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Interlocutor modelling in comprehending speech from interleaved interlocutors of different dialectic
backgrounds

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Abstract

It has been shown that, in language comprehension, listeners model certain attributes of their interlocutor (e.g., dialectic background, age, gender) and interpret speech against that model; e.g., they understand cross-dialectally ambiguous words such as *flat* and *gas* as referring to their American English (AE) meanings more often when listening to an AE interlocutor than a British English (BE) interlocutor. This study further investigated whether listeners construct concurrent interlocutor models when communicating with two interlocutors of different dialectic backgrounds and, if they do, how they choose between concurrent models to interpret words. In two experiments, participants heard a word (e.g., *flat*) spoken by a BE or AE interlocutor and provided a word associate (indicating which meaning of the word was accessed). When different interlocutors were encountered in separate blocks, participants accessed more AE meanings when listening to an AE rather than BE interlocutor, and the accent effect was not larger for words pronounced more differently in BE and AE (e.g., *fall* sounds more distinctly British versus American than *flat* does). These results suggest that participants constructed an interlocutor model (e.g., of a BE or AE speaker) and used it (instead of accent details in a word) to guide word meaning access. When interlocutors were interleaved in the same block, we observed a comparable accent effect, which increased as a function of between-accent differences in pronunciation. These results suggest that participants constructed concurrent interlocutor models and used accent details in a word to select the appropriate interlocutor model. We also observed that the accent effect was comparable for two interleaved interlocutors of the same gender (e.g., a female BE interlocutor and a female AE interlocutor) and for two interleaved interlocutors of different genders (e.g., a female BE interlocutor and a male AE interlocutor). These results suggest that participants did not use gender-related voice details for model selection when accent details were sufficient for interlocutor model selection.

Keywords: Interlocutor modelling; word meaning access; accent; dialect; dialogue

Language comprehension can be viewed as an inferential process whereby the listener infers the meaning most likely intended by the speaker (Van Berkum, 2008). For instance, if a colleague asks you to meet on the *first floor* of a building, you may need to consider their dialectic background so you can decide whether they mean the ground level (as in American English, AE) or the level above the ground level (as in British English, BE). While there is much evidence that listeners interpret speech in light of their interlocutor (e.g., Cai et al., 2017; Van Berkum et al., 2008), it is yet unclear whether and how listeners interpret speech against interlocutor-specific models when there are multiple concurrent interlocutors. In this paper, we asked whether listeners construct concurrent interlocutor models of dialectic backgrounds and use them to guide the interpretation of cross-dialectally ambiguous words (e.g., *flat*, *gas* between BE and AE), and if so, how they select among concurrent models.

There is good evidence that listeners take interlocutor attributes (e.g., age, gender, socioeconomic status, ethnicity) into account when interpreting speech (Creel & Bregman, 2011). Van Berkum et al. (2008) showed that listeners interpret speech against an interlocutor's socioeconomic status, age, or gender (e.g., they had difficulty understanding *If only I looked like Britney Spears in her latest video* when it was spoken by a man compared to by a woman). Martin et al. (2016) also showed that listeners expect dialect-specific expressions, having difficulty understanding an accent-incongruent expression (e.g., *holiday* embedded in a sentence spoken by an AE interlocutor, or *vacation* in a sentence spoken by a BE interlocutor). Listeners also consider whether their interlocutor is a native or non-native speaker. Caffarra and Martin (2019), for instance, showed that listeners are more tolerant of typical than atypical morphosyntactic errors in non-native speech (for more findings of differences in comprehending non-native versus native speech, see Gibson et al., 2017; Brehm et al., 2018; Hanulíková et al., 2012).

But how do these interlocutor effects arise in comprehension? Making use of cross-dialectally ambiguous words, Cai et al. (2017) showed that BE-speaking listeners accessed AE meanings of cross-dialectally ambiguous words (e.g., the “surface” meaning of *flat*) more often when the words were spoken in the AE rather than BE accent. Interestingly, listeners do not just make use of accent details in a word to guide their meaning access: words pronounced more differently between accents

(e.g., *fall* compared to *flat*) did not lead a larger accent effect. More critically, participants accessed more AE meanings for neutrally-accented speech morphs (50% AE accent and 50% BE accent) when these neutrally-accented morphs were interleaved with strongly AE-accent morphs (90% AE accent and 10% BE accent) than when they were interleaved with strongly BE-accented morphs (90% BE accent and 10% AE accent); furthermore, the accent effect for the neutrally-accented morphs (when interleaved with strongly BE- versus AE-accented morphs) was comparable to that for the strongly-accented morphs. This latter finding strongly suggests that listeners derive a model of the interlocutor and interpret words (whether neutrally or strongly accented) believed to come from that interlocutor in light of the interlocutor model, a process which we refer to here as *interlocutor modelling* in language comprehension (note that interlocutor modelling is also used in language production to tailor utterances in light of the addressee; for evidence see Branigan et al., 2010; Cai, Sun, & Zhao, 2021; Fussell & Krauss, 1992; Isaacs & Clark, 1987). While there is solid evidence of interlocutor modelling when listening to a single interlocutor, it is unclear whether listeners can concurrently model multiple interlocutors and how they select an appropriate interlocutor model to constrain speech comprehension.

