University of Pennsylvania Working Papers in Linguistics

Volume 22
Issue 2 *Selected Papers from New Ways of Analyzing Variation (NWAV 44)*

Article 16

12-1-2016

Intergroup Dynamics in Speech Perception: Interaction Among Experience, Attitudes and Expectations

Nhung Nguyen

Jason A. Shaw

Rebecca T. Pinkus

Catherine T. Best

Intergroup Dynamics in Speech Perception: Interaction Among Experience, Attitudes and Expectations

Abstract
Experience, attitudes, and expectations have been identified as separate influences on speech perception and comprehension across groups. In this study, we investigate the interaction among these three variables. 58 Australia-born participants completed an online survey and a vowel categorization task. The survey examined participants' experience with Vietnamese-accented English and their attitudes towards Asians. The vowel categorization task examined participants' recovery of a Vietnamese-accented speaker's intended vowels. Half of the participants were told to expect a Vietnamese accent whereas the other half were not. Results indicated that the relationship between listener expectations and group attitudes varied according to whether or not participants had experience with the Vietnamese accent. This interaction was most clearly reflected on the 'book' vowel. Compared to participants who did not expect a Vietnamese accent, had no experience with the Vietnamese accent, but positive attitudes towards the Vietnamese group, those who expected a Vietnamese accent showed a decrease in accuracy on 'book' categorization. A decrease in 'book' categorization accuracy was also found for those having experience with the accent but negative attitudes. In contrast, an increase in accuracy was found for those having no experience with the Vietnamese accent and negative attitudes towards the Vietnamese group, and those having experience with the accent and positive attitudes. We concluded that expectations, experience and attitudes interact in their relationship with speech perception.

Intergroup Dynamics in Speech Perception: Interaction Among Experience, Attitudes and Expectations

Nhung Nguyen, Jason A. Shaw, Rebecca T. Pinkus and Catherine T. Best*

1 Introduction

Since Rubin's (1992) study on the effect of perceived speaker ethnicity on speech perception, listener factors have received increasing attention in speech perception and comprehension research (e.g., Babel and Russell 2015, Hay and Drager 2010, Hay, Nolan and Drager 2006, Lindemann 2002, McGowan 2015, Nguyen et al. 2015, Niedzielski 1999). These studies demonstrate the importance of three listener factors: attitudes, expectations, and experience. Listener *attitudes* towards a foreign-accented speaker's group have been shown to relate to the accented speech perception and comprehension in several ways. First, listeners with negative attitudes towards Koreans reported unsuccessful communication with the accented speakers whereas those with positive attitudes reported successful communication (Lindemann 2002). Second, when listeners had negative attitudes towards Koreans and used avoidance strategies (i.e., not giving feedback to clarify information to their Korean-accented conversational partners), on top of their perceived unsuccessful communication with their Korean partners, their interactions were also genuinely unsuccessful (Lindemann 2002). Third, listener attitudes towards Asians have also been found to negatively correlate with categorization accuracy of Vietnamese-accented vowels (Nguyen et al. 2015). Listener *expectations* about a speaker's accent, in turn, have been demonstrated to shift perception of vowels in regional accents in the direction of the expected accents (Hay and Drager 2010, Hay, Nolan and Drager 2006, Niedzielski 1999). Finally, *experience* with a speaker's accent has also been found to improve accuracy of foreign-accented speech comprehension (McGowan 2015).

To date, however, the effects of attitudes, expectations, and experience on speech perception have been researched separately. In Niedzielski's (1999) study on *expectations*, for example, although some participants had experience with Canadian vowels, others did not; unfortunately, the study did not quantify the relationship between such *experience* and listeners' vowel perception. Research quantifying *experience* with a speaker's accent, for example McGowan's (2015) study, did not take listener *attitudes* into account. Nguyen and colleagues (2015) examined the relationship between affective *attitudes* towards Asians and Vietnamese-accented vowel perception, but did not take listener *experience* with the accent into consideration.

The current study, therefore, was designed to explore how attitudes, expectations, and experience interact in speech perception. Specifically, we manipulated listener *expectations* about a speaker's accent, examined which vowels were affected by this information, then explored how the perceptual effects of the experimental manipulation interact with the effects of the other two factors: listeners' *experience* with the accent and their *attitudes* towards the speaker's group. To achieve that goal, firstly, we administered a survey to our Australian English participants to examine their experience with Vietnamese-accented English. We then assessed their attitudes towards Asians via the Scale of Anti-Asian American Stereotypes (SAAAS), modified for the Australian context (Nguyen et al. 2015). We then revealed the speaker's Vietnamese accent to the participants in the Treatment condition prior to our speech perception test, to create expectations about the speaker's accent as well as to elicit effects of group attitudes. The participants in the Control condition, by contrast, did not receive such information about the accent, and thus should have had neither specific expectations nor attitudes toward the speaker's group. Expectations created in the Treatment condition were predicted to have an effect on particular vowels (as seen in Hay and Drager 2010, Hay, Nolan, and Drager 2006, Niedzielski 1999). Attitudes evoked in the Treatment condition were predicted to negatively relate to participants' performance in a vowel categorization task (Bundgaard-Nielsen, Best and Tyler 2011, Faris, Best and Tyler 2016), as seen in Ngu-

