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## Children's accent-based inferences depend on geographic background

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### ABSTRACT

Young children make inferences about speakers based on their accents. Here, we show that these accent-based inferences are influenced by information about speakers' geographic backgrounds. In Experiment 1, 4- to 6-year-olds ( $N = 60$ ) inferred that a speaker would be more likely to have the same cultural preferences as another speaker with the same accent than a speaker with a different accent; in Experiment 2 ( $N = 90$ ), children made similar inferences about speakers' friendship preferences. Critically, in both experiments, children were less likely to make accent-based inferences when they were told that the speakers all came from different places (both experiments) or from the same place (Experiment 2). These results suggest that young children's accent-based inferences hinge on information about geographic background and provide insight into how and why children make accent-based inferences. These findings are also the first to show that young children use accent to infer *other people's* social preferences.

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### Introduction

Suppose you meet two new people, one who shares your accent and another who speaks with a foreign accent. You might make very different inferences about the speakers based on their accents.

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For example, you might assume that the speaker who shares your accent is more likely than the foreign-accented speaker to share your cultural preferences. This would be justified because accent is informative about geographic background (Derwing & Munro, 2009; Labov, 2006; Moyer, 2004), and geographic background is predictive of cultural preferences and practices. But what if you learn that the speaker with the foreign accent has lived in your city for many years? Now you may be less certain about which speaker has more in common with you. This example suggests that although accents are a powerful source of information about others, accent-based inferences may critically hinge on information about geographic background.

Accent has widespread effects on children's preferences and inferences about others (e.g., Kinzler, Corriveau, & Harris, 2011; Kinzler, Dupoux, & Spelke, 2007). For example, 5-year-olds would rather be friends with a speaker of their native accent than with a foreign-accented speaker (Kinzler, Shutts, DeJesus, & Spelke, 2009). Accent-based social preferences have been investigated and replicated cross-culturally and with both monolingual and bilingual children (e.g., DeJesus, Hwang, Dautel, & Kinzler, 2017; Okumura, Kanakogi, Takeuchi, & Itakura, 2014; Souza, Byers-Heinlein, & Poulin-Dubois, 2013). Accent also influences children's inferences about others' cultural practices (Wagner, Clopper, & Pate, 2014; Weatherhead, White, & Friedman, 2016). Children aged 5 and 6 years match utterances spoken in their native accent (or spoken with a regional accent) with local cultural items (e.g., local clothes and houses) but match utterances spoken with a foreign accent to unfamiliar cultural items (Wagner et al., 2014). In addition, children aged 4 and 5 years link speakers who share a foreign accent to the same foods and games as one another but link speakers with differing foreign accents to different foods and games (Weatherhead et al., 2016).

In addition to these preferences and cultural inferences, young children use accent to infer others' geographic backgrounds. Preschool-aged children expect speakers with the same accent to come from similar places and expect speakers with different accents to come from different places (McCullough, Clopper, & Wagner, 2017b; Weatherhead et al., 2016). From 4 years of age, children use accent to infer whether a speaker shares their national background or has a different background; they do this when judging the speaker's national group membership (e.g., American or Korean), where the speaker lives, and where the speaker was born (DeJesus et al., 2017; Kinzler & DeJesus, 2013; Weatherhead, Friedman, & White, 2017). In addition, 5- and 6-year-olds choose native-accented speakers over foreign-accented speakers when judging who lives "around here" (Kinzler & DeJesus, 2013).

To summarize, accent affects children's preferences for speakers, their inferences about speakers' cultural practices, and their inferences about where speakers live and come from. However, as described above, accent-based inferences may result, at least in part, from accent serving as a proxy for geographic background. For example, although children normally infer that speakers who share a common accent also share cultural norms (Weatherhead et al., 2016), they might be less likely to infer this if informed that the speakers actually come from different places. Crucially, this would not require children to know which specific geographic locations are linked with different accents—knowledge that might not develop until later in childhood (McCullough, Clopper, & Wagner, 2017a). Instead, it would require only that children make the general assumption that accents are linked to geography.