When multiple concurrent interlocutors differ in one or two linguistic routines (e.g., grammatical, lexical or prosodic expressions), listeners seem to be able to keep interlocutor-specific track of these routines and adapt their comprehension accordingly. For instance, listeners make use of a speaker's prosodic cues for sentence interpretation if the speaker has been previously reliable in prosodic use but not if the speaker has been previously unreliable (e.g., Roettger & Rimland, 2020). Listeners also keep track of different speakers' prior quantifier use (e.g., *some* vs. *many*) and develop interlocutor-specific expectations (e.g., Yildirim et al., 2016). Listeners even interpret an interlocutor's expression in light of their professional experience (e.g., being more receptive to the statement that an ox is a typical exemplar of a farm animal if the statement is expressed by an ox farmer; Ryskin et al., 2020).

However, it is less clear whether and to what extent interlocutors model interlocutor-specific linguistic routines when these routines are difficult to track. For instance, in one experiment, participants first listened to an interlocutor naming different things in one session and then, in a

second session, listened to either the original interlocutor or a new interlocutor naming objects from the first session. Results were mixed regarding whether participants expected the original interlocutor (but not the new one) to use the same name for an object (Barr & Keysar, 2002; Metzing & Brennan, 2003). Rodd et al. (2013) showed that participants failed to track interlocutor-specific word use (e.g., using *bark* to refer to tree bark or a dog bark) when they had to keep track of dozens of such words (as in a typical psycholinguistic experiment).

Much research has suggested that taking an interlocutor's perspective in sentence comprehension taxes listeners' cognitive resources (e.g., working memory, attention; e.g., Brown-Schmidt, 2009; Nilsen & Graham, 2009; Wardlow, 2013). Thus, it is likely that listeners track and adapt to interlocutor attributes and linguistic routines only when such tracking is not too cognitively costly and benefits language communication (e.g., for more efficiency and better comprehension). Indeed, there is evidence that people keep track of and imitate stable linguistic attributes (e.g., slower speech of non-native speakers than native speakers; Ostrand & Chodroff, 2021) but not individual-level linguistic idiosyncrasies (e.g., exclusive use of a particular syntactic structure by a particular individual for no obvious reason; Ostrand & Ferreira, 2019).

In this paper, we tested whether listeners model interleaved interlocutors based on their dialectic backgrounds (e.g., BE or AE) and if so what cues related to an interlocutor they use for model selection. The dialectic background of an interlocutor can be important for interpretation (as in the *first-floor* example). Indeed, Martin et al. (2016) showed that, when listening to two interleaved interlocutors of different accents, participants expected accent-specific word choices (e.g., *holiday* vs. *vacation*). But it remains to be seen what linguistic cues (e.g., accent details, voice details) listeners use to select among concurrent interlocutor models for constraining speech from one of multiple interleaved interlocutors.

Experiment 1

When listening to a single interlocutor of a particular accent (BE or AE), listeners construct a model of his/her dialect background and use such a model to constrain their interpretation of cross-

dialectally ambiguous words (e.g., *flat*), thus leading to more AE meaning access when listening to an AE than to an BE interlocutor (Cai et al., 2017). This experiment tested whether listeners construct concurrent dialectic models of interleaved interlocutors (e.g., a BE and an AE interlocutor) and appropriately apply these models to constrain speech from the interlocutors (e.g., more AE meaning access with an AE than BE interlocutor; in other words, an accent effect on meaning access). If they do, we should expect an accent effect for interleaved interlocutors (e.g., more AE meaning access for an AE than BE interlocutor), as expected when there is only one interlocutor at a time (e.g., when the interlocutors are encountered in different blocks). We also asked whether listeners make use of accent details in a word to choose between concurrent interlocutor models (i.e., which dialect to interpret a word against). If they do, we should expect people to better apply the appropriate interlocutor model to interpret a word when the word is more indicative of the dialectic of its speaker (e.g., a larger accent effect for words with a larger between-accent difference, like *fall* compared to *flat*).

Methods

Design. This experiment adopted a design of 2 (interlocutor accent: BE vs. AE) x 2 (interlocutor grouping: blocked vs. interleaved). Interlocutor accent was manipulated within both items and participants. Interlocutor grouping was manipulated within items and between participants: a participant listened to two interlocutors (of different accents) either in a blocked manner (one interlocutor in the first block and the other interlocutor in the second block) or in an interleaved manner (two interlocutors in each of the two blocks).