*This study was supported by the Research Training Scheme funding by The MARCS Institute for Brain, Behavior and Development, Western Sydney University. The first author thanks Mark Lathouwers for help with data collection. Thanks also to Michael Tyler who contributed valuable comments and insights to the project.

yen et al. 2015. We also predicted a positive relationship between experience with the Vietnamese accent and participants' categorization performance (similar to McGowan 2015).

2 Method

2.1 Participants

60 first-year Psychology students from the Western Sydney University (WSU) participant pool participated in the study for course credit. Two participants were excluded prior to data analysis because they did not complete the vowel categorization task. Data analyses were conducted on the remaining 58 participants (32 Control, 26 Treatment) who were between the ages of 18 and 45 (M = 21, SD = 4.7). Although Australia-born, participants had a range of self-reported family backgrounds, i.e., European = 41, Indigenous Australian = 2, South American = 1, African = 1, European and South Asian = 1 (England-born father and India-born mother), Fijian = 1 (Fiji-born parents of Indian heritage), South Asian = 3 (1 Afghanistan-born parents, 1 India-born parents, and 1 Australia-born parents), Southeast Asian = 1 (Thailand-born parents). Seven participants chose the 'other – please specify' option and wrote in 'Australian' in the blank. Of these 58 participants, 15 reported having experience with Vietnamese-accented English while the rest reported having none (n = 43).

2.2 Survey

Our survey explored participants' experience with the Vietnamese accent and attitudes towards Asians. The question on experience was just a simple yes/no question, asking 'Do you have experience with the following accent?' and a list of 10 accents (i.e., Vietnamese accent and nine filler accents: Chinese, Mexican, Italian, Thai, Lebanese, Korean, French, Japanese, and Indian). Attitudes towards Asians were quantified by the SAAAS scale (Lin et al. 2005), adapted to the Asian Australian group and three filler groups in the Australian context: Aboriginal Australians, Anglo Australians, and Arab Australians. Built on the Stereotype Content Model (Fiske et al. 2002), the SAAAS scale comprises 25 items: 12 indicating Competence and 13 indicating Sociability. The scale items are about cognitive attitudes or stereotypes, but they were designed in such a way that they can indirectly quantify affective attitudes or prejudice (i.e., positive and negative prejudice; Fiske et al. 2002, Lin et al. 2005). SAAAS prejudice comes from the combination of the Competence and Sociability dimensions, which can indicate mixed evaluations about a group. For example, Asian Americans are respected for their high Competence but disliked for their low Sociability (Fiske et al. 2002, Lin et al. 2005). Participants' responses were coded from 0 ('strongly disagree') to 5 ('strongly agree') for 19 normal items and vice versa for 6 reverse-scored items. The higher the SAAAS scores, the stronger the negative prejudice towards a group. The SAAAS scores for the Control condition were negatively skewed and ranged from 18 to 105 (M = 73.28, SD = 23.17). The SAAAS scores for the Treatment condition were normally distributed and ranged from 33 to 122 (M = 70.31, SD = 20.40).

It was important to distract participants from the true purposes of the survey. If participants figured out those purposes, they would be likely to respond to the survey items in a certain way to present themselves in a positive light, a bias that is called a 'demand characteristic' (Orne 1959). Therefore, the accent experience question and SAAAS scale above were interspersed with other filler questions and scales such as questions on personal details and language backgrounds, 17 emotion items (Fiske et al. 2002), a liking item (adapted from Stephan et al. 1998), Ten-Item Personality Inventory (TIPI) (Gosling, Rentfrow, and Swann Jr. 2003), Balanced Inventory of Desirable Responding (BIDR) (Paulhus 1984), and emotional responses scales. For comparison purposes, all participants experienced the same order of questions and scales in the survey. However, to avoid order effects, groups within a scale (e.g., Aboriginal Australians, Anglo Australians, Arab Australians, and Asian Australians) were randomized, and items within a group (e.g., Asian group) were also randomized. Qualtrics Survey Software on the WSU server was used to host the survey online.

