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Children Increase Their Sensitivity to a Speaker's Nonlinguistic Cues Following a Communicative Breakdown

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Bilingual children regularly face communicative challenges when speakers switch languages. To cope with such challenges, children may attempt to discern a speaker's communicative intent, thereby heightening their sensitivity to nonverbal communicative cues. Two studies examined whether such communication breakdowns increase sensitivity to nonverbal cues. English-speaking monolingual (n = 64) and bilingual (n = 54) 3- to 4-year-olds heard instructions in either English only or English mixed with a foreign language. Later, children played a hiding game that relied on nonverbal cues. Hearing a foreign language switch improved both monolingual and bilingual children's use of these cues. Moreover, bilinguals with more prior code-switching exposure outperformed those with less prior code-switching exposure. Children's short-term strategies to repair communication breakdowns may evolve into a more generalizable set of skills.

Simple communication failures in day-to-day interactions underscore the potential fallibility of communicative interactions. Successful communication requires abilities to notice, monitor, diagnose, and repair communicative breakdowns (Comeau, Genesee, & Mendelson, 2010). Communication failures may occur due to ambiguity, choice of words, mispronunciation, inaudible utterances, off-topic comments, or noise (Comeau, Genesee, & Mendelson, 2010; McKellin, Shahin, Hodgson, Jamieson, & Pichora-Fuller, 2007). Bilinguals face an additional source of communicative breakdowns. Some examples of communication failure in a bilingual environment include situations when a language that the listener does not understand was used either as a base language, in mixing with another language, or as a failure to switch back or translate (Grosjean, 1989).

Bilingual children become better able to deal with communicative breakdowns by monitoring the communicative context, figuring out the language choice and intent of the speakers, and then either clarifying by translation or altering their own language choices accordingly (e.g., Comeau & Genesee, 2001; Comeau, Genesee, & Lapaquette, 2003; Genesee, Boivin, & Nicoladis, 1996; Genesee, Nicoladis, & Paradis, 1995; Hakuta, 1987; Lanza, 1992; Rontu, 2007; Vu, Bailey, & Howes, 2010; Wei & Milroy, 1995). For example, Genesee et al. (1996) found that during a free-play session with strangers, bilingual children were able to ascertain the native language of the stranger, judge the stranger's level of proficiency in the other language, and modify their language use accordingly (Genesee et al., 1996). Similarly, Comeau, Genesee, and Mendelson (2007) found that 2- and 3-year-old French–English bilinguals observed speakers for feedback about the appropriateness of their language choices. The children were able to repair communicative breakdowns due to language choice by switching their language to match the interlocutor, and repair other communicative breakdowns using different strategies (such as repetition or reformulation of an utterance). Vu et al. (2010) found that 4- and 5-year-old bilinguals would try to gain an adult's attention by switching to the (monolingual) adult's language.

Bilingual children's success in tracking language choices of the speakers and adapting their own accordingly suggest that they regularly monitor the

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context to achieve successful communication, which may in turn lead to a general increase in sensitivity to a speaker's communicative intent. Indeed, there is a growing body of research that suggests that, compared to monolinguals, children growing up bilingual are better able determine a speaker's communicative intent (e.g., Ben-Zeev, 1977; Comeau et al., 2003; Cummins & Mulcahy, 1978; Genesee, Tucker, & Lambert, 1975; Siegal, Iozzi, & Surian, 2009; Yow & Markman, 2011a, 2011b). For example, 4- to 6-year-old bilingual children were found to be better able to detect violations of Gricean conversational maxims compared to monolingual children (Siegal et al., 2009). Moreover, 4-year-old bilinguals were more attuned to the speaker's affective intent and were better able to use the speaker's tone of voice to judge the speaker's emotion compared to monolingual children, especially when the content of the utterance conflicted with the tone of voice used (Yow & Markman, 2011a). Two- to 4-year-old bilingual children were also better able than their monolingual peers to use an experimenter's nonverbal communicative cues to locate hidden objects, particularly in a more challenging condition where the experimenter was seated behind an empty box but gestured toward a baited box (the box that contained an object; Yow & Markman, 2011b). Bilingual children's greater sensitivity to a speaker's communicative intent could result, in part, from their regular efforts to cope with breakdowns from language switches. It is possible that the more a child is exposed to communicative breakdowns from language mixing, the more likely the child would be to monitor the speaker's nonverbal cues to determine the speaker's communicative intent.