Participants. A total of 96 participants were recruited from the crowdsourcing platform Prolific Academic (<https://www.prolific.co/>) and were paid £5 to take part in the experiment. They were all registered on Prolific Academic as native speakers of British English, aged between 18 and 50 and residing in the UK at the time of testing. Eighteen participants were excluded from further analyses (see below), leaving 78 participants for further analyses (age: mean = 31.8, range = 18–50, SD = 8.8; 59 females).

Materials. All materials were taken from Cai et al. (2017), consisting of 40 target words (see Appendix 1) and 47 filler words, together with their recordings in WAV files (all publicly accessible

at Open Science Framework <https://osf.io/3myw2/>). According to norming results in Cai et al. (2017) (see also Appendix 1), both the BE and AE meanings of a word were known to BE speakers (with familiarity rating above 3 in a 7-point scale); the BE meaning was always rated as more familiar than the AE meaning by BE speakers and the reverse by AE speakers. Due to an error, one of these items, *garage*, was mistakenly replaced by *drape* (thus *drape* was not included in the between-accent difference pretest, but it was one of the target items used in Cai et al., 2017, and was thus included in our analysis). Among the materials were also 47 filler words which are not ambiguous (within a dialect or between dialects; e.g., *girl*, *brain*, *cage*). Of these, 1 word served as a practice item, two sets of 3 words served as lead-in items, and the remaining 40 items served as fillers to be interleaved with the target items. All words were recorded using a BE speaker and an AE speaker (both females in their 20s).

Between-accent difference pretest. As not all the selected target words were pretested for difference between BE and AE pronunciations in Cai et al. (2017), we carried out a between-accent difference pretest on Qualtrics (an online survey platform), using 30 participants from the same population as the participants of the main experiment. In the pretest, participants heard a BE recording of a word, followed by the AE recording of the same word; they then decided, on a 7-point scale, how different the two pronunciations were (7 being the most different). We then calculated an average difference score for each word across the participants (mean difference score = 3.2, range = 1.4 – 6.3, SD = 1.2).

Main procedure. The experiment was run on Qualtrics and followed the same experimental procedure as that in Cai et al. (2017, Experiments 1 – 3). Participants gave their consent before embarking on the experiment, which consisted of a word association session (with two experimental blocks) followed by a meaning classification session (see below for details of these tasks). The whole experiment took about 30 minutes to complete. We next describe the procedure of word association and then that of meaning classification.

Word association. In a trial of word association, participants heard a word and typed, in a textbox, the first word/phrase that came to their mind (Figure 1A); for instance, if they heard the word *flat*, they could type in “house” (an associate related to the BE meaning of *flat*) or “surface” (an

associate related to the AE meaning of *flat*). After instructions and a practice trial, participants began the first of two word association blocks. There were three lead-in practice trials, followed by 20 target trials and 20 filler trials (randomly presented for each participant). Participants could choose to take a break after the first word association block and then continue to the second block, which again started with three lead-in practice trials and then 20 target trials and 20 filler trials. Note that, when interlocutors were blocked, a block had only one interlocutor saying all the words; when the interlocutors were interleaved, the two interlocutors took random turns to say words in both blocks.

Meaning classification. After completing the word association session, participants continued to the meaning classification session (see Figure 1B). In a trial of meaning classification, participants read a word (out of 40 targets, plus 8 fillers from the word association session) and also the associate they had provided for that word earlier in the word association session (e.g., “house” as an associate for the word *flat*). For a target word, they indicated whether the word associate they had provided related to the word’s BE or AE meaning (definitions of these two meanings were provided as Option 1 and 2; order counterbalanced among items), was due to mishearing (Option 3), or related to some other meaning of the word (Option 4). The 8 filler words served as foils for checking random responding. These foil items had the same format as the target items, except that a foil’s definition and an apparently unrelated definition were the first two options (again with order counterbalanced across the fillers), together with “mishearing” and “other meaning” as the other two options.

Figure 1. (A) A trial of word association (“1 of 40” indicates progress through a block). (B) A trial of meaning classification.

Data exclusion. We first removed 14 participants from further analyses for either not following the word association instructions (e.g., repeating a target word instead of providing a word

associate) or for classifying more than 40% of the associates as relating to “other” meanings or due to “mishearing” (which indicates random responding or not being able to understand the target words). We then removed 4 further participants who chose the irrelevant definition 50% of the time or more for the eight attention-check foils. For the remaining 3120 word association trials from 78 participants, we further removed 334 trials where word associates were reported to be given due to “mishearing” or to related “other meaning” in the meaning verification session.