If children's accent-based inferences hinge on information about geographic background, this will suggest that these inferences may often have a rational basis. For example, whereas children's social preferences for similarly accented individuals might in part reflect a preference for familiarity (DeJesus et al., 2017), they could also reflect inferences about potential relevance. Children might feel that a speaker from nearby is more likely to know and communicate information that is relevant than is a speaker from somewhere far away (see Begus, Gliga, & Southgate, 2016, for a related discussion regarding infants' preferences for native-language speakers over foreign-language speakers).

In this study, we examined whether information about geographic background influences two kinds of accent-based inferences in young children: inferences about speakers' cultural practices and inferences about speakers' social preferences. For the latter type of inference, we also aimed to show, for the first time, that young children consider accent in making inferences about *other people's* social preferences. As reviewed above, many previous studies have revealed that accent affects young children's own social preferences. However, the only study investigating effects of accent on children's judgments of others' social preferences (Arredondo & Gelman, 2017) found that children younger than

10 to 12 years do not expect third parties to prefer people who share their accent. However, that study tested bilingual children on highly similar regional accents that children under 6 years of age had difficulty in discriminating.

To explore these issues, we conducted two experiments with 4- to 6-year-olds. In Experiment 1, we investigated whether children's accent-based inferences about speakers' cultural practices differ when children are informed that the speakers come from different places compared with when they are not told about the speakers' geographic backgrounds. In Experiment 2, we investigated whether children's inferences about speakers' social preferences also vary across these conditions and further examined children's inferences about speakers from the same geographic background.

### **Experiment 1: Cultural preferences**

This experiment investigated children's accent-based inferences about speakers' cultural practices. We hypothesized that children would be more likely to make accent-based inferences when they were uninformed about speakers' geographic backgrounds than when they were informed about their backgrounds.

#### *Method*

##### *Participants*

We tested 60 4- to 6-year-olds (mean = 5;6 [years;months], range = 4;2–6;11; 30 male). In both experiments, English was the primary language spoken in all children's homes. Children in both experiments were recruited and individually tested in schools in the Kitchener-Waterloo region of Canada. In this region, 85% of residents are Caucasian; Chinese and South Asian are the largest visible minority groups. In addition, 75% of residents identify English as their mother tongue, 1% report French as their language, and 24% report a nonofficial language. Although we did not formally record information about children's ethnicities, most participating children were Caucasian.