2.3 Vowel Categorization Task

2.3.1 Speakers

Auditory stimuli were recorded from two female speakers. One speaker was born and raised in Western Sydney, was in her 20s, and spoke only Australian-accented English. The other speaker was born in Vietnam, learned English in Vietnam with Vietnamese teachers, and immigrated to Australia at 19 years of age. At the time of the recording, she was in her 30s, self-evaluated her English to be at an intermediate level, and spoke it with a Vietnamese accent. The stimuli from the Australian-accented speaker were used in the Training phase of the experiment, and those from the Vietnamese-accented speaker were used in the Test phase.

2.3.2 Nonce word auditory stimuli

Auditory stimuli were recorded in a sound-attenuated booth at The MARCS Institute for Brain, Behavior and Development, Western Sydney University. Adobe Audition software was used to record auditory stimuli on an Impact core i7 tower computer. The sampling rate was 44.1 kHz and the sound card was MOTU 896 mk3.

The speakers were recorded with a Shure SM10A-CN headset microphone. They were instructed to look at PowerPoint slides and, on each slide, read out a key word containing one of 13 Australian English monophthongs (i.e., /iː/, /ɪ/, /e/, /æ/, /ɐː/, /ɐ/, /ɔ/, /oː/, /ʊ/, /ʉː/, /ɜː/, /ɪə/, /eː/), then that monophthong on its own, then that monophthong embedded in the /hVd/ and then /hVdə/ contexts (e.g., b**a**n, **æ**, h**a**d, h**a**dda). The production steps were put in place to guide the speakers to produce the correct vowels for the /hVdə/ nonce words. For the Australian-accented speaker, the vowels were presented randomly within a block of 13, and repeated 10 times. For the Vietnamese-accented speaker, since she had difficulty producing the vowels consistently across the 10 repetitions when they were randomized, the vowels were each repeated 10 times in a row to ensure consistent productions for stimulus selection purposes. In addition, for the Vietnamese-accented speaker to correctly produce the schwa, the nonce words were presented to her as a mixture of English and Vietnamese orthography (e.g., 'hadda' was written as 'hadđờ').

For each set of 10 tokens belonging to the same vowel, we subjectively judged their similarity in terms of speaking rate and loudness, and selected four of them to be the stimuli for the experiment. However, for the Australian-accented 'hudda' tokens, only two were chosen as the other eight were judged by native Australian English listeners to sound closer to 'hadda' in a pre-test. We repeated each of these two clear 'hudda' tokens twice to ensure that the vowel would appear four times in the Training phase.

2.3.3 Reference word visual display

Participants were presented with a grid of 13 reference words (i.e., bad, bard, bead, beard, bed, bid, bird, book, bored, bud, food, paired, and pod). The presentation of those words on the screen was programmed via ePrime (version 2.0), with the positions randomized by participant. For each word, light red was used to highlight the letters indicating the vowel. Figure 1 illustrates what a participants' screen looked like in the task.

2.4 Procedure

At the lab, participants were greeted by an associate researcher who was a Caucasian Australian and spoke Australian-accented English. They were then instructed to do the online survey first. After finishing the survey, they were asked to do the vowel categorization task, starting with a five-trial practice, then the Training phase and after that the Test phase. Before the Training phase started, participants in the Treatment condition were told to expect an Australian accent in the Training phase and a Vietnamese accent in the Test phase whereas those in the Control condition were told to expect two different speakers only. In the Training phase, participants categorized Australian-accented English vowel tokens in a block of 52 trials (one token per trial × four trials per vowel × 13 vowels). The 52 trials were randomized. Feedback was given to participants on incorrect responses only. When participants had an incorrect response, the following message appeared on the screen 'Your response ''[selected word]'' is incorrect. The correct response is [correct word].' When they responded correctly, the experimental program asked them to rate the

match between the highlighted vowel in the word they selected and the first vowel sound in the nonsense word they heard: 1 = 'foreign'; 4 = 'okay'; and 7 = 'native-like'. After participants finished rating, the next trial began. After one block, if participants correctly responded to at least three out of four tokens of a vowel and at least 10 out of the 13 vowels, their Training ended and the experiment moved on to the Test phase. If participants did not pass the above criterion, another 52-trial block was presented to them. When they reached the end of the fourth Training block, irrespective of whether or not they satisfied the criterion, the Test phase started. The Test phase was identical to the Training phase, except that the stimuli were in Vietnamese-accented English, that participants went through only one 52-trial block, and that they did not get feedback on incorrect responses.

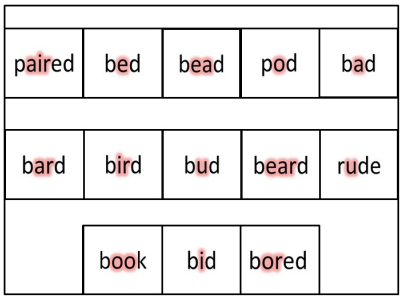

Figure 1: One of the possible orders of reference words that was displayed on participants' screen in the vowel categorization task.