Results and discussion

We used logit mixed-effects (LME) modelling on trial-level BE and AE meaning access (with BE meaning as the reference), with interlocutor grouping (blocked = -0.5, interleaved = 0.5), interlocutor accent (BE = -0.5, AE = 0.5), and between-accent difference (transformed into z-scores) as interacting predictors (as mentioned, the between-accent difference for *drape* was missing). We used the maximal random effect structure justified by the data, determined via forward model comparison, with the alpha level of .2 instead of .05 to minimise anti-conservativity (Matuschek et al., 2017). All the data and analytical scripts are publicly available on Open Science Framework (<https://osf.io/3myw2/>).

As shown in Table 1 and Figure 2, there was a significant effect of interlocutor accent, with more AE meaning access if words were spoken by an AE rather than BE interlocutor (38% vs. 33%). Separate analyses showed a significant effect of accent for both blocked and interleaved interlocutors. The lack of a significant interaction between accent and grouping, though a null finding, seems to suggest participants interpreted word meanings in light of an interlocutor model and did so to similar extents regardless of interlocutors being blocked or interleaved. There was also a significant three-way interaction among accent, grouping, and between-accent difference: there was a significant interaction of accent and between-accent difference (i.e., a larger accent effect for words with a larger between-accent difference) for interleaved but not blocked interlocutors (see also Figure 3). This finding suggests that participants used accent details in a word to select between interlocutor models when interlocutors were interleaved, but not when they were blocked (as there was only one interlocutor model; see also Cai et al., 2017).

Table 1. LME results for Experiment 1 (significant effects in **bold**).

Effect	β	SE	z	p
<i>Main analysis</i>				
Intercept	-0.92	0.23	-3.90	< 0.001
Accent	0.36	0.10	3.63	< 0.001
Grouping	0.04	0.15	0.29	0.769
Difference	0.18	0.23	0.80	0.426
Accent: Grouping	-0.08	0.20	-0.41	0.681
Accent: Difference	0.13	0.10	1.35	0.177
Grouping: Difference	-0.09	0.11	-0.84	0.400
Accent: Grouping: Difference	0.44	0.19	2.28	0.023
<i>Separate analysis for blocked interlocutors</i>				
Intercept	-1.04	0.24	-4.29	< 0.001
Accent	0.39	0.13	2.99	0.003
Difference	0.26	0.23	1.15	0.252
Accent: Difference	-0.02	0.13	-0.14	0.887
<i>Separate analysis for interleaved interlocutors</i>				
Intercept	-0.87	0.26	-3.30	< 0.001
Accent	0.32	0.14	2.21	0.027
Difference	0.15	0.25	0.61	0.545
Accent: Difference	0.36	0.14	2.55	0.011

Note: Random effect structure included a by-item slope for interlocutor grouping in the main analysis and no random slopes in the separate analyses.

Figure 2. Proportion of AE meaning responses as a function of interlocutor accent and interlocutor grouping in Experiment 1. Error bars stand for $1 \pm SE$.

Figure 3. Accent effect (proportion of accent-congruent meaning access) as a function of a word's between-accent difference for blocked interlocutors (red) and interleaved interlocutors (blue) in Experiment 1.

Experiment 2

This experiment was preregistered (<https://osf.io/nzsjsx>) and had a three-fold purpose. First, we aimed to replicate the interlocutor-specific accent effects with interleaved interlocutors; thus, in this experiment, two interlocutors were interleaved in the same session. Second, we aim to confirm the finding that listeners use accent details to choose between concurrent interlocutor models; if so, we should replicate the finding in Experiment 1 that the accent effect is larger for words with a larger between-accent difference when the interlocutors are interleaved. Finally, we examined whether listeners additionally select between interlocutor models according to voice details when these are manipulated to indicate a speaker's dialect. Voice details have been repeatedly shown to help listeners to establish interlocutor identities (e.g., Creel, 2012; Creel et al., 2008; Creel & Tumlin, 2011). It is likely that, in a scenario where the BE and AE interlocutors differ in gender (e.g., a male BE interlocutor and a female AE interlocutor), participants will make use of the gender-related voice details to select an appropriate interlocutor for word meaning access, resulting in a larger accent effect (compared to when the interlocutors are of the same gender).

Methods

Design. The experiment had a design of 2 (interlocutor accent: BE vs. AE; manipulated within participants and within items) x 2 (interlocutor genders: same vs. different genders; manipulated between participants and within items). Thus, participants always listened to two interleaved interlocutors with different accents. The interlocutors were either of the same gender (two females, as in Experiment 1, with no association between accent and genders) or of different genders associated with different accents (a female BE interlocutor and an AE male interlocutor, or a male BE interlocutor and a female AE interlocutor).