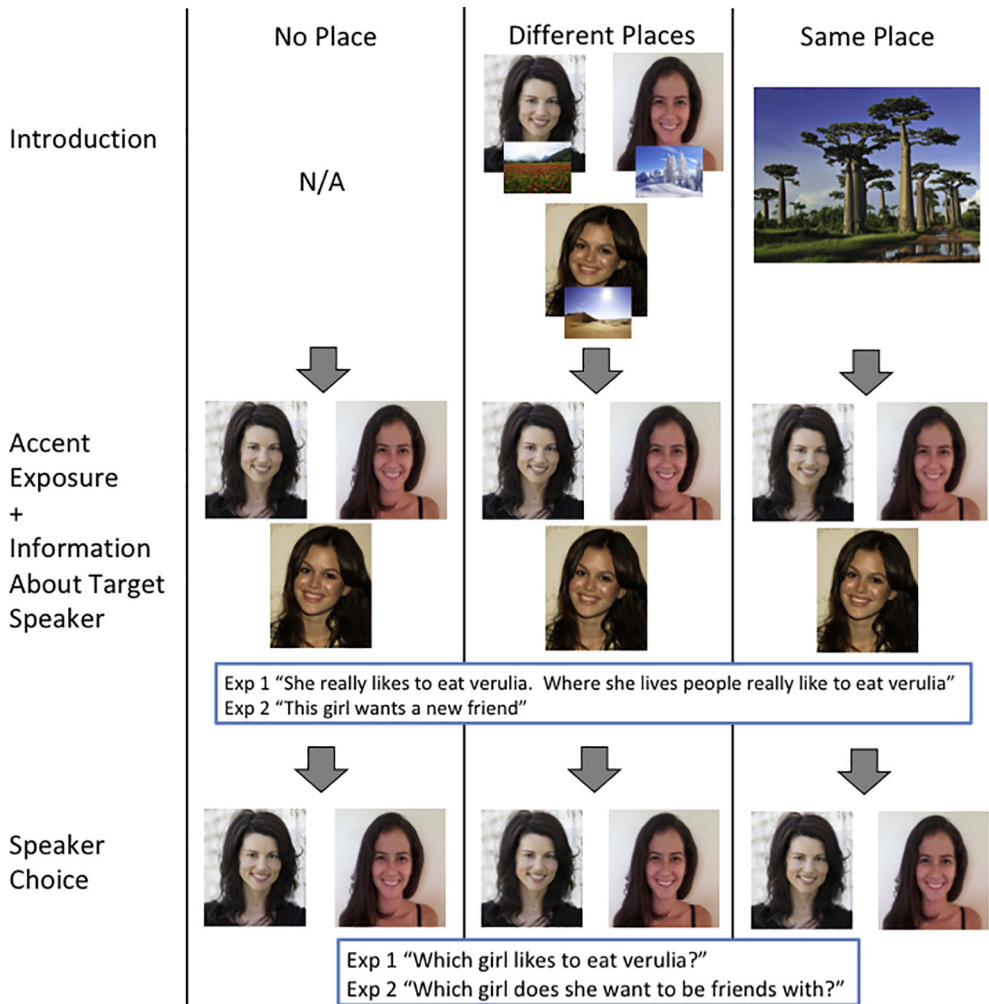
##### *Materials*

Audio stimuli consisted of six audio recordings produced by six different accented speakers (three female and three male). The recordings were of neutral everyday sentences (e.g., "She told me that she was going to be there very soon") either recorded in the lab (the female speakers) or taken from the Speech Accent Archive (the male speakers) (Weinberger, 2015). Two of the female speakers had the same accent (Spanish) and one had a different accent (South African). The same was true of the male speakers; two had a Turkish accent and one had a Mandarin accent. Stimuli were selected such that the speakers were similarly fluent and easy to understand. All audio stimuli were previously used in Weatherhead et al. (2016), where it was verified that children aged 3 to 5 years old could discriminate across the accents.

Visual stimuli were pictures of six people (three female and three male, all Caucasian) and six landscapes (snowy scene, flowery meadow, sandy desert, mountain range, forest, and ocean). The six landscapes were selected from Google images and were chosen to look like geographically distinct places. The audio and visual stimuli were combined in Microsoft PowerPoint and displayed on a 13-inch laptop computer.

##### *Procedure*

Each child completed two trials in one of two between-participant conditions; assignment to condition was random, with equal numbers of children at each age assigned to each condition. In trials in the No Place condition, children first saw pictures of three same-gendered speakers (female speakers in Trial 1 and male speakers in Trial 2) and listened to an audio clip of each speaker saying a sentence. The "target" speaker, centered in the lower half of the screen, spoke in one accent. The "matching" speaker shared the same accent as the target speaker; the "nonmatching" speaker had a different accent. Their pictures appeared to the left and right in the upper half of the screen (see Fig. 1). Children were told about a cultural preference of the target speaker (preferred food in Trial 1 and preferred



**Fig. 1.** Overview of stimuli used in the No Place and Different Places conditions (both experiments) and in the Same Place condition (Experiment 2 only). In each experiment, the pictures always appeared as shown. The target speaker was always heard first, followed by the speaker on the upper right and then the speaker on the upper left. The accent paired with the upper right and upper left speakers was counterbalanced across participants, such that each person served as the matching and nonmatching speaker in equal proportions.

game in Trial 2; e.g., "She really likes to eat verulia. Where she lives, people really like to eat verulia."). The picture of the target speaker then disappeared, and children were asked which of the other speakers had this cultural preference (e.g., "Which girl likes to eat verulia?").