In this work, we simulated a bilingual environment by mixing foreign words in an English utterance. We then engaged children in a task that required them to make use of a speaker's nonverbal cues to find a hidden object, where an experimenter pointed to or looked at a baited box while seated either centered between the baited box and an empty box (no bias) or directly behind the empty box (biased; Povinelli, Reaux, Bierschwale, Allain, & Simon, 1997; Yow & Markman, 2011b). Povinelli et al. (1997) found that in the unbiased (easier) condition 2.5-year-old children could use both pointing and gaze direction to locate hidden rewards, but in the biased (more difficult) condition they could only use the direction of the speaker's point, not eye gaze, to locate hidden rewards. Pointing is a more explicit referential gesture than eye gaze, and more routinely used to attribute intentions to others (Tager-Flusberg, 1997). So it makes sense that reliance on pointing in this task was more robust for preschoolers. Furthermore, the biased condition of these studies is challenging for young children because of the temptation to use a distance-based rule to search the box nearest to the experimenter instead of relying on the experimenter's subtle gesture, eye gaze, to search the box furthest from her. Using Povinelli et al.'s (1997) procedure, Yow and Markman (2011b) asked whether young bilinguals might be better able to cope with the increased demands of the biased condition and the more subtle eye-gaze cue. They found that in the unbiased condition both monolingual and bilingual preschoolers could use both the direction of the speaker's pointing and eye gaze to locate hidden objects, but in the biased condition only the bilingual children could make use of the speaker's gaze direction to locate the hidden objects.

In Study 1, we employed these same procedures with monolingual children in one of two conditions. The two conditions were identical except that prior to the start of the procedure, one group of children interacted with an experimenter who spoke in one language throughout, while the other group of children interacted with an experimenter who sometimes inserted foreign words into her speech to the child. We hypothesized that a communication breakdown would alert children to more carefully monitor a speaker's nonlinguistic signals; thus, monolingual children who experienced such a language switch would succeed at using the subtle cues they otherwise would have missed. In Study 2, we explored bilingual children's performance in the same tasks and asked whether bilinguals who had more prior exposure to code-switching contexts would make better use of the speaker's nonverbal cues than bilinguals who had less.

Study 1

Method

Participants

Sixty-four 3- and 4-year-old English-speaking monolingual children of various ethnicities participated in this study in the spring of 2010 (M_{age} = 4.09, range = 3.16–4.97; 32 males). All the children were recruited from the same university laboratory school in Palo Alto, California, and lived in its surrounding middle- to upper-middle-class neighborhood. A language questionnaire was sent to the parents asking for information about the language first acquired by the child, the language(s) used by the parents and caregivers, and the amount of time the child was exposed to the language(s). The children who were recruited for this study were reported by their parents to be English-speaking monolinguals with minimal exposure to another language (e.g., no more than 10% exposure of another language from TV programs, story-telling sessions, etc.). Of the 64 children, the majority were Caucasians (n = 28), and the rest were of various ethnicities (n = 5 Asians, 2 Hispanics, 2 Indians, 1 African, 17 mixed, and the rest undisclosed).

Materials

The materials used in the study consisted of two identical opaque boxes with lids (17.5 × 20 × 9 cm), a cardboard screen (50 × 116.5 cm), two cardboard stands with slots for the screen (20 × 29 × 9 cm), a bag of toys, and a chute-like structure (21 × 21 × 25 cm). To eliminate any sound that might be generated from hiding the toy, a layer of nonskid cushion was taped to the entire inner bottom of each box. The inside of the chute consisted of a xylophone that made sounds as the toy slid through the chute. There were nine toys in the bag, chosen to fit the chute's opening and to have sufficient variety to maintain the child's interest.

Procedure

The study consisted of two phases within one single session: the exposure phase (setting up the game together) and the test phase (playing the game). Figures 1 and 2 present the schematic diagrams of the setup for the two phases, respectively.

Exposure phase (setting up). All the materials were placed close together on the floor of the room.

