de adivinar.

Por favor avisa si tienes preguntas.

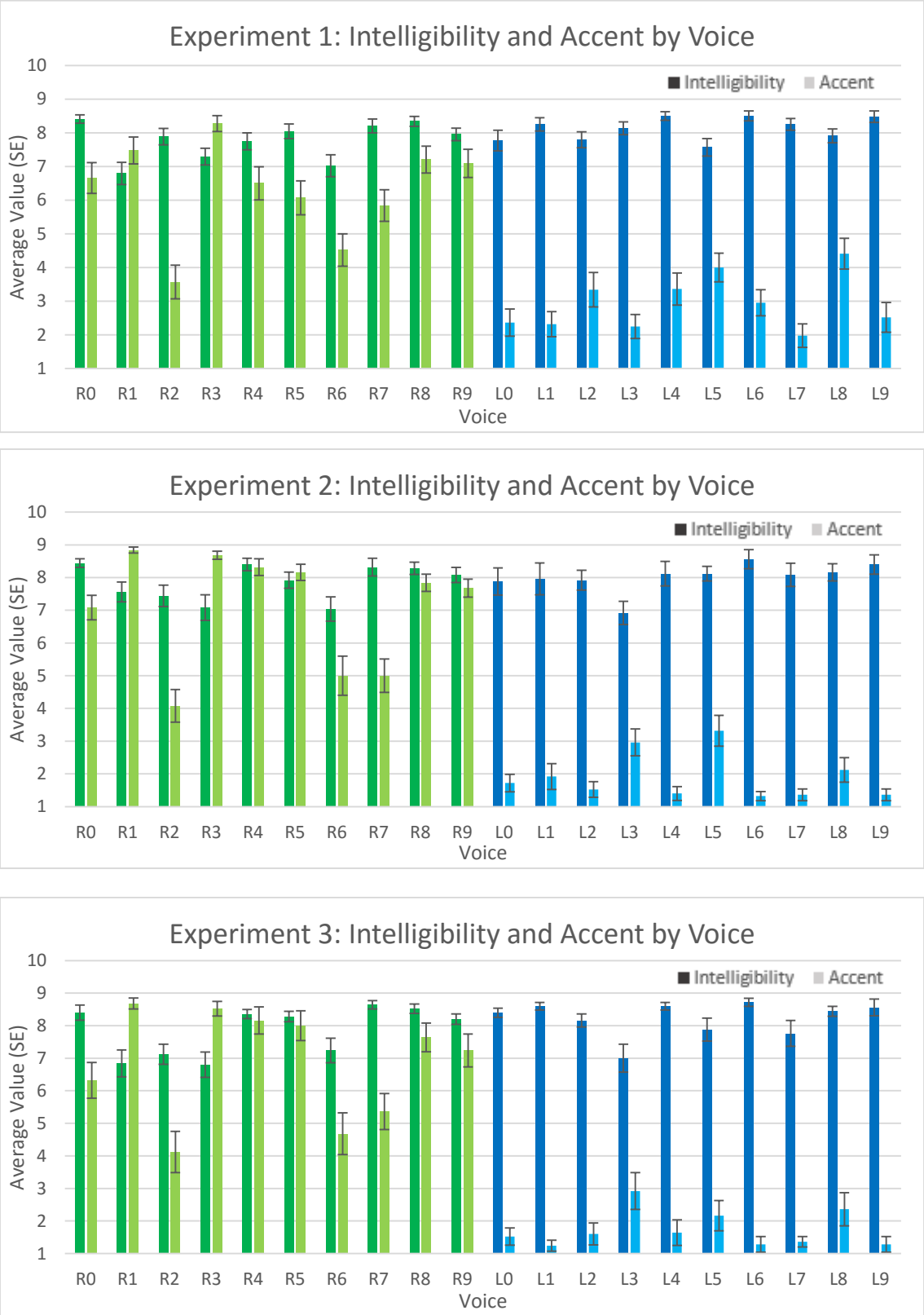
Presiona la barra de ESPACIO para comenzar."

[Each sentence is presented aurally and then assessed one by one]

"Totalmente Falsa Totalmente Verdadera

(1) (9)"

Appendix C—Intelligibility and Accent by Voice Graphs



Average intelligibility and accent score by voice. Top figure corresponds to Experiment 1, the second to Experiment 2, and the last to Experiment 3. Regionally accented voices are marked as R# and in green and locally accented voices marked as L# and in blue. The darker colors mark average intelligibility scores and the lighter colors denote accent scores. The error bars show +/- 1 standard error above and below the mean.