LEXICAL ACCESS BY L1 AND L2 MONO- AND BIDIALECTAL LISTENERS

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ABSTRACT

This paper investigates lexical access in English in 36 listeners from four different participant groups. The groups vary in English language background (L1 vs. L2 [native Russian]), and in terms of English dialect exposure (D1 [monodialectal Australian] vs. D2 [bidialectal American / Australian]), providing the four groups: L1D1, L1D2, L2D1, and L2D2. We analyze accuracy in a lexical decision task in terms of the lexical item's dialect origin (e.g. American *faucet* vs. Australian *tap*), and the speaker's accent (Australian vs. American). Results reveal that L1 lexical decision is significantly more accurate on items with congruent word dialect and speaker accent (e.g. *faucet* in an American rather than Australian accent) than on incongruent ones. However, (in)congruency has no significant effect on accuracy during L2 lexical decision.

Keywords: perception, bidialectalism, second dialect acquisition, second language acquisition

1. INTRODUCTION

Every time we say something, the speech signal carries two different types of information: linguistic and indexical. The linguistic information conveys the meaning of the message ("what was said"), while the indexical information provides details about the speaker ("who said it"). Indexical attributes can include characteristics of the speaker such as age, sex, social class, regional and ethnic background.

Traditional linguistic theory treated indexical information as noise that was ignored during speech perception. However, recent studies suggest that the processing of linguistic and indexical information is integrated during speech perception, and listeners use indexical properties of the speaker's voice to facilitate a phonetic interpretation of the linguistic content of the message. For example, a speaker's perceived regional origin can affect what vowel we think they are producing [5]. Similarly, a speaker's perceived age can have an effect on how we perceive a vowel [4], while a speaker's sex can influence whether we perceive a certain consonant as [s] or [ʃ] [8]. Accent cues have also been shown to be able to modulate access to word meaning, such that British participants are more likely to retrieve the American dominant meaning of a word (e.g., the *hat* meaning of the word *bonnet*) if they hear the words in an American rather than a British accent [2].

Most of the research in this area is based on monolingual speakers, and not much is known about how second language speakers make use of indexical information during second language speech processing or lexical access (but see [9]). Existing research shows that there are important differences between L1 and L2 speakers, for example in accuracy of native dialect classification [3].

In this paper, we address the following research questions:

1) How does (in)congruency between word dialect and speaker accent affect lexical access in L1 and L2 mono- and bidialectal speakers?
2) What can these results tell us about the link between linguistic and indexical information in L1 and L2 speakers?

2. METHOD

2.1. Participants

Four groups of participants were recruited to participate in the study: 7 native speakers of Australian English (L1D1), 8 native speakers of American English (L1D2), 14 native speakers of Russian who have not lived in any other English-speaking countries but Australia for more than 3 months (L2D1), and 7 native speakers of Russian who lived in the USA before moving to Australia (L2D2). A summary of the groups is given in Table 1. All were residing in Australia at the time of the study and moved there as adults. The L1D2, L2D1, and L2D2 groups have lived in Australia between 1 and 10 years, and the L2D2 group additionally lived in the USA between 1 and 10 years. They were recruited through social media posts and the friend-of-friend method.

2.2. Stimuli

Seventy-six real words and 76 pseudo-words were used as stimuli in a lexical decision task. The real words consisted of 38 pairs, such that one item in each pair is generally considered an Australian lexical item and the other an American item (e.g. American *candy* and Australian *lolly*). These 152 items were audio-recorded being read by both a male native speaker of

Australian English and a male native speaker of American English. Both speakers were trained linguists who were instructed to read the items in a natural manner. This way each lexical item was pronounced in an Australian accent as well as an American accent, resulting in a total of 304 items such that half the real lexical items had *congruent* speaker accent and word dialect (e.g. Australian *lolly* in an Australian accent, or American *candy* in an American accent), while the other half had *incongruent* speaker accent and word dialect (e.g. American *candy* in an Australian accent, or Australian *lolly* in an American accent).

Table 1: Listener groups.

group	description
L1D1	Monolingual Australian, Australian English monodialectal
L1D2	Monolingual American, American/Australian English bidialectal
L2D1	Russian-English bilingual, Australian English monodialectal
L2D2	Russian-English bilingual, Australian/American English bidialectal

2.3. Procedure

All participants from the four groups took part in a lexical decision task. They also completed several other tasks in the same session, namely reading, lexical preference, and shadowing. The whole session took about one hour to complete.