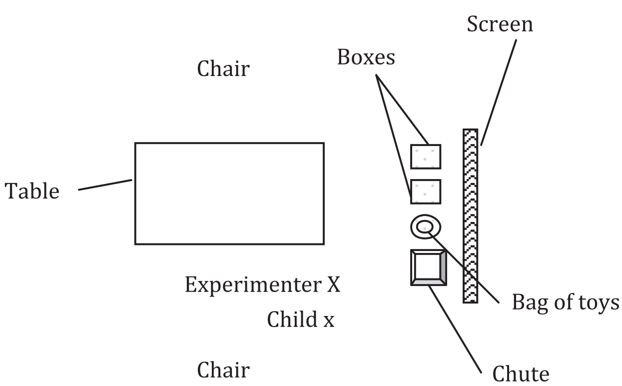

Figure 1. Setup of exposure phase.

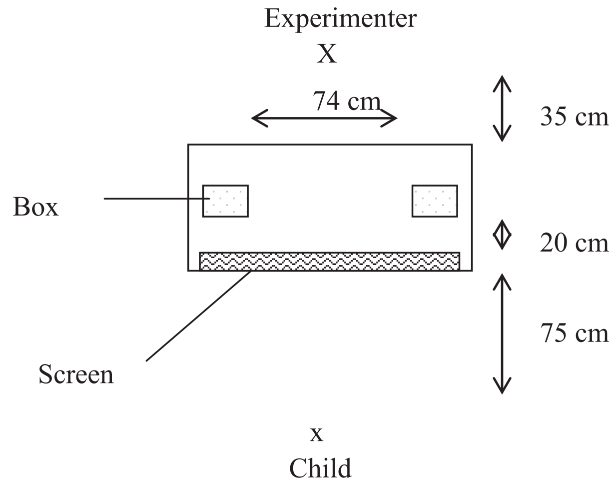

Figure 2. Setup of test phase.

An experimenter, who was a native speaker of English, explained to the child that they were going to play a "hide-and-find-it" game together but that she needed the child's help to set up the game. There were four such "helping" trials for each of the two between-subjects conditions (single-language and language-switch conditions). For each "helping" trial, the experimenter requested the same helping behavior twice, the first with a distal point to the target object and the second a proximal point.

In the single-language condition, the experimenter used a single language, English, throughout the entire procedure. She used English only to request that the child help set up the game. For example, the experimenter would say to the child, "Can you bring me the big piece of cardboard, please?" pointing to the cardboard, among other things, from a distance, and then moving nearer to the cardboard and repeating the same request, now pointing unambiguously to the cardboard. In the language-switch condition, the experimenter similarly requested that the child help set up the game, but each request was an English sentence mixed with some foreign words (e.g., "Can you bring me the oh-ki-na-a-tsu-ga-mi, please?"). Japanese words were used as none of the children in the study had prior exposure to Japanese. Each child was randomly assigned to either the single-language or the language-switch condition. The experimenter then thanked the child for helping and proceeded with the next helping trial until all four helping trials were completed.

Test phase (playing the game). The test phase was conducted entirely in English for both conditions.

The experimenter told the child that they were now ready to play the game together. During the warm-up period, the experimenter asked the child to pick a toy from the bag, placed the toy in one of the two boxes while the child watched, and then asked the child to locate the missing toy. When the child located the toy, the experimenter asked the child to place the toy into the chute that made sounds as the toy slid through it. This was done to maintain the interest level of the child in the game. After one warm-up trial, the experimenter proceeded with the actual testing.

During the actual testing, each child received two trials from each of the four within-subjects trial types, as described in Yow and Markman (2011b): body centered with point, body biased with point, body centered with gaze, and body biased with gaze (see Figure 3).

Body-centered point trials. The experimenter was positioned equidistant from the two boxes; she then extended part of her arm and pointed to the baited box while fixing her gaze on a dot marked on the center of the table.

Body-biased point trials. The gesture was similar to the body-centered point trial, except that the experimenter sat directly behind the empty box and gestured to the farther but correct box. The tip of her finger was approximately equidistant from the two boxes.

Body-centered gaze trials. The position of the experimenter was the same as the body-centered point trials; however, instead of pointing with her finger, the experimenter turned her head to look the correct box and kept her hands either behind her back or in her lap.