Participants listened to the auditory stimuli via Sennheiser HD280 PRO Headphones (once per trial) and saw the reference words on Acer TravelMate P645 notebook computers. The duration of the task was from 20 min to an hour (depending mainly on how long participants took in Training). At the end of the experiment, the associate researcher debriefed the participants on the purposes of the vowel categorization task. Interested participants received a full debriefing about the connection between the survey and the vowel categorization task and a summary of results at the end of the project.

3 Results

3.1 Expectation effects

We began by fitting four binomial mixed effects models to the accuracy data in R (version 3.1.2) to examine the expectation effects using lme4 (Bates et al. 2014). We checked the main effects of expectations by comparing a model without any fixed factor and another model with expectations as the only fixed factor. We found no main effect of listener expectations on overall vowel categorization accuracy. Since previous findings establish expectation effects on individual vowels (Hay and Drager 2010, Hay, Nolan and Drager 2006, Niedzielski 1999), we then checked the interaction between expectations and vowels by comparing two other models containing vowel as a fixed factor, one with and one without the interaction term between expectations and vowels. Random effects of participants (intercept only) and tokens (intercepts and slopes varying with expectations) were included for all models. In Table 1, the results of model comparison show the significance of the interaction between expectations and vowels, with AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion, logLik = log likelihood, Pr(>Chisq) = *p*-value of the Likelihood Ratio Test (LRT) applied for models (1) and (2), which follows a Chi-Square distribution. Compared to model (1), smaller deviance in model (2) means that model (2) fits the data better and explains more variance. In addition, the *p*-value of the LRT shows that the difference between models (1) and (2) (i.e., the interaction term) is significant. However, the higher AIC and BIC in model (2) mean that the variance explained does not justify model complexity (i.e., there is a chance that the interaction term is over-fitting the data).

model	AIC	BIC	logLik	deviance	Pr(>Chisq)
(1) without interaction term: Accuracy ~ expectations + vowels + (1|Participant) + (1+expectations|Token)	3213.3	3321.5	-1588.7	3177.3	
(2) with interaction term: Accuracy ~ expectations * vowels + (1|Participant) + (1+expectations|Token)	3214.0	3394.4	-1577.0	3154.0	<0.05

Table 1: Significant interaction between expectations and vowels by model comparison.

Figure 2 illustrates expectation effects on individual vowels. The vowels are arranged in the ascending order of accuracy. Error bars indicate one standard error. Expectations appear to have an effect on the categorization accuracy of 'book', 'bead', 'food', and 'bard.' In the Treatment condition, when listeners were told to expect the Vietnamese accent, accuracy decreased on vowels that fall around the periphery of the Australian English vowel space: 'book', 'bead', and 'bard.' Accuracy on 'food', which is fronted to the degree that it is a central vowel /ʉː/ in Australian English, goes in the other direction. Its accuracy increased when listeners expected the speaker to have a Vietnamese accent. Table 2 shows the significant predictors in model (2). Among 'book', 'bead', 'food', and 'bard', which are observed to apparently be under expectation effects, only 'bead' and 'book' are (marginally) statistically significant, with β = log odds of accuracy for the corresponding predictor, and Pr(>Chisq) = *p*-value of the LRT (as mentioned for Table 1).

predictor	**β**	**Pr(>|z|)**
(Intercept)	0.83	<0.001
bad	-5.10	<0.001
beard	-0.87	<0.01
bid	1.13	<0.001
bird	-1.20	<0.001
book	-0.53	<0.05
bored	-5.80	<0.001
bud	-1.00	<0.001
paired	-1.10	<0.001
pod	-1.91	<0.001
Treatment * bead	-0.81	0.055
Treatment * book	-0.78	0.059

Table 2: Significant predictors in model (2).

The formant plot of the Australian English vowels in Figure 3 was regenerated with means in Mel units reported for 60 female speakers in Cox (2006). It highlights the locations of the vowels with decreased categorization accuracy in the Treatment condition (bead, beard, bad, bud, bard, and book), as opposed to the locations of those with increased categorization accuracy (bid, paired, bed, food, bird, pod, and bored), within the Australian English vowel space. We will focus the following discussion on 'bead' and 'book' since they showed the most reliable effects.