For the lexical decision task participants were seated in front of a computer with E-prime [6]. The auditory stimuli were presented through headphones, and the participants responded to them on a button-box. The stimuli were presented in random order one by one, and the participants had to decide whether the word was a real English word or not, as fast and as accurately as they could. After they pressed a button, their reaction time was presented on the screen which was then automatically followed by the next auditory stimulus. If participants took longer than 2 seconds to respond a *'No response detected'* message was presented instead of their reaction time. For correct responses the RT was presented in blue, for incorrect responses in red. RT and responses were both logged (1 = accurate, 0 = inaccurate).

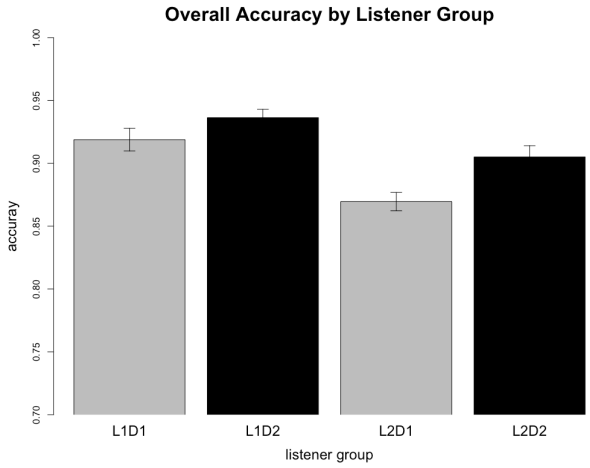
3. RESULTS

Section 3.1 presents descriptive statistics of the raw data, while model predictions are given in Section 3.2. Statistical analysis using generalized mixed effects logistic regression models was carried out using the lme4 package [1] in the R software [7]. The analyses were carried out on the real word data only.

3.1. Descriptive Statistics

Participants overall performed at a high 90% accuracy level in the lexical decision task, however, and not surprisingly, English L1 participants were significantly more accurate (92%) than the L2 participants (88%) (Wilcoxon rank sum test, $W = 3805800$, $p<.0001$). Figure 1 shows the mean accuracy and standard error for each of the four listener groups. Both L1 and L2 bidialectal groups (i.e. L1D2 and L2D2) performed more accurately than their respective monodialectal counterparts (i.e. L1D1 and L2D1), however this difference does not reach statistical significance.

Figure 1: Overall accuracy in the lexical decision task by listener group.



Rather than the overall accuracy by each group, we are more interested in how accuracy is modulated by *speaker accent* and *word dialect*, and the *(in)congruency* between the two within each participant group. Figure 2 breaks down accuracy levels by speaker accent alone. Participants were generally more accurate on words spoken by the Australian speaker, with the exception of the American L1D2 group. The bilingual L2D1 group, who moved from Russia directly to Australia, was particularly less accurate on items spoken in the American accent.

Figure 3 shows accuracy levels with regard to the dialect origin of the words. Regardless of native language background, both Australian monodialectal groups (i.e. L1D1 and L2D1) show a preference for Australian lexical items, while the American L1D2 group is more accurate on American words.

In this paper our main interest is to investigate how – if at all – a mismatch between speaker accent and word dialect affects accuracy levels in lexical

decision for each of our groups. Figure 4 demonstrates that for the two L1 English groups matched trials result in more accurate responses.

Figure 2: Accuracy by Listener Group and Speaker Accent (Australian accented voice vs. American accented voice).

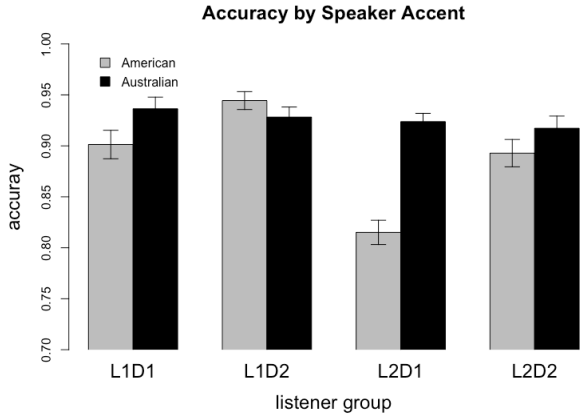


Figure 3: Accuracy by Listener Group and Word Dialect (e.g. Australian *fringe* vs American *bangs*).

