Processing of Voice Onset Time Differences in Monolingual German versus Bilingual Italian-German Preschoolers.

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Behavioral and neurophysiological evidence suggest that bilingual children's neural commitment to their two languages and hence their phoneme processing abilities vary in accordance with the relative amount of exposure to each language (Sebastián-Gallés & Bosch, 2002). Mismatch Responses (MMRs) are known to index automatic neural discrimination of speech contrasts (Yu et al., 2020). We explore the following question: How does monolingual versus bilingual experience modulate the neural commitment to the laryngeal feature voice onset time (VOT), that defines the voicing categories of stop consonants? Some languages, like German and Italian, differ in terms of how they use this feature to determine phonemic category.

We hypothesized that simultaneous bilingual Italian-German preschoolers would show good neural discrimination for both the Italian prevoiced and the German aspirated contrast. We further predicted that their monolingual German peers would show robust discrimination of the aspirated contrast but no mismatch response (MMR) to the prevoiced stimulus. Finally, we hypothesized that acoustic difference between the standard and the deviant would also modulate children's discriminatory performance.

Twenty-two children (12 monolingual German and 10 bilingual Italian-German, mean age 5;1years) were tested with an oddball paradigm. Stimuli consisted of naturally produced bilabial stop consonants. The short lag /b/, common to both languages was used as the standard. For German, two aspirated deviants were selected: ASPeasy (92ms VOT) and ASPdifficult (36ms VOT). For Italian, two prevoiced deviants were selected: PREVeasy (-112ms VOT) and PREVdifficult (-36ms VOT). Event related potentials (ERPs) were recorded from 32 scalp sites. MMRs were derived by subtracting the standard from the deviant.

MMRs were greater for the easy compared to the difficult condition. Preliminary analysis revealed that both groups of children showed MMRs of an initial positivity followed by a negativity, similar to Shafer and colleagues (2010). Mixed ANOVAs revealed a significant group difference for ASPeasy. The monolinguals showed a greater positive MMR at 100-150ms but no difference was observed for the negative MMR 200-300ms. For ASPdifficult a greater negative MMR was observed for the monolingual group around 200-250ms. No group difference was observed for neither of the prevoiced stimuli. Examination of the means show that generally bilinguals showed a greater negativity compared to the monolinguals.

Our data show that a greater acoustic difference between the standard and the deviant enhances the MMR. Further, our findings are consistent with Yu and colleagues (2020) suggesting that bilinguals may pay more attention to the speech signal thereby enhancing their negative MMR. It an unexpected result that we did not find a significant advantage for the bilingual children when processing the prevoiced contrast. Explanations for this will be discussed.

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