PREJUDICIAL PROCESSING: AN INVESTIGATION OF THE ROLE OF PREJUDICE AND BIAS ON THE FLUENCY EFFECT

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Abstract

The present study examines the fluency effect and factors which may influence its prevalence. The fluency effect is a phenomenon first reported by Lev-Ari and Keysar (2010), which purports that people attribute less believability to those with accented speech as opposed to those with native accents, despite the content of speech being identical. The fluency effect is thought to be due to language processing efficiency alone, rather than to any influence outside of the language processing system. This claim, however, is untested. The present study first replicates the experiment conducted by Lev-Ari and Keysar (2010) where participants were asked to listen to trivia facts and indicate whether they seem true or false. Participants were then asked to complete measures for additional potential influencing factors. The additional factors of interest for this project are the prejudicial views and biases of the participants as measured by the Feeling Thermometer and the Implicit Association Test respectively. In contrast to earlier work, this study showed no evidence of a fluency effect. The study also showed no evidence that prejudices and biases affected the participants' responses to statements by different speakers.

People are constantly bombarded by speech. Communication is a fundamental aspect of human interaction and we must constantly make judgments on the information we hear. According to the cooperative principle that is thought to guide successful conversations in everyday life, individuals do not seek to provide false information in conversation (Grice, 1975). A result of this unspoken rule is that individuals will generally assume they are being told the truth. However, this trend begins to break down as statements seem to "not sound right," or when a statement seems unlikely to be true due to content, origin or some other factor. This breakdown of the assumption of truth and the factors that lead to a sense of a statement not sounding correct is of principal interest in this study.

When the truthfulness of a statement is in doubt, individuals begin to rely on methods and cognitive processes other than assumption to ascertain the truth. One such process is known as the fluency effect (Lev-Ari and Keysar, 2010). The fluency effect refers to fluency of cognitive processing of a given stimulus leading to that stimulus being more or less believable. In general, all other factors being equal, individuals tend to rate stimuli they can better understand and more efficiently process as more representative of the truth. This effect is well evidenced by the work of Lev-Ari annd Keysar (2010). In his work, it was found that people are more likely to believe speakers that are easier to understand (i.e. native speakers of the language) when compared to speakers with foreign or unfamiliar accents. This is largely attributed to the aforementioned fluency effect as the truthfulness is determined by language processing efficiency rather than more objective statement content analyses.

Interestingly, Lev-Ari and Keysar (2010) came to the conclusion that the fluency effect they found evidence for was entirely based on the efficiency of language processing. However, they generally did not test for the influence of other factors. There were some attempts to control for influencing factors but these attempts often did not go far enough to truly isolate the potential third-variable problems. One such factor of interest that is marginally addressed but not adequately tested is the role of differing backgrounds due to the importance of accents on the study, there seems to be a strong possibility that some of the ratings of truthfulness may be based on prejudicial views or biases held by the participants listening to the statements. It is

common knowledge that people are constantly influenced by personal biases and outright prejudices (Huntley, 2019; Gluszek prejudice on ratings of truth (Lev-Ari and Keysar, 2010). As the speakers are necessarily of & Dovidio; 2010, Anne-Sophie & Scott, 2010; Mai & Hoffman, 2014). Such influences are likely to affect language processing as well. The present project seeks to replicate the work of Lev-Ari and Keysar (2010) and additionally assess the role of prejudice and bias on the fluency effect.

Attitudes towards non-native accents have a quite large role in contemporary society as they often influence a number of aspects of behavior (Gluszek & Dovidio; 2010, Anne-Sophie & Scott, 2010; Mai & Hoffman, 2014) It is common to study these influences and their impact on employment and economics and it has been shown that these influences have quite negative results for those who speak with a non-standard accent. Accented speakers have been found to suffer in interviews and in general business and economic actions (Anne-Sophie & Scott, 2010; Mai & Hoffman, 2014). While these studies are comprehensive and serve to complete the objective they set out to complete, these studies often do not delve into underlying causes of negative attitudes towards out-groups, but rather assume their existence.