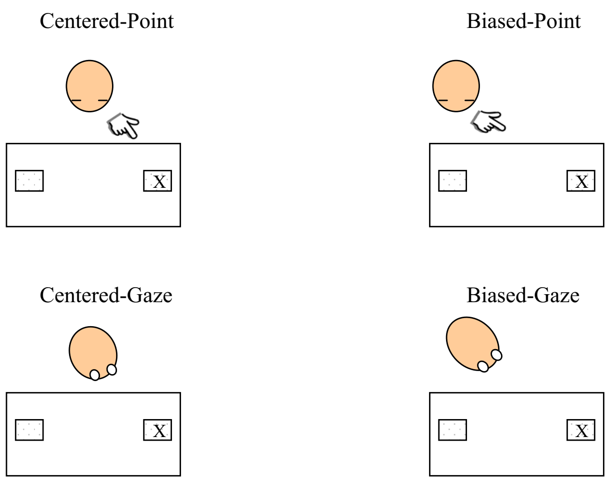

Figure 3. Schematic representation of the four types of test trials in test phase.

Body-biased gaze trials. The gesture was the same as the body-centered gaze trials, and the experimenter's position was the same as the body-biased point trials.

The cardboard screen was placed on the table to block the child's visual access to the hiding process before the start of every trial. The experimenter then asked the child to pick a toy from the bag. While seated behind the screen equidistant from the two boxes, she hid the toy carefully to minimize any sound or movement that might indicate the correct location of the toy. She then repositioned her chair according to the trial type, removed the screen, and asked the child, "Can you find it now?" while she pointed to or looked at the correct box. She held her gestures while the child made a choice. The decision rule for the children having made a choice was when they first touched or moved a lid of either box. This procedure was repeated for the remaining trials. There were four different orders, counterbalanced for side. The orders were randomly assigned to each participant in a way that was balanced across gender and age.

Results

In each of the four types of test trials, children were given a score of 0–2 that reflected the number of times they successfully selected the correct box. Table 1 presents the average total number of times (out of the 2) a child chose the correct box in each trial type by condition. Preliminary analyses revealed no effect of order, gender, or age, so they were combined in subsequent analyses.

We hypothesized an interaction effect between condition, type of cue, and position, such that monolingual children who experienced the language switch would perform better in the most challenging biased gaze condition than children who had not experienced the language switch. A 2 (type of cue: point vs. gaze) × 2 (body position: centered vs. biased) × 2 (condition: single language vs. language switch) repeated measures analysis of variance (ANOVA) was conducted. There was a significant main effect of type of cue, $F(1, 62) = 7.67$, $p = .007$, $\eta_p^2 = .11$. Children performed better when the cue provided was a point instead of a gaze, confirming that gaze is a more subtle communicative gesture than pointing. There was a significant main effect of condition, $F(1, 62) = 19.83$, $p < .001$, $\eta_p^2 = .24$. Children in the language-switch condition who heard a mixed utterance of English and Japanese performed better across all test trial types than children in the single-language condition

Table 1
Mean Scores and Standard Deviations (in Parentheses) of Correct Responses (Out of 2) for Studies 1 and 2

	Point		Gaze	
	Body centered	Body biased	Body centered	Body biased
Study 1—Monolinguals				
Single language	1.22 (0.75)	1.38 (0.70)	1.09 (0.64)	0.97 (0.60)
Language switch	1.78 (0.42)	1.59 (0.56)	1.44 (0.62)	1.53 (0.62)
Study 2—Bilinguals				
Single language	1.70 (0.54)	1.78 (0.42)	1.56 (0.58)	1.26 (0.76)
Language switch	1.63 (0.63)	1.63 (0.56)	1.63 (0.69)	1.60 (0.50)

who heard just English. There was also a significant interaction between type of cue, body position, and condition, $F(1, 62) = 4.99$, $p = .029$, $\eta_p^2 = .074$. Post hoc independent sample t tests showed that children in the language-switch condition performed better than children in the single-language condition in almost all trial types, $t_{\text{centered point}}(62) = 3.70$, $p < .001$, $\eta^2 = .18$; $t_{\text{centered gaze}}(62) = 2.18$, $p = .033$, $\eta^2 = 071$; and $t_{\text{biased gaze}}(62) = 3.70$, $p < .001$, $\eta^2 = .18$, respectively, except body-biased point trials, $t_{\text{biased point}}(62) = 1.37$, $p = .18$, $\eta^2 = .029$; see Figure 4. No other significant differences were found.