The trials in the Different Places condition were identical except that before children heard the speech samples, they were told that all three speakers lived in different places from one another. To convey this, a landscape picture appeared below each speaker, and the experimenter explained that the pictures showed where the speakers lived (e.g., "See, she lives somewhere where there's lots of sand, and she lives somewhere where there's lots of flowers, and she lives somewhere where there's lots of snow"). The pictures of the landscapes then disappeared, and the procedure continued as in the No Place condition.

Based on previous findings, we expected that children in the No Place condition would use accent to infer cultural preferences and would be more likely to say that the target speaker's cultural preference is shared by the matching speaker than by the nonmatching speaker (Weatherhead et al., 2016). However, if children's accent-based inferences hinge on geographic background, they should respond differently when told that the three speakers come from different places. This information might prevent children from inferring that the speakers who share an accent have common cultural practices.

### Results and discussion

We examined the percentage of trials in which children selected the matching speaker rather than the nonmatching speaker (see Fig. 2).<sup>1</sup> Children were more likely to choose the matching speaker in the No Place condition than in the Different Places condition, Mann–Whitney  $U = 228.00$ ,  $z = -3.64$ ,  $p < .001$ . Furthermore, whereas children chose the matching speaker at rates above chance in the No Place condition, one-sample Wilcoxon test,  $p < .001$ , they chose between the speakers at chance rates in the Different Places condition,  $p = .593$ . Finally, to examine whether responses varied with age, we checked whether children's choices of the matching speaker correlated with their age in months. In both conditions, these correlations were nonsignificant,  $ps \geq .399$ .

These findings suggest that children's accent-based inferences about speakers' cultural practices hinge on information about geographic background. Children who were not informed about the speakers' geographic backgrounds inferred that speakers who share an accent also share cultural practices. However, children who were told that the speakers come from different places did not make accent-based inferences.

In the next experiment, we investigated whether similar effects might arise in children's judgments about others' social preferences. In this experiment, we also investigated whether children's accent-based inferences are reduced if children are told that all three speakers come from the *same* place.

### Experiment 2: Social preferences

This experiment used a similar procedure to examine children's judgments about speakers' social preferences. We hypothesized that children would be more likely to make accent-based inferences when they were uninformed about speakers' geographic backgrounds than when they were informed that the speakers were from different places or informed that the speakers were from the same place.

#### Method

##### Participants

We tested 90 4- to 6-year-olds (mean = 5;5, range = 4;0–6;11; 48 male).

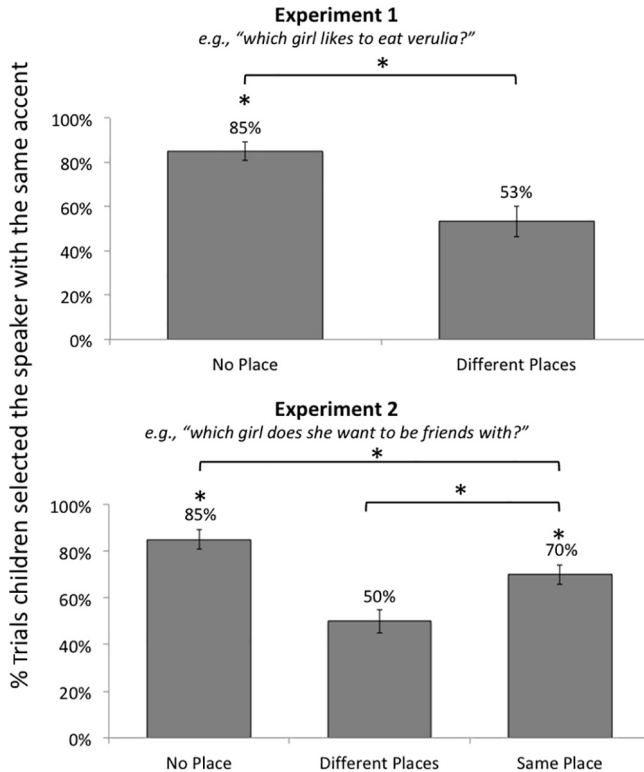
##### Materials

The stimuli were the same as in Experiment 1 except that the new Same Place condition used a picture of a grove of baobab trees.