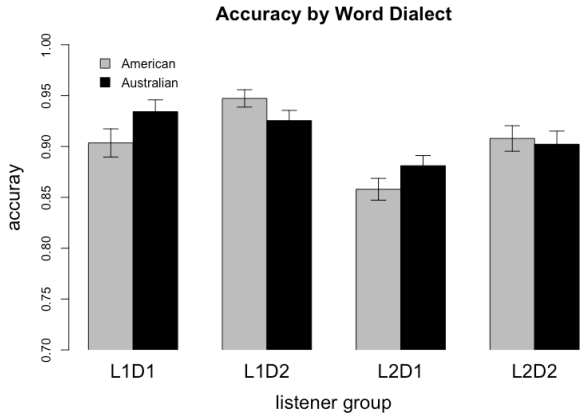
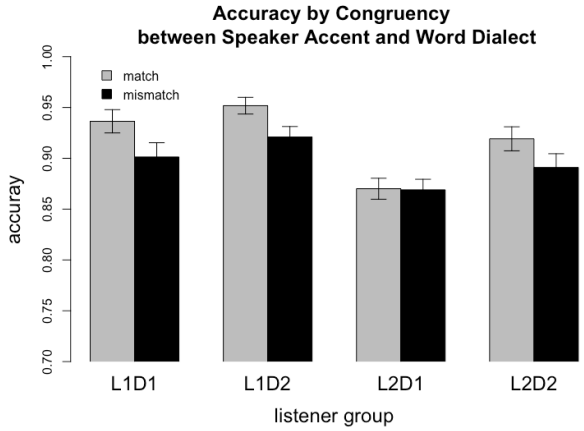


Figure 4: Accuracy by Listener Group and Congruency between Speaker Accent and Word Dialect (e.g. match = Australian *fringe* in an Australian accent; mismatch = Australian *fringe* in an American accent).



3.2. Model Predictions

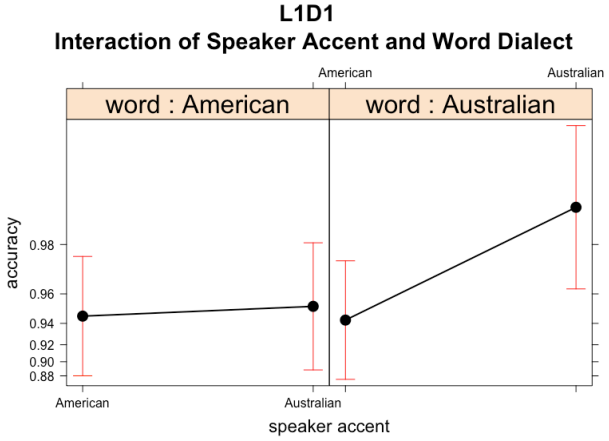
To examine the effect of speaker accent and word dialect on accuracy levels in the lexical decision task, we ran four separate generalized mixed effects logistic regression models for our four participant groups. The dependent variable in each model was *accuracy*, with *speaker accent*, *word dialect*, and *their interaction* entered as fixed effects. *Participant* and *lexical item* were entered as random intercepts into the model.

For the Australian monolingual L1D1 group the model shows a significant interaction between speaker accent and word dialect. Table 2 provides the coefficients for the L1D1 model, and Figure 5 plots this interaction. The L1D1 group is significantly more accurate for Australian lexical items (such as *lolly*) that are pronounced in an Australian accent.

Table 2: Coefficients table for L1D1 model glmer(acc~(1|subject)+(1|item)+accent*word, binomial, data=L1D1).

	Est.	*SE*	*z*	*Pr(>|z|)*
(Intercept)	2.85	0.44	6.48	<.001 ***
accent=aus	0.14	0.47	0.30	0.764
word=aus	-0.05	0.33	-0.17	0.866
acc=aus:wd=aus	0.59	0.59	2.51	0.012 *

Figure 5: Model prediction of Accuracy by L1D1 Group. Significant interaction between Word Dialect and Speaker Accent.



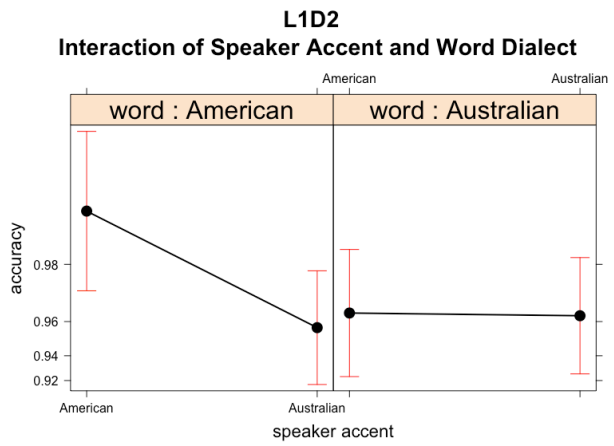
Similarly, the American monolingual but bidialectal L1D2 group also shows a significant interaction between speaker accent and word dialect, such that American lexical items (such as *candy*) pronounced in an American accent exhibit the highest accuracy levels. Table 3 shows the coefficients for the L1D2 model, while Figure 6 plots the interaction.