We also compared performance against chance. Children in the single-language condition chose the correct box above chance in the body-biased point trials, $t_{\text{biased point}}(31) = 3.00$, $p = .005$, $\eta^2 = .23$, but were at chance in the other three types of trials, $t_{\text{centered point}}(31) = 1.65$, $p = .11$, $\eta^2 = .08$; $t_{\text{centered gaze}}(31) = 0.83$, $p = .41$, $\eta^2 = .02$; and $t_{\text{biased gaze}}(31) = -0.30$, $p = .77$, $\eta^2 = .003$. By contrast, children in the language-switch condition chose the correct box significantly above chance level in all four trial types (all ps < .001).

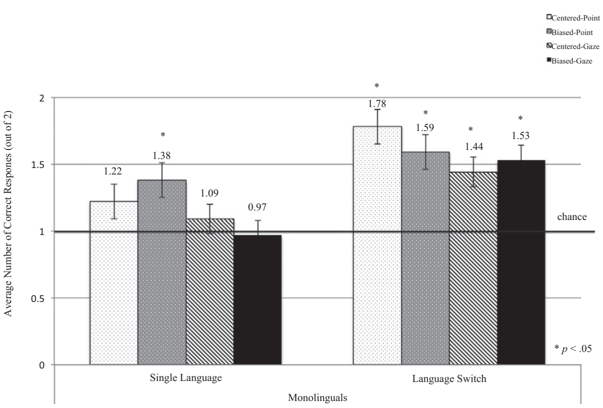

Figure 4. Average number of correct responses (out of 2; +*SE*) by condition for monolingual children in Study 1.

Although we expected the monolingual children who experienced a language switch to perform better than children without such an experience, we had predicted that this advantage would be limited to the most challenging task in the study. Instead, we found that the children who heard the language switch performed better on almost all trial types compared to children who heard only English.

Study 1 provided evidence that exposure to a communication challenge that is common in a bilingual environment heightens monolingual children's sensitivity to nonverbal cues to a speaker's communicative intent. In Study 2, we explored whether we would see a comparable benefit for bilingual children. While children who are familiar with code switching may not receive any additional benefit from another example in a particular context, each individual code-switching experience might increase even bilingual children's vigilance at monitoring contextual and communicative cues. We also asked whether differences in the degree of code-switching individual bilingual children routinely experience affects their proficiency in using nonverbal communicative cues.

Study 2

Method

Participants

Fifty-four 3- and 4-year-old bilingual children participated in this study in the spring of 2012 ($M_{age} = 4.16$, range = 3.00–5.04; 29 males). The children were recruited from private child-care centers in a middle-class neighborhood in Singapore. Singapore is a highly bilingual environment where about 80% of its population aged 15–54 is literate in at least two languages, including English (Singapore Department of Statistics, 2010). English is the most frequently spoken language at home in families with children aged between 5 and 9 (50.5%), followed by Mandarin (28.3%), Bahasa Melayu (13.1%), Indian languages (5.8%), and Others (2.2%). The same language questionnaire used in Study 1 was sent to the parents. The children in the study were predominantly English–Mandarin bilinguals ($n = 52$); the remaining two children were

English–Marathi and English–Malay bilinguals. The bilingual children in this study were reported to have regular exposure to both languages since birth, mainly from parents, grandparents, or a nanny (mean exposure to English and the other languages = 55.9% and 41.5%, respectively). The parents were also given a code-switching exposure questionnaire adapted from Rodriguez-Fornells, Kramer, Lorenzo-Seva, Festman, and Munte (2012), which asked parents, for example, how often they switch languages during their conversations with their child (see Appendix S1).

Materials

The materials were similar to those used in Study 1.

Procedure

The experimental design and procedure for Study 2 were exact replications of Study 1. Note that the bilingual children in the single-language condition heard English only, while the bilingual children in the language-switch condition heard English mixed with a foreign language (Japanese). One experimenter was of Chinese origin while the other was of Malay origin. Although both of them were bilingual speakers, it had not been explicitly demonstrated to the children that they could speak more than English. Children from both conditions were randomly assigned to one of the two experimenters.