Participants, materials, and procedure. As planned in the preregistration, we recruited participants from the same population on Prolific Academic as we did in Experiment 1. We stopped participant recruitment after reaching 96 valid participants (which was an increase on the 78 valid participants in Experiment 1). Participants were paid £4 for completing the experiment. The materials and procedure were the same as in Experiment 1, except in the following aspects. First, we replaced

the mistaken item *drape* with the intended correct item *garage*. Second, we created male versions of the materials used in Experiment 1 by changing the gender of a voice in Praat (see <https://osf.io/nzsjsx> for the Praat scripts). Thus, we ended up with four versions of an experimental item: a female (original) BE recording and its gender-transformed male version, and a female (original) AE recording and its gender-transformed male version. Third, there was only one block of word association, where participants always heard two interleaved interlocutors (with different accents and of the same or different genders) taking random turns saying words for which participants typed in a word associate.

Data exclusion. We adopted the same exclusion criteria as in Experiment 1. Ten participants were replaced for not following word association instructions (e.g., repeating target words instead of providing word associates) or for selecting “other meaning” or “mishearing” for more than 40% of the meaning classifications.

Results and discussion

As shown in Table 2 and Figure 4, there was a significant effect of accent, with participants accessing more AE meanings when words were spoken by the AE than BE interlocutor (36% vs. 26%). The accent effect was not modulated by gender (i.e., was comparable in the same- and different-gender conditions; see separate analyses), which, despite being a null finding, seems to suggest that participants did not additionally use gender-related voice details for interlocutor model selection (otherwise the accent effect should have been larger when interlocutors were of different genders than of the same gender). The accent effect was modulated by between-accent difference (i.e., a larger accent effect for words with a larger between-accent difference); and this two-way interaction was not further qualified by gender (though separate analyses suggest that this interaction was observed only in the different-gender condition). These results confirm the finding in Experiment 1

that, when interlocutors were interleaved, listeners made use of accent details in a word to select an appropriate interlocutor model to constrain meaning access for that word.¹

We note that gender-transformed recordings might have varying degrees of naturalness and might also differ from the original recordings in between-accent differences. To address these issues, we conducted two exploratory (unpreregistered) analyses (see Appendix 2 for more details). In the first analysis, we ran the planned analysis but also adding naturalness of recordings (average rating on a 7-point scale for each gendered-transformed recording and 7 for each original female recording) as a (noninteracting) control predictor. The second analysis further improved from the first analysis by having newly collected between-accent difference ratings for the gender-transformed recordings. We replicated the key findings in both exploratory analyses: a significant main effect of accent, no significant interaction between accent and genders, and a significant interaction of accent and between-accent difference (though in one of the exploratory analyses, the three-way interaction became significant, which may suggest more use of accent details for model selection with different-gendered interlocutors than with same-gendered interlocutors). Finally, a between-experiment comparison revealed that the interleaved interlocutors of the same gender in Experiment 2 resulted in a larger accent effect than the interleaved interlocutors in Experiment 1 despite the two conditions being the same (see Appendix 3).

¹ In the preregistration, we planned to manually check meaning classifications by participants and to correct “apparent” classifications. But we agreed with a reviewer that meanings are subtle and subjective and such corrections would not be appropriate and we therefore did not adopt manual corrections. However, it should be noted that using the preregistered corrections of meaning classifications did not change the statistical pattern reported in Table 2.

Table 2. LME results for Experiment 2 (significant effects in **bold**).

	Effect	β	SE	z	p
<i>Main analysis</i>					
	Intercept	-1.24	0.27	-4.60	< 0.001
	Accent	0.70	0.12	5.76	< 0.001
	Genders	-0.11	0.11	-1.08	0.279
	Difference	0.32	0.27	1.20	0.232
	Accent: Genders	0.03	0.19	0.18	0.861
	Accent: Difference	0.25	0.11	2.26	0.024
	Genders: Difference	-0.15	0.10	-1.47	0.141
	Accent: Genders: Difference	-0.32	0.19	-1.71	0.088
<i>Separate analysis for same-gender interlocutors</i>					
	Intercept	-1.34	0.29	-4.64	< 0.001
	Accent	0.80	0.17	4.73	< 0.001
	Difference	0.30	0.28	1.08	0.280
	Accent: Difference	0.08	0.15	0.51	0.609
<i>Separate analysis for different-gender interlocutors</i>					
	Intercept	-1.10	0.24	-4.53	< 0.001
	Accent	0.55	0.13	4.30	< 0.001
	Difference	0.43	0.24	1.78	0.075
	Accent: Difference	0.39	0.13	3.00	0.03

Note: Random effect structure included a by-subject slope for between-accent difference and a by-item slope for accent in the main analysis, included a by-item slope for accent in the same-gender separate analysis, and no random slopes in the different-gender separate analysis.

Figure 4. Proportion of AE meaning responses as a function of speaker accent and speaker gender grouping. Error bars stand for $1 \pm \text{SE}$.