##### Procedure

Each child completed two test trials in one of three between-participant conditions; assignment to condition was random, with equal numbers of children at each age assigned to each condition. The trials in the No Place and Different Places conditions were identical in structure to those in the first experiment. The only difference was that, following presentation of the speakers (and their locations in the Different Places condition), children were not told and asked about cultural preferences. Instead, children were told that the target speaker wanted a new friend (e.g., "This girl wants a new friend") and were then asked which of the other two speakers the target speaker wanted to befriend (e.g., "Which girl does she want to be friends with?").

<sup>1</sup> All data from this study are available at <https://osf.io/tmcxb/>.



**Fig. 2.** Mean choices of the matching speaker in Experiments 1 and 2. Error bars represent  $\pm 1$  standard error. \* indicates a  $p$  value of .05 or smaller.

In trials in the Same Place condition, children were first told about a faraway place called Zorpia. They were told that lots of different people live in Zorpia and that people who live in Zorpia are called Zorps. Children were then shown the pictures of the three speakers and were told that they were all Zorps who live in Zorpia. After this, children listened to audio clips of each speaker. They were told that the target speaker wanted a new friend (e.g., "This Zorp wants a new friend"). The target speaker disappeared, and children were asked which speaker the target speaker wanted to befriend (e.g., "Which Zorp does she want to be friends with?").<sup>2</sup> Children were told about an invented place, rather than a real one, to ensure that children's responses would not be influenced by their background knowledge.

We expected that children in the No Place condition would judge that the target speaker wanted to be friends with the matching speaker rather than the nonmatching speaker, in keeping with previous research. However, if children's accent-based inferences hinge on geographic background, children's choices of the matching speaker should decrease when all three speakers come from different places or from the same place. This geographic information should undermine inferences that the target speaker has more in common with the matching speaker than with the nonmatching speaker. For example, when all three speakers come from the same place, both the matching and nonmatching

<sup>2</sup> We told children about Zorpia in this condition to ensure that they understood that the three speakers all came from the same place. We worried that telling them that each speaker came from a place with particular physical features (e.g., "Where she lives there's lots of sand") might not suffice to convey that the speakers actually came from the same place. For instance, such descriptions would leave open the possibility that all three speakers came from different places that happened to share common physical features (e.g., three different sandy places).

speakers should be likely to know and communicate information that is relevant for the target speaker.

## Results and discussion

We again examined the percentage of trials in which children selected the matching speaker rather than the nonmatching speaker (see Fig. 2). Children were more likely to choose the matching speaker in the No Place condition than in the Different Places condition, Mann–Whitney  $U = 166.50$ ,  $z = 4.77$ ,  $p < .001$ , and the Same Place condition, Mann–Whitney  $U = 325.50$ ,  $z = 2.13$ ,  $p = .033$ ; they were also more likely to choose the matching speaker in the Same Place condition than in the Different Places condition, Mann–Whitney  $U = 288.00$ ,  $z = 2.90$ ,  $p = .004$ . Furthermore, children chose the matching speaker more than expected by chance in the No Place condition, one-sample Wilcoxon test,  $p < .001$ , and in the Same Place condition,  $p = .001$ . However, in the Different Places condition, children chose between the speakers at chance level,  $p > .999$ . To examine whether responses varied with age, we checked whether children's choices correlated with their age in months. In all conditions, these correlations were nonsignificant,  $ps \geq .620$ .

## General discussion

Our findings show that young children's accent-based inferences hinge on information about geographic background. When children were uninformed about speakers' geographic backgrounds, they used accent to infer cultural practices and social preferences. In the first experiment, they inferred that a speaker would be more likely to have the same cultural preferences as another speaker with the same accent compared with a speaker with a different accent. In the second experiment, children made similar inferences about speakers' friendship preferences; however, children were less likely to make accent-based inferences when they were told that the speakers all came from different places (both experiments) or from the same place (Experiment 2).