Results

As with Study 1, children were given a score of 0–2 that reflected the number of times they successfully selected the correct box for each of the four types of test trials (see Table 1).

A 2 (type of cue: point vs. gaze) × 2 (body position: centered vs. biased) × 2 (condition: single language vs. language switch) repeated measures ANOVA was conducted. There was a significant main effect of type of cue, $F(1, 52) = 5.35$, $p = .025$, $\eta_p^2 = .093$. Children performed better when the cue provided was a point rather than gaze. There was a significant interaction between type of cue and condition, $F(1, 52) = 4.28$, $p = .043$, $\eta_p^2 = .076$. Paired sample *t* tests showed that bilingual children in the single-language condition performed significantly worse in the gaze than point trials, whereas bilingual children in the language-switch condition performed equally well in the gaze and in the point trials: single language, $t(26) = -3.03$, $p = .005$, $\eta^2 = .26$, $M_{\text{point}} = 3.48$, $SD_{\text{point}} = 0.75$, $M_{\text{gaze}} = 2.81$, $SD_{\text{gaze}} = 1.21$; language switch, $t(26) = 0.18$, $p = .86$, $\eta^2 = .001$, $M_{\text{point}} = 3.26$, $SD_{\text{point}} = 0.98$, $M_{\text{gaze}} = 3.22$, $SD_{\text{gaze}} = 0.93$; see Figure 5. Thus, bilingual children who experienced a communication breakdown related to an unfamiliar language switch made better use of the speaker's subtler cues (gaze) to locate the hidden object. No other significant differences were found.

We also compared performance against chance. Bilingual children in the single-language condition chose the correct box significantly above chance in all trials except for the more challenging body-biased gaze trials, $t_{\text{centered point}}(26) = 6.75$, $t_{\text{biased point}}(26) = 9.54$, $t_{\text{centered gaze}}(26) = 5.00$, $ps < .001$, η^2s = .64, .78, .49, respectively; $t_{\text{biased gaze}}(26) = 1.76$, $p = .09$, $\eta^2 = .11$. Bilingual children in the language-switch condition chose the correct box significantly above chance in all trial types (all $ps < .001$).

We also explored whether the amount of prior exposure to code-switching at home has an impact on bilingual children's sensitivity to a speaker's nonverbal cues. Parents gave a score of 1–5 with respect to each of eight items that asked about their code-switching behavior with their child. Preliminary analyses showed that all eight items correlate highly with each other, so an overall code-switching score was computed for each child ($M = 19.35$, $SD = 4.20$, minimum = 12, maximum = 28). Pearson correlation analyses revealed that parental reports of code-switching behavior were positively related to the overall task performance of bilingual children in the language-switch condition ($r = .42$, $p = .031$), in particular, the gaze conditions ($r_{\text{centered gaze}} = .40$, $p =$
$.038$; $r_{\text{biased gaze}} = .44$, $p = .022$; $r_{\text{centered point}} = .23$, $p =$

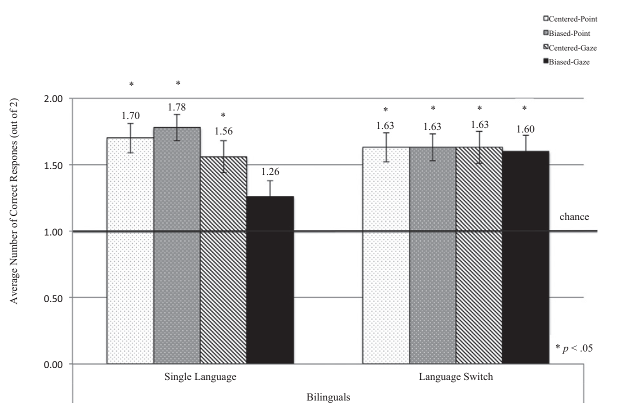

Figure 5. Average number of correct responses (out of 2; +*SE*) by condition for bilingual children in Study 2.

.25; $r_{\text{biased point}} = .027$, $p = .89$). However, no significant correlation was found for bilingual children in the single-language condition (ps > .37). Bilingual children who were reported to have more prior exposure to code switching tended to perform better in the gaze trials than those with less prior exposure, but only in the language-switch condition. Thus, both children's immediate prior experience of interacting with an adult who interspersed incomprehensible words from a foreign language into her conversation and children's long-term experience of code switching combined to enable them to make better use of subtle cues.