Figure 5. Accent effect (proportion of accent-congruent meaning access) as a function of a word's between-accent difference for same-gender interlocutors (red) and different-gender interlocutors (blue) in Experiment 2.

General Discussion

We showed that participants accessed more AE meanings when words were spoken by an AE rather than BE interlocutor, regardless whether the interlocutors were blocked or interleaved. These findings are consistent with interlocutor modelling, according to which people take into account certain attributes of an interlocutor (speaker in comprehension and addressee in production) to constrain speech comprehension (Cai et al., 2017) and to tailor speech production (e.g., Cai et al., 2021). These attributes include demographic background (e.g., Van Berkum et al., 2008), dialectic background (Cai et al., 2017; Martin et al., 2016), reliability (e.g., Brothers et al., 2019; Roettger & Rimland, 2020), prior linguistic routines (e.g., Brennan & Clark, 1996; Gann & Barr, 2014; Metzling & Brennan, 2003; O'Shea et al., 2021), linguistic competence (e.g., Branigan et al., 2010; Cai et al., 2021; Fisher & Tokura, 1995), and knowledge (e.g., Fussell & Krauss, 1992; Isaacs & Clark, 1987), among others. In particular, we showed that listeners can model an interlocutor for their dialectic background and use their long-term lexical-semantic knowledge for that dialect to constrain meaning access.

But why did our (British) participants not show overwhelming accent-congruent meaning access when listening to AE-accent words? It has been shown that meaning activation depends on an array of different factors (Cai & Vigliocco, 2018). In particular, meaning dominance is the key factor; therefore, it is not surprising that our BE participants would still access dominant BE meanings even when listening to an AE interlocutor. We are not claiming that interlocutor modelling would override meaning dominance; instead, the claim is that people use an interlocutor model to *constrain* word meaning access. It is interesting though to note that Martin et al. (2016) showed fairly stark dialect-specific expectations, which overrode frequency effects. We note that Martin et al. differed from the current study (and from Cai et al., 2017) in two important ways as far as the discrepancy in the results is concerned. First, the effect in Martin et al. was observed online in ERPs, which can be very sensitive. In contrast, word association is offline (e.g., word associates are provided with a delay after meaning has been accessed), which opens up a longer window for influence of other factors. In particular, word association is known to be very sensitive to meaning dominance (e.g., Rodd et al.,

2013). Second, in Martin et al. but not our study, the materials (i.e., passages) allow the build-up of expectation for the target word, which was likely to increase the effect of speaker dialect.

In addition, is it possible that listeners do not build an interlocutor model but instead simply use accent details in a word to determine which meaning to access (e.g., a more AE-accented word leading to more AE meaning access)? Two findings argue against this alternative account. First, this account would predict a larger accent effect for words with a larger between-accent difference (e.g., *fall* compared to *flat*), which we did not observe in either of the current experiments or in Cai et al. (2017). Second, Cai et al. (2017) interleaved the accent-neutral target words (50% BE and 50% AE accent) with weakly BE-accented fillers and strongly BE-accented target words in the BE block, and the same accent-neutral targets with weakly AE-accented fillers and strongly AE-accented targets in the AE block. As expected, they observed more AE meaning access for the strongly AE-accented items than for the strongly BE-accent items (an accent effect). Critically, they also observed more AE meaning access for the accent-neutral items interleaved with AE-accented words than for the *same* set of accent-neutral items interleaved with BE-accented words. In fact, the accent effect was comparable for the accent-neutral words and the strongly accented words. These findings strongly argued against the claim that participants use accent details to determine meaning access (if so, there should be no accent effect for the accent-neutral items). Instead, they provided direct evidence that participants infer the dialectic background of the interlocutor and use that model (instead of accent details in individual words) to guide meaning access (hence the comparable accent effects for accent-neutral and strongly accented items).

However, we did observe that the accent effect is larger when a word has a larger between-accent difference (e.g., *fall* compared to *flat*) when interlocutors were interleaved (e.g., the interleaved-interlocutors condition in Experiment 1 and in Experiment 2) but not when they were blocked (in Experiment 1; see also Cai et al., 2017). These findings suggest that, when there is only one interlocutor, people do not need to use accent details in a word to select between interlocutor models to constrain word interpretation, but they need to do so when there are multiple interlocutor models (e.g., interpreting a word against the existing AE model if the word sounds American). The

fact that we did not observe a reduction in the accent effect for interleaved interlocutors compared to blocked interlocutors suggests that people are good at using accent details in a word to choose between interlocutor models.