3.2 Interaction between expectations and experience

Figure 4 shows categorization accuracy on the Vietnamese-accented 'bead' and 'book' vowels across conditions for listeners with or without experience with the Vietnamese accent. Error bars indicate one standard error. We ended up with unequal numbers of experienced and inexperienced participants: 11 experienced participants out of 32 in the Control condition, but just 4 out of 26 in the Treatment condition. Although the numbers of inexperienced and experienced participants were different, the effect of expectations on vowel categorization was the same for both experienced and inexperienced listeners. For both experience groups, knowledge that the speaker had a Vietnamese accent reduced accuracy on 'bead' and 'book' vowels, relative to lack of such knowledge. In the next section we add prejudice data to the current factors to explore why experi-

ence does not seem to help vowel perception, even when listeners know the speaker's accent.

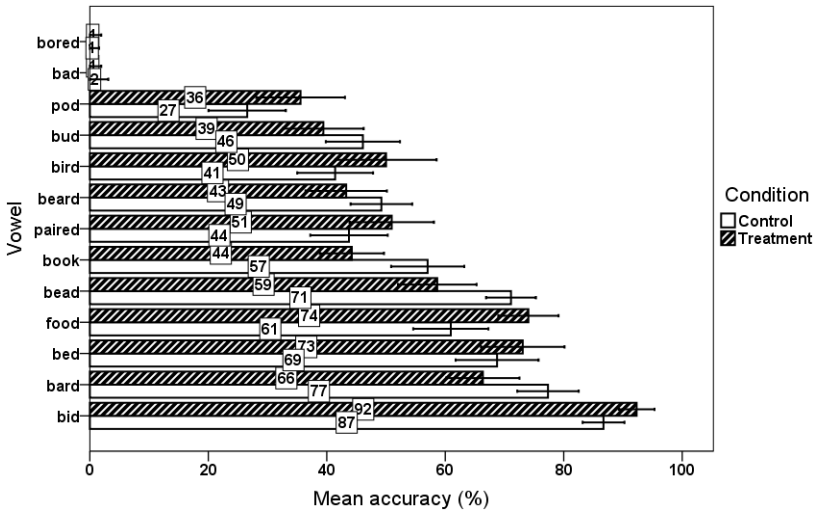

Figure 2: Mean categorization accuracy by vowel in Test. Error bars indicate one standard error of the mean.

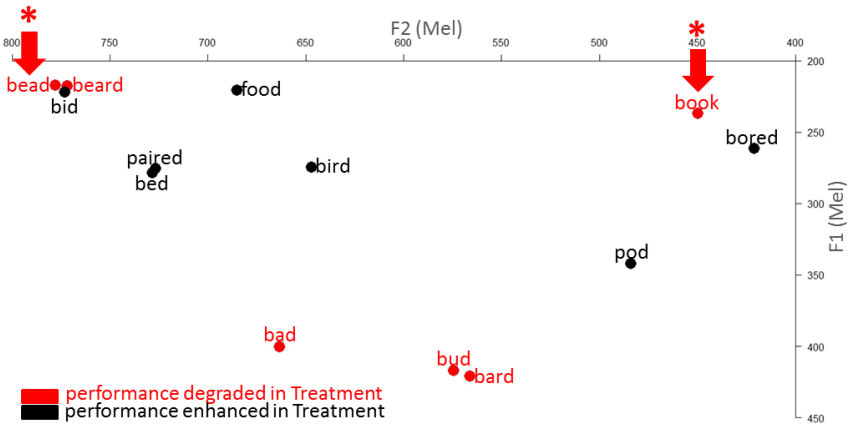

Figure 3: Degraded (red) versus enhanced (black) performance in the Treatment condition, relative to the Control condition, as located within the Australian English vowel space. Arrows mean (marginally) statistically significant differences between Treatment and Control participants.

3.3 Interaction among expectations, experience and prejudice

Recall that prejudice was estimated using SAAAS scores, with negative prejudice inferred from high SAAAS scores. Figure 5 plots participants' centered SAAAS scores against the percentages of their categorization accuracy according to the conditions they were in. The curves reflect quadratic functions fit to the data points (Control: $R^2 = 0.076$, Treatment: $R^2 = 0.057$). We observe that the correlation between categorization accuracy and SAAAS scores is curvilinear for both conditions, with an increase in accuracy for both low and high SAAAS scores (i.e., positive prejudice and negative prejudice) and a dip in accuracy for mid SAAAS scores (i.e., no particular prejudice). Since the relationship between categorization accuracy and SAAAS scores is not linear, SAAAS scores were standardized and divided up into three bins: mid bin consists of z-scores between -0.5 and +0.5, expressing no particular prejudice (24 participants: $n_{\text{Control}} = 12$, $n_{\text{Treatment}} = 12$); low bin consists of the scores below -0.5, expressing positive prejudice towards Asians (15 participants: $n_{\text{Control}} = 8$, $n_{\text{Treatment}} = 7$); and high bin with the scores above +0.5, expressing negative prejudice

towards Asians (19 participants: $n_{Control} = 12$, $n_{Treatment} = 7$) (Figure 6).

