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Is That How You Should Talk To Her? Using Appropriate Prosody Affects Adults', But Not Children's, Judgments Of Communicators' Competence

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Abstract

Two studies explored whether the appropriateness of a speaker's prosodic style (i.e., pitch, volume, speech rate) affects observers' judgments of speakers' and listeners' competence. Adults and school-aged children watched videos of speakers addressing a listener using prosodic styles that were either appropriate (e.g., adult-directed for an adult listener), or inappropriate (e.g., child-directed for an adult listener). Adults, but not children, awarded higher ratings in some domains of communicative competence to speakers and listeners when a speaker used appropriate prosodic styles.

Keywords

prosody, prosodic fit, child-directed speech, observer judgments, communication accommodation theory, communicative competence

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Adjusting our communication style to our conversational partner is important: when communicating orally, we adjust both the content of our speech, including our words and sentence structure, and our manner of speech (Communication Accommodation Theory; Giles & Coupland, 1991; Giles, 2016). As conversation unfolds, speakers accommodate to their communicative partner's prosody, and both individuals exhibit similar pitch contours, loudness, and speech rate (De Looze, Oertel, Rauzy, & Campbell, 2011; Goldinger, 1998; Gregory, Webster, & Huang, 1993; Ko, Seidl, Christia, Reimchen, & Soderstrom, 2016; Natale, 1975). Adults make characteristic prosodic adjustments when addressing infants and children (e.g., Uther, Knoll, & Burnham, 2007), which include higher mean pitch, and greater pitch and volume variability (Fernald et al., 1989). There are clear expectations that certain prosodic styles should be used with certain listeners (Bryant & Barrett, 2007). Specifically, recent work found that children and adults used prosody to determine the intended listener of child-directed (CD) and adult-directed (AD) speech even when the content of the utterance suggested another listener (Varghese & Nilsen, 2016). Thus, from an early age, individuals have expectations for which prosodic styles should be used for whom (at least, in the context of CD and AD speech).

Given these expectations about the kinds of prosodic styles that speakers use with listeners, what are the consequences for failing to adjust one's prosody for a listener in these expected ways? This question is timely given popular interest in communication styles and their appropriateness for addressees. For instance, viewers' opinions about a politician might be affected by the communication style with which 'he' addressed his opponent (Coe, 2016), which may also have consequences for perceptions of 'his' opponent (Filipovic, 2016).

The aim of this study was to assess the judgments individuals form based on the appropriateness of a speaker's prosodic style for a listener (i.e., prosodic fit). Past work found that individuals use a speaker's prosodic quality to form opinions about personality (Fowler,

Lilienfeld, & Patrick, 2009; Liscombe, Venditti, & Hirschberg, 2003) and understand communicative intent (Berman, Chambers, & Graham, 2010). We assess whether judgments about a speaker's prosody are affected by who the speaker is addressing. Given that vocal accommodation (albeit, involving more than just prosodic adjustments) facilitates social interaction through the promotion of affiliation, acceptance, and perceptions of competence (Feldstein, Dohm, & Crown, 2001; Gallois & Callan, 1998; Natale, 1975), we anticipate that speakers who do not tailor their prosody to that of their listener may be viewed negatively. We additionally explored the intriguing question of whether perceptions of *listeners'* competence varied based on the prosody used. Put another way, in the absence of other cues, is an adult who is addressed in a more child-like manner perceived as less competent?

Method – Study 1 (Adults)

Participants

The sample consisted of 32 English-speaking adults (16 males), recruited through a university research pool. They indicated proficiency in English and demonstrated verbal skills above a Low Average range (per receptive vocabulary in the Wechsler Individual Achievement Test - Third Edition [WIAT-III]; Wechsler, 2009).