Finally, in Experiment 2, there was no observable difference in accent effect when interleaved interlocutors were of the same gender or of different genders. This finding, though a null effect, suggests that, in contrast to accent details, gender-related voice details were not used for model selection, despite earlier findings that people are good at inferring speaker identities from voice details (Creel, 2012; Creel et al., 2008; Creel & Tumlin, 2011). It is likely that the accent details in words are sufficient for listeners to select between interlocutor models (i.e., to determine if a word is produced by a BE or AE speaker in order to interpret the word against the appropriate interlocutor model); hence there is no need to additionally use gender-related voice details. It is also possible that interlocutor gender is irrelevant to word interpretation, at least for the words we used (i.e., there is no gender-related meaning difference) and thus listeners did not attend to gender-related voice details when interpreting word meanings (though see Van Berkum et al., 2008, for an effect of gender-related voice details when gender is communicatively relevant).

In summary, we showed that listeners are able to construct concurrent interlocutor models regarding dialectic backgrounds and interpret words against the appropriate model.

Open Practices Statements

The experimental materials, data and analytical scripts associated with this paper are publicly accessible on Open Science Framework (<https://osf.io/3myw2/>).

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Appendix 1

Table S1: Cross-dialectally ambiguous words used in the experiments and associated pretest results; meaning familiarity data were from Cai et al. (2017).

Word	D- OR	D- GR	N- BEGR	N- AEGR	BEP- BEM	BEP- AEM	AEP- BEM	AEP- AEM
bangs	4.17	3.87	3.83	4.47	6.31	3.28	6.06	6.35
blinkers	2.7	2.72	4	4.9	4.64	3.44	2.15	6.19
bonnet	4.7	4.53	4.53	4.87	5.41	4.16	1.88	4.94
brackets	2.63	2.56	4.3	5.53	6.15	6.10	5.15	5.54
chemist	2.53	2.4	4.67	5.7	6.82	5.92	2.85	6.00
chips	2.33	2.29	4.47	5	6.44	4.41	3.41	6.18
coach	1.93	2.05	5.1	4.67	6.62	6.05	3.88	6.27
comprehensive	3.4	3.25	4.07	5.9	6.31	6.23	2.58	5.88
cricket	3.03	2.95	3.6	5.37	6.69	5.95	4.12	6.31
crisp	2.77	2.79	4.4	5.67	6.16	4.91	3.35	5.65
dummy	1.83	1.79	4.13	5.4	5.28	5.00	1.24	5.82
fall	4.9	4.7	3.73	5.53	6.63	3.97	6.41	6.65
flannel	3.53	3.31	3.87	5.47	6.51	5.82	2.27	6.08
flat	2.9	2.71	4	5.63	6.53	6.38	4.59	6.65
football	4.3	4.08	4.7	5.37	6.91	4.31	4.24	6.65
garage	6.3	6.24	4.43	5.77	6.41	5.36	3.19	6.23
gas	3	2.82	4.63	5.3	6.53	4.22	6.29	6.76
gutted	4.4	4.3	3.53	5.77	6.63	4.44	2.41	5.00
hamper	4.47	4.3	4.33	5.33	6.33	4.72	3.04	6.54
jelly	2.77	2.89	4.6	4.57	5.94	3.44	3.35	6.47
jumper	2.57	2.41	4.57	6.03	6.81	3.84	3.59	4.76
lift	2.23	2.22	4.73	5.03	6.63	6.34	4.00	6.41
major	3.17	3.01	4.77	5.4	6.22	3.97	6.12	6.82
mate	2.03	1.95	4.53	5.43	6.75	5.03	4.12	5.71
nicked	2.37	2.27	4.47	5.1	4.91	3.78	1.65	5.88
nickel	2.6	2.48	4.97	4.23	4.91	3.03	5.76	6.71
pants	4.27	4.27	4.7	5.53	6.38	3.91	2.12	7.00
plaster	5.2	4.95	3.93	5.13	6.25	5.41	2.76	5.94
quarter	4.97	4.76	4.4	5.6	6.47	3.69	6.06	6.82
reception	2.47	2.39	4.27	5.83	6.33	6.00	4.88	6.35
retainer	2.9	2.89	3.97	5.97	5.13	4.44	4.88	5.19

shattered	4.8	4.73	3.93	5.77	6.63	5.94	2.18	6.47
surgery	2.83	2.83	4.37	5.1	6.72	6.59	3.46	6.35
swede	1.4	1.48	4.73	5.73	5.50	5.25	1.06	5.35
tin	1.8	1.84	5.07	5.1	6.67	5.92	4.77	5.92
trainer	2.6	2.54	4.97	5.6	6.75	5.81	4.12	6.35
trolley	4.17	4.01	3.93	5.93	6.72	3.59	2.81	5.31
tube	4.37	4.29	3.97	4.43	6.78	5.63	3.65	6.00
vest	1.47	1.5	5.23	5.3	5.97	3.97	4.65	5.94
zip	1.7	1.65	4.83	5.13	2.54	4.28	2.58	6.69

Note: D-OR = between-accent difference for original recordings; D-GR = between-accent difference for gender-transformed recordings; N-BEGR = naturalness rating for BE gender-transformed recordings; N-AEGR = naturalness rating for AE gender-transformed recordings; BEP-BEM = BE participants' familiarity rating of the BE meaning of a word; BEP-AEM = BE participants' familiarity rating of the AE meaning of a word; AEP-BEM = AE participants' familiarity rating of the BE meaning of a word; AEP-AEM = AE participants' familiarity rating of the AE meaning of a word.