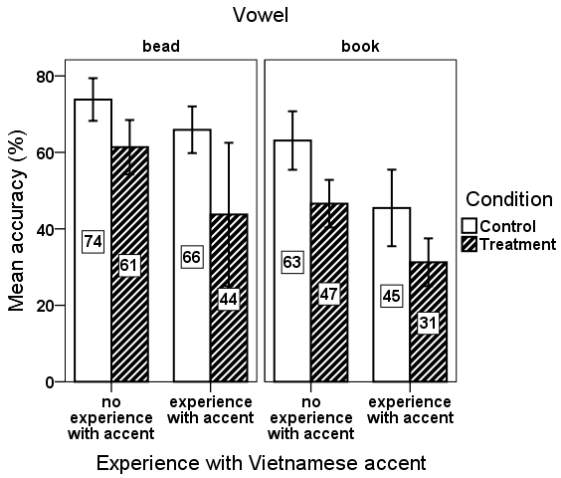

Figure 4: Mean categorization accuracy by 'bead' and 'book' in Test across conditions and across experience levels. Error bars indicate one standard error of the mean.

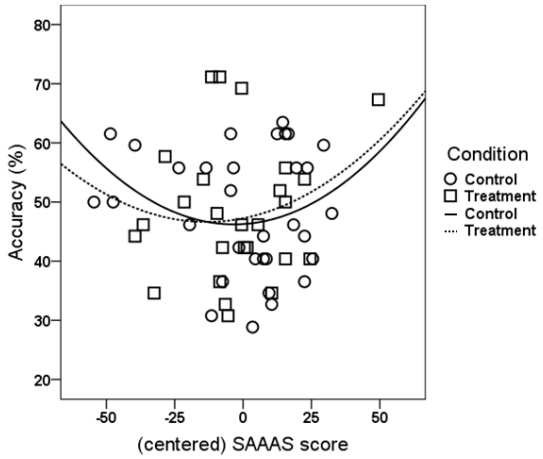

Figure 5: Non-linear relationship between categorization accuracy and SAAAS scores.

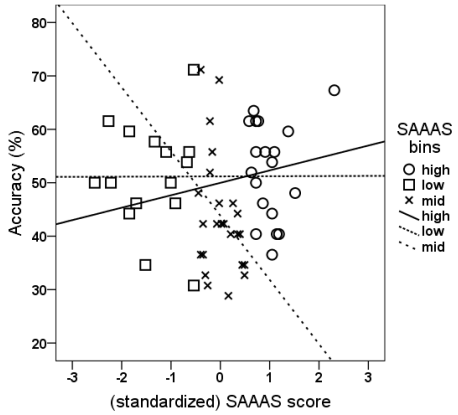

Figure 6: Three prejudice bins based on standardized SAAAS scores.

Figure 7 plots participants' experience (+/-) with the Vietnamese accent against their accuracy percentages, according to the respective conditions they were in (i.e., no fill for Control and pattern fill for Treatment) and the types of prejudice they held towards Asians (i.e., bottom row for those with positive prejudice, middle row for those with no particular prejudice, and top row for those with negative prejudice) for the Vietnamese-accented 'bead' vowel on the left column and 'book' on the right. The rows on the left column show that there is no relationship between prejudice and the accuracy on the 'bead' vowel. The pattern is the same across SAAAS bins. However, for 'book', the rows on the right column show a clear relationship between prejudice and accuracy that interacts with experience and expectations. Specifically, in the experienced group, participants' performance for 'book' was the same whether or not they expected a Vietnamese accent, if they did not have a particular prejudice towards Asians. However, their performance was enhanced when they expected a Vietnamese accent and had positive prejudice towards Asians. In contrast, participants' 'book' vowel perception degraded with negative prejudice towards Asians. Participants without experience show the opposite pattern. Their performance degraded with positive prejudice while it was enhanced with negative prejudice towards Asians.