Study 2 provided converging evidence that communicative breakdowns heighten children's sensitivity to a speaker's nonverbal communicative cues. Compared to bilingual children who heard only one language from the experimenter, bilingual children who heard foreign words interspersed in the experimenter's conversation were better able to make use of the speaker's gaze cues to locate the hidden object. In addition, bilingual children with more prior exposure to code switching made more effective use of the speaker's nonverbal cues than those with less prior exposure, suggesting a potential synergistic benefit of both long-term experience and immediate context-specific episodes of code switching.

Combined Analysis of Study 1 Versus 2

As Studies 1 and 2 used the exact same method, we compared the monolingual children's performance with the bilingual children's performance in the tasks. A 2 (type of cue: point vs. gaze) × 2 (body position: centered vs. biased) × 2 (condition: single language vs. language switch) × 2 (language status: monolingual vs. bilingual) repeated measures ANOVA was conducted. There was a significant main effect of type of cue, $F(1, 114) = 12.59$, $p = .001$, $\eta_p^2 = .099$. Children performed better when the cue provided was a point rather than gaze. There was a main effect of condition, $F(1, 114) = 10.50$, $p = .002$, $\eta_p^2 = .084$. Children in the language-switch condition performed better than children in the single-language condition. There was a significant interaction between type of position, cue, and condition, $F(1, 114) = 5.57$, $p = .02$, $\eta_p^2 = .047$. Post hoc independent sample t tests showed that children in the language-switch condition performed better than children in the single-language condition in the body-biased gaze trials, $t(116) = 3.95$, $p < .001$, $\eta^2 = .12$. There was a significant main effect of language status, $F(1, 114) = 9.46$, $p = .003$, $\eta_p^2 = .077$. Bilingual children generally performed better than monolingual children. Most interestingly, there was a significant interaction between language status and condition, $F(1, 114) = 6.76$, $p = .011$, $\eta_p^2 = .056$. Independent samples t test revealed that the bilingual children did significantly better than monolingual children in the single-language condition, $t(57) = 3.94$, $p < .001$, $\eta^2 = .21$, $M_{\text{bilingual}} = 6.30$, $SD_{\text{bilingual}} = 1.66$, $M_{\text{monolingual}} = 4.66$, $SD_{\text{monolingual}} = 1.54$, but both groups of children performed equally in the language-switch condition, $t(57) = 0.34$, $p = .73$, $\eta^2 = .002$, $M_{\text{bilingual}} = 6.48$, $SD_{\text{bilingual}} = 1.58$, $M_{\text{monolingual}} = 6.34$, $SD_{\text{monolingual}} = 1.49$. No other significant differences were found.

This comparison of monolingual and bilingual children's performances provided further support to our hypothesis that greater exposure to communicative breakdowns from unfamiliar language switches improves children's sensitivity to nonverbal communicative cues. This is most evident in the interaction effect between language status and condition. Monolingual children without the exposure to an unfamiliar language switch were worse than bilingual children in using the speaker's nonverbal communicative cues to complete the tasks. However, monolingual children who experienced the unfamiliar language switch used the speaker's nonverbal cues to complete the tasks as well as bilingual children.

General Discussion

In these two studies we explored one explanation for bilingual children's superiority in discerning a speaker's communicative intent. We suggest that the greater exposure to communicative breakdowns that young bilinguals experience may improve their sensitivity to nonverbal communicative cues. In these studies we simulated communicative breakdowns caused by a language switch—a kind of breakdown that is frequent for bilingual children but rare for monolinguals. Our results showed that monolingual children who earlier heard a speaker sometimes use foreign words later succeeded at using the speaker's eye-gaze direction to locate a hidden object, while they otherwise would have failed. Bilingual children who heard a foreign language switch also made better use of the speaker's nonverbal cues to locate the hidden object than those who did not, but only in the more challenging gaze trials. Importantly, monolingual children were able to use the speaker's subtle nonverbal cues as well as bilingual children, but only if they had exposure to the foreign language switch. Moreover, in the foreign language switch condition, bilingual children with greater levels of prior exposure to code switching tended to perform better than those with lower levels.