In addition to economic discrimination, people's attitudes towards non-native accented speakers may skew their worldviews away from rationality. Such an influence over one's perception of reality is of great concern to society as it serves to obfuscate objective truths and may lead to discriminatory practices, both in conscious and obvious ways and those that may be more subtle. Additionally, such accent effects as those described by within this project, whether prejudicially based or not, often lead to a sense of exclusion within foreign accented populations (Gluszek & Dovidio, 2010). As such, it is imperative that we seek greater understanding of this phenomenon so that we are better equipped to scientifically address the likely unavoidable consequences of bias in cognition and language processing.

Broadly, this study seeks to address the question of how bias and prejudice impact the fluency effect. We expect participants who show a higher rate of prejudice and bias will show a stronger fluency effect (that is, a larger difference in the assessment of statements by native and non-native speakers). This hypothesis is largely based upon

known effects of personal biases influencing other areas of cognition. Such effects are extensive, and it seems unlikely they should be absent from speech processing efforts (Huntley, 2019; Gluszek & Dovidio; 2010, Anne-Sophie & Scott, 2010; Mai & Hoffman, 2014).

Alternatively, the more traditionally understood cause of the fluency effect may be the cause of the results. The traditional view is that the fluency effect is based on mere capability of language processing rather than any other extra-linguistic factors. There is also mixed evidence that individuals are able to suppress personal biases against a certain group when audio is all that is present and it may be that people require a physical presence to fall within the negative trends of the fluency effect based on prejudice or biases (Wang, Arndt, Singh,Biernat, & Liu, 2012). It is this gap in research that this project hopes to fill.

In order to test between the language-processing-alone account and the language-processing-plus-prejudice account, this study measures prejudice and bias of participants and seeks to demonstrate what relationship these factors have with the fluency effect. The present study first aims to replicate the findings of Lev-Ari and Keysar (2010) and then it aims to assess the role of the covariates of prejudice and bias. This assessment of the relationships between these concepts will provide a part of the answer to the question of what influences different outside factors have upon the fluency effect.

Methods

In order to obtain this greater understanding and address the proposed question, this study first sought to replicate the work of Lev-Ari and Keysar (2010). Then, part of the conclusion drawn by previous researchers was to be challenged. Specifically, the current study was to challenge the assumption made by Lev-Ari and Keysar of the fluency effect being based on processing efficiency alone (2010). As mentioned previously, this study will examine the role of bias and prejudice on the fluency effect found in Lev-Ari and Keysar's work.

Participants

Participants were all recruited from a student population of a Southeastern university. Through this recruitment method, a sample size of 166 participants provided usable data. Compensation for participation was provided in the form of class credit. Though

initially led to believe the study focused upon intuition rather than prejudice or bias, all participants were informed on the risks associated with the study before undertaking any tasks related to data collection. Deception was utilized in order to prevent participants from artificially changing their responses in order to be perceived as less prejudicial. Participants' data was used only if they consented after they were informed of the deception during the debriefing. All participants completed the same survey with various counterbalanced variations.

Materials

All data was collected using an online survey created and distributed through the online program Qualtrics. This survey included all aspects of the study and was distributed exclusively online. The survey consisted of four separate sections.

The first section provided 48 trivia fact audio files sequentially to participants. These trivia facts were all read aloud by various speakers of differing accents. In total, there were six different speakers that recorded readings of the same trivia fact script. These speakers included two natively-accented speakers, one Irish, one English, one Spanish and one Moroccan accented speaker. These speakers were selected primarily due to availability. However, the foreign accents available conveniently were complimentary of one another. The Irish and English speakers served as strong and weak English-speaking western European respectively and due to the intertwined history of Spain and Morocco, the speakers from this region also served one another as strong and weak accents of similar type. These accent strengths allowed further analysis of the impact of accent strength on the fluency effect. Additionally, all speakers will be female in order to control for potential gender biases. It is certainly possible, if provided with a mixture of speakers of different sexes, for participants with a tendency for misogyny or misandry to allow those prejudices to guide their responses. For the purpose of this study, only prejudice and bias based on accent alone were of interest.