For the two bilingual groups the models showed that the interaction between speaker sex and word dialect was not statistically significant, therefore the interaction term was removed from both models.

Table 3: Coefficients table for L1D2 model glmer(acc~(1|subject)+(1|item)+accent*word, binomial, data=L1D2).

	Est.	*SE*	*z*	*Pr(>|z|)*
(Intercept)	4.55	0.51	8.98	<.001 ***
accent=aus	-1.45	0.55	-2.61	.009 **
word=aus	-1.27	0.41	-3.11	.002 **
acc=aus:wd=aus	1.42	0.51	2.75	.006 **

Figure 6: Model prediction of Accuracy by L1D2 Group. Significant interaction between Word Dialect and Speaker Accent.



Even though the interaction was not significant, the L2D1 group – who had never lived in America – shows significantly higher accuracy levels on words pronounced in the Australian accent, and also a near significant effect on Australian lexical items. But whether the speaker accent matches the word dialect or not, does not make a difference in terms of accuracy in the lexical decision task. The coefficients for the L2D1 model are presented in Table 4, and the main effects of speaker accent and word dialect are shown in Figure 7.

Table 4: Coefficients table for L2D1 model glmer(acc~(1|subject)+(1|item)+accent+word, binomial, data=L2D1).

	Est.	*SE*	*z*	*Pr(>|z|)*
(Intercept)	2.37	0.41	5.69	<.001 ***
accent=aus	1.34	0.51	2.62	0.008 **
word=aus	0.29	0.15	1.87	0.061 .

The model for the bilingual and bidialectal L2D2 group did not return significant effects for either speaker accent or word dialect. As seen in Figure 1, this group is more accurate than the L2D1 group, and the regression model shows that accuracy levels are not affected by the accent or the dialect of the word. Whether the speaker accent is congruent with the word dialect also does not affect this group's accuracy. The L2D2 model coefficients are given in Table 5.

Figure 7: Model prediction of Accuracy by L2D1 Group. Significant effect of Speaker Accent with no interaction with Word Dialect.

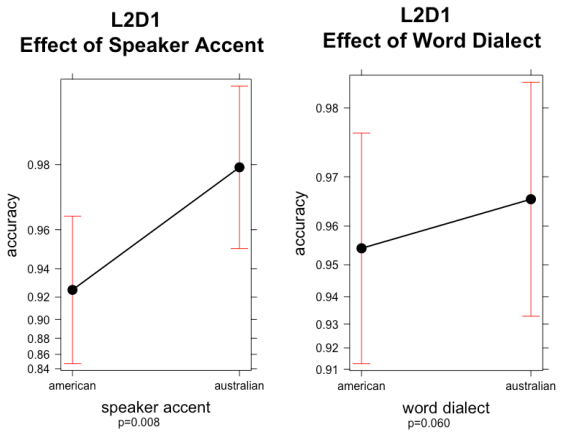


Table 5: Coefficients table for L2D2 model glmer(acc~(1|subject)+(1|item)+accent+word, binomial, data=L2D2).

	Est.	*SE*	*z*	*Pr(>|z|)*
(Intercept)	3.01	0.38	7.78	<.001 ***
accent=aus	0.06	0.43	0.13	0.891
word=aus	-0.07	0.22	-0.34	0.732

4. SUMMARY

This study demonstrates that monolingual and bilingual as well as monodialectal and bidialectal participants vary in their accuracy in a lexical decision task that crosses word dialect and speaker accent. Specifically, L1 speakers are most accurate on matched word dialect and speaker accent items in their native dialect. The match between word dialect and speaker accent, however, is not important for L2 speakers. Bilingual monodialectal speakers are found to be more accurate on the familiar word dialect and speaker accent, but these two predictors are not significant for the bilingual bidialectal group. These results reveal a strong familiarity effect, while also indicate that second language speakers are influenced by the (in)congruency of word dialect and speaker accent to a lesser degree than monolingual speakers are, suggesting weaker ties between linguistic and indexical information in an L2.

7. REFERENCES

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