Our results from monolinguals and bilinguals suggest that in the face of a communicative breakdown, there is both a heighted sensitivity to nonverbal communicative cues shortly after exposure to unfamiliar language mixing and a more long-term impact of repeated communicative challenges on the development of communicative competence in children. We speculate that while the exposure to one person on one occasion that motivated monolingual children to monitor nonverbal cues more carefully would not readily generalize to other people and contexts, bilinguals' long-term experiences with such episodes may create a more robust ability that transfers broadly to other people and situations. Goffman (1971) contended that the ability to detect, interpret, and respond to cues is a skill that can be acquired through experience. Our results suggest bilingual children's short-term strategies to repair communication breakdowns may evolve into a more sustained, robust, generalizable set of skills.

One question about our manipulation of code-switching is whether the children perceive the Japanese words as non-English words or English words that they simply do not know. Studies have shown that infants as young as 9 months old can discriminate words and nonwords that differ in phonetic and phonotactic properties of their native language (Jusczyk, Friederici, Wessels, Svenkerud, & Jusczyk, 1993; Jusczyk, Luce, & Charles-Luce, 1994). Although we did not systematically manipulate phonemes and phoneme sequences in our study, we calculated the phonotactic probability of the Japanese words used in the study as possible words in English with a web-based interface by Vitevitch and Luce (2004; http://www.bncdnet.ku.edu/cgi-bin/DEEC/post_ppc.vi). The probability of such Japanese phonemes occurring in English is very rare (ranged from 0.0000 to 0.0034). Thus, it is unlikely that children in our study perceived the Japanese words as novel English words.

Another question is how our results bear on the question of children who are learning English as a second language (ESL). There are reports that ESL children in the United States are not achieving at levels comparable to their monolingual peers in vocabulary skills and school academic outcomes (e.g., August & Shanahan, 2006; Mancilla-Martinez & Lesaux, 2011; Restrepo & Dubasik, 2008). This sometimes raises concerns about the effects of being bilingual. But it is important to note that many of these children do not yet speak English when they arrive in English-speaking schools and might be taught all of their subjects—mathematics, history, literature, and so on, in a language they are not yet proficient in. In short, although these children are en route to becoming bilingual, depending on their age of entering an English-speaking classroom, how could they not fall behind in school if they do not understand the language they are being taught in? Moreover, many of these ESL children also come from low-income families. Socioeconomic status has been consistently identified as a risk factor for development. None of this should be construed as bilingualism per se as being a problem. State-of-the-art research has shown, for example, that in schools with a well-designed early reading program, although ESL children were behind in reading in first grade, by second grade they acquired reading abilities that were comparable, if not better than native-English monolingual children (Lesaux & Siegel, 2003). Learning one language might even help in the acquisition of reading in the other language (e.g., Cisero & Royer, 1995; Durgunoglu, Nagy, & Hancin-Bhatt, 1993). This is consistent with other research, including ours, which proposes that bilingualism engenders a number of cognitive, metacognitive, metalinguistic, and sociolinguistic advantages.

We have argued that a communication breakdown alerts children to more carefully monitor a speaker's nonlinguistic signals. Language switches may be particularly salient to a listener and may be more readily perceived as glitches in communication compared to other communicative failures, such as ambiguity, novel English words, and so on. In fact, hearing a simple sentence in English can generate an illusion of understanding where vagueness, ambiguity, and inconsistencies, for example, can pass by unnoticed by older children and even adults (Markman, 1979). In contrast, hearing a string of words or syllables in a foreign language is readily perceived as incomprehensible. Our study suggests that in addition to the routine single-language communicative challenges that children typically experience, early and repeated experiences of easily recognizable communicative failures might promote the development of sensitivity to a speaker's nonverbal cues, giving bilingual children an advantage.

In conclusion, our studies found that a communication breakdown related to an unfamiliar language switch led to heightened awareness and more successful use of a speaker's nonverbal communicative cues. It is worth pointing out that developmental progress can be propelled, not just by carefully orchestrating success for children, but also by difficulties and challenges children encounter. Children's self-generated attempts to maintain communicative effectiveness in the face of a breakdown may be one of the key factors that contribute to bilingual children's overall greater ability to figure out a speaker's intent.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Appendix S1. Questions on Code-Switching Exposure