Appendix 2: Exploratory analyses for Experiment 2

Reviewers noted that the between-accent difference of a word might differ when its recording was gender-transformed; in addition, the gender-transformed recordings might vary in degree of naturalness. To address these issues, we first collected between-accent difference ratings for each of the 40 pairs of gender-transformed recordings, using the same method as in the between-accent difference pretest in Experiment 1, from 30 participants from the same population as participants in the main experiment (there was a very high correlation between in between-accent difference ratings between the original and gender-transformed recordings: $r = .95$, $p < .001$). In addition, we also collected ratings of naturalness (on a 7-point scale, 7 being the most natural) for the 80 gender-transformed recordings (40 BE-accented and 40 AE-accented) from a further sample of 30 participants. We next ran two exploratory analyses (data and scripts for these analyses are publicly available at <https://osf.io/3myw2/>).

We first ran the planned analysis but also adding naturalness of recordings as a (non-interacting) control predictor, using the collected average rating for gendered-transformed recordings and 7 (most natural) for the original female recordings (see Table S2). The results replicated what we observed in the original analysis (significant main effect of accent and significant interaction of accent and between-accent difference).

We then conducted another analysis where we used the newly collected between-accent difference ratings for the gender-transformed recordings (instead of using the ratings for the original recordings, as we did in the planned analysis), again with naturalness as a control predictor (see Table S3). Here, the statistical pattern in the original analysis and in the first exploratory analysis was replicated except that we also observed a significant three-way interaction among accent, gender and between-accent difference.

Table S2. LME results of the first exploratory analysis of Experiment 2 (significant effects in **bold**). Random effect structure included by-participant slope for accent.

Effect	β	<i>SE</i>	<i>z</i>	<i>p</i>	Note: The
Intercept	-1.24	0.27	-4.0	< .001	
Accent	0.71	0.12	5.87	< .001	
Genders	-0.21	0.12	-1.78	.075	
Difference	0.32	0.27	1.20	.229	
Naturalness	0.09	0.05	1.70	.089	
Accent: Genders	-0.001	0.19	0.01	.994	
Accent: Difference	0.26	0.11	2.32	.020	
Genders: Difference	-0.15	0.10	-1.53	.127	
Accent: Genders: Difference	-0.33	0.19	-1.79	.073	

random effect structure included a by-participant slope for between-accent difference and a by-item slope for accent.

Table S3. LME results of the second exploratory analysis of Experiment 2 (significant effects in **bold**). Random effect structure included by-participant slope for accent.

Effect	β	<i>SE</i>	<i>z</i>	<i>p</i>
Intercept	-1.23	0.27	-4.60	< .001
Accent	0.71	0.12	5.83	< .001
Genders	-0.20	0.12	-1.66	.097
Difference	0.22	0.21	1.05	.295
Naturalness	0.06	0.06	0.95	.340
Accent: Genders	-0.01	0.19	-0.05	.957
Accent: Difference	0.28	0.11	2.55	.011
Genders: Difference	-0.15	0.09	-1.61	.108
Accent: Genders: Difference	-0.37	0.18	-2.01	.045

Note: The random effect structure included a by-item slope for accent.

Appendix 3: Between-experiment comparison

We note that the interleaved-interlocutors condition in Experiment 1 and the same-gendered condition in Experiment 2 were identical but the accent effect seemed to be larger in the latter (see Figures 2 and 4). This perception was confirmed in an exploratory analysis comparing the two conditions (see Table S4 below). We did not have a principled account for such a discrepancy, though we suspected that this could be due to a difference in the sampled participants between the two experiments (note that participants also accessed AE meanings more often in the Experiment 1 condition than in the Experiment 2 condition).

Table S4. LME results of comparing the two identical interleaved-interlocutors conditions between the two experiments (significant effects in **bold**).

Effect	β	<i>SE</i>	<i>z</i>	<i>p</i>
Intercept	-1.05	0.26	-4.01	< .001
Accent	0.51	0.10	5.08	< .001
Condition	-0.45	0.13	-3.57	< .001
Difference	0.31	0.25	1.27	.203
Accent: Condition	0.46	0.23	1.99	.047
Accent: Difference	0.23	0.10	2.33	.020
Condition: Difference	-0.02	0.10	-0.20	.846
Accent: Condition: Difference	-0.30	0.22	-1.38	.167

Note: The random effect structure included a by-item slope for the interaction between accent and condition.