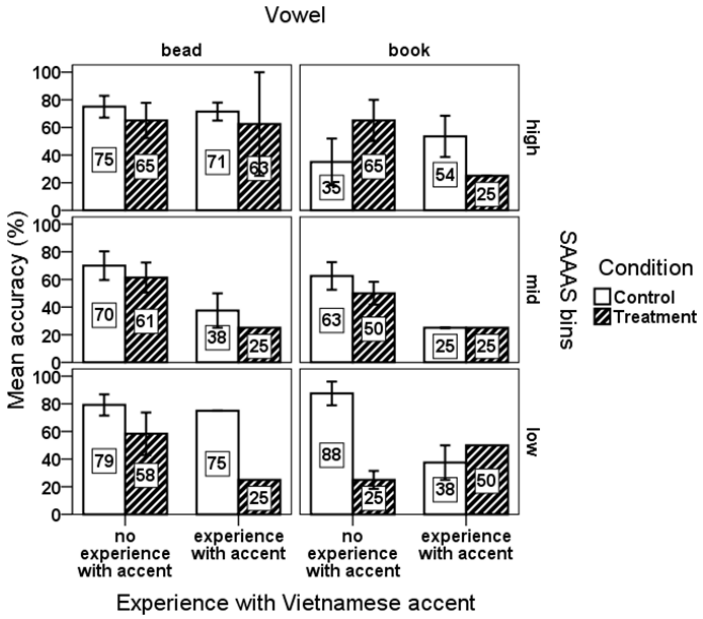

Figure 7: Mean categorization accuracy by 'bead' and 'book' in Test across conditions, across experience levels, and across prejudice levels. Error bars indicate one standard error of the mean.

4 Discussion

Expectations, experience, and attitudes were researched separately in previous speech perception studies. The current study was designed to put these three listener factors under scrutiny together. We predicted an *expectation* effect on particular vowels (Hay and Drager 2010, Hay, Nolan and Drager 2006, Niedzielski 1999), and we found the effect on 'bead' and 'book' (although only marginally significant). Since *experience* with an accent has been found to aid speech perception (McGowan 2015), we predicted that, in our study, experience would enhance speech perception regardless of expectations and attitudes. We therefore did not predict that experience would aid accuracy only for low-prejudice listeners who were told about the speaker's accent, as was the case for the 'book' vowel. We did predict the observed interaction between expectations and *prejudice*. In Nguyen et al. 2015, there was no Control condition in which listeners were uninformed about the speaker's accent. All listeners were told to expect a Vietnamese accent (similar to our Treatment condition). Although the data is the thinnest for the listeners reporting experience with the Vietnamese accent in our Treatment condition (n = 4), negative prejudice in this group (n = 2) seems to relate to the decrease in accuracy of 'book' categorization, similar to the finding by Ngu-

yen and colleagues (2015). However, the relationship was not found for the Control condition, suggesting an interaction between expectations and prejudice. Besides, as noted earlier, experience with the Vietnamese accent also contributes to the relationship among expectations, prejudice, and accuracy: Listeners who were told to expect the Vietnamese accent (and had no experience with it) showed a positive relationship between prejudice and accuracy, compared to the negative relationship found for those who had experience with the Vietnamese accent. In short, findings from past work motivating this study did not really prepare us to expect all aspects of the three-way interaction among expectations, experience, and prejudice in our data. The issue of how prejudice towards a group relates to the perception of the speech produced by members of that group is a complex one, which seems to be influenced by many factors.

In the remainder of the discussion, we speculate on some possible connections to the Social Psychology literature on mood effects (e.g., Isen et al. 1982, Sinclair 1988) that could be developed to explain some aspects of the pattern, particularly why positive prejudice could lead to decreased categorization accuracy and negative prejudice could lead to increased categorization accuracy in certain situations. According to Isen et al. (1982), individuals in a happy mood have an 'intuitive' and simplified approach to problems. They generally avoid exerting cognitive effort to find optimal solutions to problems, especially when they deem the problems to be unimportant. As a result, they may make decision errors. Similar to the happy mood effects, perhaps listeners who had positive prejudice towards the speaker group may not have processed the speech signals carefully enough when they were aware of the speaker's accent, resulting in lower accuracy. In contrast, individuals in a depressed mood have been reported to be more careful and controlled in their manner, differentiate more categories, and process information in an algorithmic way, resulting in more accuracy in their performance (Sinclair 1988). As with the depressed mood effects, for listeners with negative prejudice, disliking the speaker group may have boosted their expectations for exotic vowels. They may have attended to the speech signals more closely and followed algorithmic processing, resulting in greater accuracy.

5 Conclusions

Our results demonstrate that expectations, experience, and prejudice interact in their relationship with vowel perception. The relationship between listener expectations and group prejudice is different for experienced and inexperienced listeners. In our experiment, this result comes out most clearly for the 'book' vowel. For inexperienced listeners, accuracy on the 'book' vowel decreased for those with positive prejudice towards Asians but increased for those with negative prejudice. Those with negative prejudice towards Asians (and no experience with the Vietnamese accent) seemed to concentrate harder when they were told about the speaker's accent. In sharp contrast, among experienced listeners, accuracy on the 'book' vowel decreased for those with negative prejudice towards Asians but increased for those with positive prejudice. Listeners' prejudice towards the speaker group goes hand in hand with whether they can make productive use of their experience. Although this study has some limitations, including uneven numbers of participants across conditions, we think the general approach can fruitfully contribute to understand the dynamics of intergroup factors in speech perception and comprehension.