Before considering the implications of our findings, we consider a few limitations of our experiments. We tested children from just one culture. Findings could differ in other cultures and in regions where children have differing amounts of exposure to foreigners and speakers with different accents. We also tested children using a relatively constrained set of stimuli. For example, all speakers were depicted as Caucasians, and children heard only a few different accents. So again, the findings might differ with other stimuli.

A further issue is that children saw pictures of landscapes in the Different Places and Same Place conditions but not in the No Place condition. This raises the concern that the landscapes *distracted* children in the Different Places and Same Place conditions from attending to the speakers' accents, reducing accent-based inferences. Although we cannot conclusively rule out this concern, our findings cast doubt on it. In the second experiment, responses differed between the Same Place and Different Places conditions, even though children in both conditions saw landscapes. Furthermore, on a distraction account, we might expect even greater distraction and fewer accent-based inferences in the Same Place condition because children in this condition were not only shown landscapes but also told about the speakers' nationalities, and this information could also be distracting. On the contrary, children in this condition were *more* likely than those in the Different Places condition to make accent-based inferences. In addition, a distraction account would predict that older children should be less prone to being distracted by the landscapes than younger children and, therefore, should be more likely to make accent-based inferences than younger children. However, we did not observe any effects of age.

### Implications

Before turning to our main findings, we note that our study provides the first evidence that young children use accent to infer *other people's* social preferences. Many studies have found that accent affects young children's own social preferences (e.g., Kinzler et al., 2009). But, as reviewed above, only

one previous study investigated whether accent affects judgments of social preferences for third parties (Arredondo & Gelman, 2017); that study did not find such inferences before 10 years of age. We suspect that this difference between the studies principally stems from differences in the stimuli. Children in the earlier study heard similar regional accents, whereas children in our study heard foreign accents.

More importantly, however, our findings are informative about the basis for children's accent-based inferences. The findings demonstrate that children's accent-based inferences are not just based on perceptual or linguistic similarity. Similarity-based responding would lead children to make accent-based judgments (i.e., pick the speaker with the same accent as the target) in all conditions. But we did not observe this. Instead, children were less likely to make accent-based judgments when informed about the speakers' geographic backgrounds. This is not to suggest, however, that children's accent-based inferences *exclusively* depend on geographic background. Our own findings suggest that they do not given that children made some use of accent in the Same Place condition of Experiment 2. In addition, other factors are known to contribute to these inferences (e.g., Kinzler & DeJesus, 2013; Kinzler, Shutts, & Spelke, 2012). For example, children's own preferences for people who share their accents depend, at least in part, on a preference for familiarity (DeJesus et al., 2017). A preference for familiarity, however, could not have contributed to our findings because all of the speakers had accents that differed from those of the participating children.

It is especially striking that information about geographic background reduced children's reliance on accent given that our comparisons did not pit accent and geographic background against one another (i.e., we did not compare a same-accented speaker from a different place than the target speaker with a different-accented speaker from the same place as the target speaker). Instead, even when accent was the only distinguishing factor between the two speakers, children were less likely to use it in the presence of geographic information.

Our findings also suggest a reason for *why* children do make accent-based inferences. Specifically, they suggest that children use speakers' accents to draw conclusions about their geographic background, from which they then infer whether the speakers will have other things in common with one another and whether they are likely to be friends. Therefore, telling children that speakers with different accents actually live in the same place or in different places undermines their basis for using accent to decide whether these speakers are likely to have different cultural practices. Intriguingly, informing children that speakers come from different places had a stronger effect on their social preference judgments than did telling them that the speakers come from the same place. Although further research will be needed to understand this effect, it suggests that children could feel that speakers' accents are less informative when speakers live in different places from one another compared with when they all live in the same place. If so, this would indicate that children have a nuanced appreciation of when accents are more or less informative.

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## Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at <https://osf.io/tmcbx/>.

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