The second section of the survey was the Implicit Association Test portion in which participants completed the task that results in a D-score that serves as a numerical representation of bias for or against certain targets (Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. 1998; Greenwald *et al.* 2009). For this study, the target for

which bias was measured was American and Foreign. The third section of the survey consisted of the Feeling thermometer, a tool for measuring explicit prejudices (Axt, 2017). While it may seem counter-productive to use as explicit a measure as the Feeling Thermometer in light of the project's deception used to limit changing answers to those more socially acceptable, the measure possesses quite robust validity (Alwin, D. F. 2007). Additionally, the deception's objective is to prevent alteration of one's true and false ratings, which have already been completed by this point in the project.

The fourth and final portion of the survey was a series of demographic measures. Age, gender, race, ethnicity and political leanings were collected. These demographics were used in various exploratory analyses but no effects pertaining to any demographic were found.

Procedure

Using the survey described previously, participants were first asked to listen to 48 trivia facts uttered by the various different speakers and provide an assessment of if the fact heard was true or false. All trivia facts were sourced from various online resources and confirmed to be factual through separate sources as well. An example of such a fact is "Giraffes have the highest blood pressure of any animal." All facts used were similarly unusual. Using such obscure facts was done in order to minimize the effect of any prior knowledge held by participants. In order to induce the aforementioned breakdown of the assumption of truth of information provided, this study was initially presented to participants as a test of intuition. These misleading instructions inform the participant that much of what will be presented to them will be questionable information.

Participants heard a random speaker for each fact but no fact was repeated for the same participant. Participants' error rates were of interest and were recorded as a ratio for each speaker, for total native and total foreign speakers, and for no accent, light accented and heavy accented speakers. The specific country of origin for each accented speaker will also be noted as we will establish whether a participant possesses a negative attitude toward the speaker's origin; there is also some evidence that unfamiliarity with an accent may significantly influence the listener's response to it, even in the absence of prejudice (Braun, Llamas, Watt, French, & Robertson, 2018). Participants were then asked to complete an Implicit Association Test (IAT) to measure

implicit biases and a variation of the Feeling Thermometer questionnaire to assess the presence of direct prejudicial views held by the participant (Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. 1998; Greenwald *et al.* 2009; Alwin, D. F. 2007). The IAT was programmed and analyzed utilizing the tools provided by Carpenter, et al. (2018). These numerical measures of prejudice and bias were then compared to the rate at which the participant scored the facts as true or false; the objective of this comparison was to determine what relationship exists between biases and prejudices and the rating of truth for the statements. Such a relationship would provide the researchers with an answer to the question of interest in that it will show if the separate concepts, biases and prejudice and the fluency effect, are related to one another in a meaningful way.

Results

Analysis One - Accent Strength

Table 1 - Descriptive Statistics

Speaker Accent Strength	Mean Error Rate	Standard Deviation	N
Native	0.408	0.203	166
Light	0.399	0.202	166
Heavy	0.415	0.208	166

Table 2 - Categorical Accent Comparisons

Accent Strengths Comparison	Mean Difference	P - Value
Native vs. Light	0.008	1
Native vs. Heavy	-0.008	1
Light vs. Heavy	-0.16	0.835

The average accuracy for participants was analyzed with an ANCOVA that included Accent strength (native, light, and heavy) as a fixed factor, and Prejudice and Bias as covariates. There was no difference in accuracy for the truth ratings across Accent strength $F(5, 166) = 1.698$, $p = 0.185$. That is, we did not find evidence for a fluency effect in our data. Prejudice on its own did not serve as a predictor to a significant degree, $F(5, 160) = 0.032$, $p = 0.857$. Bias on its own also did not serve as a predictor to a significant degree, $F(5, 160) = 1.482$, $p = 0.225$. Neither of these variables interacted with accent strength, $F(5, 160) = 1.126$, $p = 0.325$ for bias and $F(5, 160) = 0.339$, $p = 0.713$ for prejudice.