References

Babel, Molly and Jamie Russell. 2015. Expectations and speech intelligibility. *Journal of the Acoustical Society of America* 137:2823–2833.

Bates, Douglas, Martin Maechler, Ben Bolker and Steve Walker. 2014. lme4: Linear mixed-effects models using Eigen and S4. R package version 1.0-6.

Bundgaard-Nielsen, Rikke, Catherine T. Best and Michael D. Tyler. 2011. Vocabulary size matters: The assimilation of second-language Australian English vowels to first-language Japanese vowel categories. *Applied Psycholinguistics* 32:51–67.

Cox, Felicity. 2006. The acoustic characteristics of /hVd/ vowels in the speech of some Australian teenagers. *Australian Journal of Linguistics* 26:147–179.

Faris, Mona, Catherine T. Best and Michael D. Tyler. 2016. An examination of the different ways that non-native phones may be perceptually assimilated as uncategorized. *JASA-Express Letters* 139:EL1. DOI: 10.1121/1.4939608.

Fiske, Susan T., Amy J. C. Cuddy, Peter Glick and Jun Xu. 2002. A model of (often mixed) Stereotype Content: Competence and Warmth respectively follow from perceived status and competition. *Journal of Personality and Social Psychology* 82:878–902.

Gosling, Samuel D., Peter J. Rentfrow and William B. Swann Jr. 2003. A very brief measure of the Big-Five personality domains. *Journal of Research in Personality* 37:504–528.

Hay, Jennifer and Katie Drager. 2010. Stuffed toys and speech perception. *Linguistics* 48:865–892.

Hay, Jennifer, Aaron Nolan and Katie Drager. 2006. From fush to feesh: Exemplar priming in speech perception. *The Linguistic Review* 23:351–379.

Isen, Alice M., Barbara Means, Robert Patrick and Gary Nowicki. 1982. Some factors influencing decision making strategy and risk-taking. In *Affect and Cognition: The 17th annual Carnegie Mellon Symposium on Cognition*, ed. M. S. Clark and S. T. Fiske, 243–261. Hillsdale, NJ: Erlbaum.

Lin, Monica H., Virginia S. Y. Kwan, Anna Cheung and Susan T. Fiske. 2005. Stereotype Content Model explains prejudice for an envied outgroup: Scale of Anti-Asian American stereotypes. *Personality and Social Psychology Bulletin* 31:34–47.

Lindemann, Stephanie. 2002. Listening with an attitude: A model of native-speaker comprehension of non-native speakers in the United States. *Language in Society* 31:419–441.

McGowan, Kevin B. 2015. Social expectation improves speech perception in noise. *Language and Speech* 1–20.

Nguyen, Nhung, Jason A. Shaw, Michael D. Tyler, Rebecca T. Pinkus and Catherine T. Best. 2015. Affective attitudes towards Asians influence perception of Asian-accented vowels. In *Proceedings of the 18th International Congress of Phonetic Sciences*. Glasgow: The University of Glasgow.

Niedzielski, Nancy. 1999. The effect of social information on the perception of sociolinguistic variables. *Journal of Language and Social Psychology* 18:62–85.

Orne, Martin T. 1959. The nature of hypnosis: Artifact and essence. *Journal of Abnormal Psychology* 58: 277–299.

Paulhus, Delroy L. 1984. Two-component models of socially desirable responding. *Journal of Personality and Social Psychology* 46:598–609.

Rubin, Donald L. 1992. Nonlanguage factors affecting undergraduates' judgments of nonnative English-speaking teaching assistants. *Research in Higher Education* 33:511–531.

Sinclair, Robert C. 1988. Mood, categorization breadth, and performance appraisal: The effects of order of information acquisition and affective state on halo, accuracy, information retrieval, and evaluations. *Organizational Behavior and Human Decision Processes* 42:22–46.

Stephan, Walter G., Oscar Ybarra, Carmen Martínez Martínez, Joseph Schwarzwald and Michal Tur-Kaspa. 1998. Prejudice toward immigrants to Spain and Israel: An integrated threat theory analysis. *Journal of Cross-Cultural Psychology* 29:559–576.

The MARCS Institute for Brain, Behavior and Development
Western Sydney University, Bankstown campus
Locked Bag 1797, Penrith, NSW, Australia 2751
nhung.nguyen@westernsydney.edu.au
j.shaw@westernsydney.edu.au
r.pinkus@westernsydney.edu.au
c.best@westernsydney.edu.au