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Beyond words: Comprehension and production of pragmatic prosody in adults and children

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ABSTRACT

Prosody includes suprasegmental components of speech, such as intonation and rate, which add meaning beyond the words being spoken. Sensitivity to pragmatic prosody could improve communication within conversations. These studies investigated adults' and preschoolers' sensitivity to pragmatic prosody. Experiment 1 demonstrated that adults and children comprehend pragmatic prosody; they selected fast actions when descriptions were spoken fast versus when descriptions were spoken slowly. Experiment 2 demonstrated that adults and children spontaneously produce pragmatic prosody—their descriptions of fast actions were faster than their descriptions of slow actions—even when it was not necessary for the task. These studies conclude that children, like adults, are capable of using and producing pragmatic prosody; however, children are less sensitive than adults to subtle prosodic distinctions.

Introduction

Prosody is an essential element of verbal communication because it adds information to the words being spoken. Prosody is *how* something is said and includes frequency, timing, and sound intensity—the suprasegmental parts of speech (Cutler, Dahan, & van Donselaar, 1997; Szczepek Reed, 2011). Prosody influences syntactic interpretation (Lehiste, 1973; Lehiste, Olive, & Streeter, 1976; Price, Ostendorf, Shattuck-Hufnagel, & Fong, 1991). Prosody aids memory; sentences with the same prosody at learning and test are recognized more accurately than sentences with differing prosody (Jungers & Hupp, 2009; Speer, Crowder, & Thomas, 1993). Prosody also conveys the speaker's intent, including emotional (Scherer, 2003) and pragmatic (Shintel & Keysar, 2009) cues.

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Research has demonstrated that adults use prosody to comprehend the speaker's intent. Emotions are cued primarily by speech rate and fundamental frequency (Lieberman & Michaels, 1962; Murray & Arnott, 1993, 1995), and these cues can be used to interpret emotion even in non-native languages (Breitenstein, Van Lacker, & Daum, 2001). Some prosodic cues, such as fundamental frequency, can indicate both emotion and linguistic focus, but these roles are separable (McRoberts, Studdert-Kennedy, & Shankweiler, 1995; Pell, 2001). Emotional prosodic cues facilitate processing of emotion words. Emotional prosody differentially affects participants' subsequent response latencies to different emotion words, thereby indicating that emotional prosody is connected to word meaning (Nygaard & Queen, 2008). More specifically, if a sad word is spoken with sad prosody, participants are faster at repeating this word than if it is spoken with happy prosody.

Prosody can carry more than just emotional meaning and can provide suprasegmental cues about the physical world (i.e., size or rate). Pragmatic prosody indicates the speaker's intent and is distinct from grammatical or affective prosody (Shriberg et al., 2001). For example, adults can select appropriate referents based solely on suprasegmental cues distinguishing size (Nygaard, Herold, & Namy, 2009); in Nygaard et al.s' (2009) study, adults were successful at selecting the referent of a novel word (e.g., *blicket*) spoken with pragmatic prosody (e.g., fast and high pitch to denote the small item). Another study of adults' comprehension of pragmatic prosody found that adults were faster at selecting the correct picture if a sentence that was spoken quickly was paired with a picture that implied motion (Shintel & Nusbaum, 2007). This combination of prosody and implied meaning in a picture worked in concert. Similarly, in Shintel and Nusbaum's (2008) study, participants listened to scenarios read at either fast or slow rates and then followed instructions (e.g., press space bar). Adults had faster reaction times after fast speech, but only when the scenario implied urgency. Therefore, adults attend to and make use of prosodic cues that are connected to word meanings.

Adults not only comprehend pragmatic prosody, but also produce prosody that aids in listeners' understanding of meaning. For example, adults can convey meaning about events that are understandable to other adult listeners based solely on prosodic information (Shintel, Nusbaum, & Okrent, 2006). These researchers found that the pitch of a speaker's voice varied in describing vertical motion (i.e., increase in pitch to denote upward object movement), and participants spoke more quickly when describing fast-moving objects. Thus, speakers modulate prosody to express meaning in speech. Comprehension and production of pragmatic prosody, therefore, seem to be natural components of adult speech that play a basic and important role in communication; however, the development of these skills during childhood has not yet been established.

Previous research with young children has demonstrated that they are also sensitive to prosodic information. Many studies focus on children's interpreting of emotions, but the developmental trajectory of children's use of prosodic information for emotional understanding is not linear (i.e., it follows a unique path and does not simply improve with development; see Quam & Swingley, 2012). Most notably, young infants show evidence of sensitivity to prosodic cues from approximately 5 to 15 months of age, but this capacity diminishes once word learning takes off. Then, it is argued that a "lexical bias" begins to overshadow understanding of prosody during the preschool years such that children weigh the content more heavily than the prosodic information (Friend, 2000), possibly due to children's cognitive inflexibility rather than a language-specific factor (Waxer & Morton, 2011). As evidence of this complex developmental path, Fernald (1993) demonstrated that infants as young as 5 months are sensitive to prosodic emotional cues across several languages. Then, at approximately 15 months of age, infants begin to rely more on what is being said rather than on how it is said to guide their actions (Friend, 2001). Friend (2001) concluded that this is the age at which a lexical bias begins to overshadow children's use of prosodic information, whereby the more word learning is taking place, the more children focus on the words themselves. Similarly, 4- and 5-year-olds are starting to be able to use prosodic cues in expressive utterances, but prosody is not as important as other factors such as the words themselves (i.e., prosody ignoring bias; Aguert, Laval, Le Bigot, & Bernicot, 2010).

Some evidence suggests that 4-year-olds start to grow out of the posited lexical bias and show some behavioral regulation based on emotional prosody. For example, children were more likely to approach a toy and to play with it longer when adults' prosodic information conveyed approval (Friend, 2003). However, even though 6-year-olds are sensitive to prosodic cues in interpreting emotion, they still maintain a lexical bias (Morton, Trehub, & Zelazo, 2003), and they are inflexible in their