Analysis Two - Individual Speakers

Table 3 - Descriptive Statistics

Speaker	Mean Error Rate	Standard Deviation	N
Native 1	0.395	0.201	166
Native 2	0.422	0.205	166
English	0.402	0.193	166
Irish	0.382	0.209	166
Moroccan	0.396	0.211	166
Spanish	0.448	0.207	166

We performed an additional ANCOVA with Speaker (the 6 individual speakers) as a fixed factor and Prejudice and Bias as covariates. Although we did not see an effect across accent types in the first analysis, we were interested in assessing whether there were differences across individual speakers. The effect of Speaker was marginally significant, $F(5, 160) = 1.989$, p-value = 0.078. Post-hoc tests (Bonferroni corrected) indicated one difference in responses to individual speakers, namely the difference between the Irish-accented speaker and the Spanish-accented speaker (p-value = 0.028). As before, the effects of Prejudice and Bias were not significant. Prejudice on its own did not serve as a predictor to a significant degree, $F(5, 160) = 0.075$, $p = 0.784$. Bias on its own also did not serve as a predictor to a significant degree, $F(5, 160) = 1.273$, $p = 0.261$, nor were the interactions of these variables with Speaker significant, $F(5, 160) = 0.58$, $p = 0.715$ for bias and $F(5, 160) = 0.708$, $p = 0.617$ for prejudice.

Discussion

It seems there is no conclusive support for the existence of the fluency effect in the population studied in this project. The lack of significant differences between truth ratings for Native-accented speakers and foreign-accented speakers in general offer strong support for this claim, as does the fact that no individual speaker's truth ratings differed significantly from either of the two native-accented truth ratings. This lack of evidence for the fluency effect may be considered a rather positive result however, as it may, in general, be that people are able to suspend their prejudicial views or biased attitudes when judging objective reality.

Though it is potentially a positive outcome for societal interac-

tions, the lack of support for the fluency effect in the studied population is not consistent with expectations. The researchers believed the fluency effect to be valid and as such planned to do further analyses to find cognitive origins of the effect. The proposed influencing factors of prejudice and bias did not have an influence on truth ratings, but this is not surprising considering the absence of the fluency effect overall. As such, little can be concluded about these variables. From the data gathered, individual differences other than the presence or absence of an accent among speakers seem the most likely explanation for the few significant results found.

Possible explanations for the lack of support for the previous work conducted by Lev-Ari and Keysar (2010) may arise from certain methodological differences between the current study and the earlier studies. Of the most significant of these differences is the relatively small sample size of the previous project. Lev-Ari and Keysar (2010) conducted two separate experiments, of varying effectiveness, one of which had 30 participants and the other had 27, leading to a total of 57 participants. The present study's larger sample size of 166 may give a more accurate estimate of the effect that accents have on truth ratings and may be less likely to be a result of chance. Additionally, as alluded to previously, 30 of the previous study's data points may be of questionable validity. One of the two experiments of Lev-Ari and Keysar (2010) included a sort of priming as participants were told at the start of the experiment that it is often difficult to understand foreign accents. This may have primed the participants to perform worse as they possessed expectations for the outcome. Priming is well established to be present in a number of cognitive functions and language Processing is unlikely to be an exception (Bargh and Chartrand, 2000). This could potentially result in only 27 participants' data being valid as evidence for the fluency effect alone, furthering the previous study's problem of having a small sample size.

Due to the inconclusive nature of this project and its role in contradicting other previously established work, further study is necessary in order to ascertain the reality of the fluency effect. The effect found in previous work may be more a result of individual differences among the speakers tested rather than their accents alone. Alternatively, it may be that the previous project utilized much more heavily accented speakers than the present study incorporated. Though this project recruited speakers that had been living in the

United States for only a short period of time and with quite strong accents, the delineation between heavy and light accents is debatable. Additionally, if further research does provide support for the fluency effect in other populations, a revisiting of the impact of prejudice and bias would be warranted. Such factors being influential could not be ruled out by this study so their importance remains a possibility.

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