Judgments Task

Participants watched videos of an adult speaker delivering instructions (using CD or AD prosody) to a listener (either a child or an adult). The speaker's prosody was tailored appropriately to her listener in some videos (e.g., AD prosody to address an adult listener), and inappropriately tailored to her listener in others (e.g., CD prosody for an adult), which was a within-subject manipulation. Every participant heard two different speakers using CD prosody, and two additional speakers using AD prosody (four trials/videos in total). Trials were presented in a blocked fashion, and prosody order was counterbalanced across participants. Listener type (i.e., adult or child) was a

between-subject factor. While participants were exposed to only one listener type, they heard speakers use both AD and CD prosody such that all participants experienced inappropriate and appropriate prosodic styles (see Figure 1).

Videos were introduced to participants within the context of a treasure hunt. Participants were told that the speaker was using a walkie-talkie to tell the listener (in another room, wearing headphones) how to find the treasure. The videos featured two White female actors sitting and facing the wall, such that their backs were visible (thus, minimizing the influence of facial expression). The instruction, “here’s *another* team” on subsequent trials helped distinguish dyads.

Audio was recorded separately by four females. The designation of voice actors’ prosodic style as “child-directed” and “adult-directed” was verified with ratings from 10 adults and with acoustical analyses using Praat (Table 1; Boersma & Weenink, 2016). Ratings of how CD or AD each of the utterances sounded confirmed that the two prosody types were distinct, $p < .001$. Moreover, paired samples t-tests conducted on dimensions extracted from Praat (i.e., pitch mean and standard deviation, volume mean, and utterance duration) also showed that the prosody types were distinct, $ps < .008$ (except volume standard deviation, $p = .21$). The prosodic style that each voice actor used was counterbalanced across participants. Instructions differed slightly in content to reduce redundancy (see Appendix).

Following each clip, participants answered questions about the competence of either the speaker or the listener (i.e., half the participants rated the *speakers’* competence and the other half rated the *listeners’* competence (Table 2)¹. Question order was randomized, except that participants rating speakers were asked the “weird” question last, to minimize priming. Participants responded using a Likert scale: (1) “not at all” to “a bit” to (3) “very much”. Scores from both trials of each prosody type were aggregated.

Results and Discussion

Independent samples t-tests showed that there was no significant difference in language ability between groups (by listener type or focus of rating), $ps > .20$. Data were analyzed with a 2(prosody: child-directed/adult-directed) x 2(listener type: child/adult listener) mixed model ANOVA separately for the speaker and listener ratings.

Speaker Ratings

Communicative Competence Composite. Two questions were strongly correlated with each other and aggregated into a composite measure². Results from the mixed model ANOVA showed a significant prosody*listener type interaction, $F(1, 14) = 39.93, p < .001, \eta_p^2 = .74$. Paired-samples t-tests for each listener type showed an effect of prosody for both child listener teams, $t(7) = -5.95, p = .001, d = 2.42$, and adult listener teams, $t(7) = 3.76, p = .007, d = 2.30$. However, there was an opposite pattern for each listener type: participants attributed greater communicative competence to speakers who addressed children with CD prosody (therefore, appropriately) than speakers who addressed children with AD prosody. Further, speakers who used AD prosody to address adults were viewed as more competent than those who used CD prosody to address adults. Independent samples t-tests showed that speakers who used AD prosody with adult listeners were given higher ratings than those who used AD prosody with child listeners, $t(14) = 3.92, p = .002, d = 1.96$. Similarly, speakers who used CD prosody with child listeners were given higher ratings than those who used CD prosody with adult listeners, $t(14) = 5.86, p < .001, d = 2.91$. In sum, prosodic fit was critical in participants' ratings of speakers' communicative competence.

Communicative 'Weirdness'. Participants were asked if there was anything 'weird' about the way the speakers talked to determine whether anything unconventional in speech was detected. ANOVA results yielded a significant effect of prosody, $F(1, 14) = 9.74, p = .008, \eta_p^2 = .41$, that was qualified by a prosody*listener type interaction, $F(1, 14) = 5.48, p = .04, \eta_p^2 = .28$. The effect of prosody was significant for adult listener teams, $t(7) = 4.78, p = .002, d = 2.11$, but not for child

listener teams, $p = .65$. Speakers who used CD (and therefore, inappropriate) prosody to address adult listeners were rated as speaking more weirdly than speakers who used AD prosody to address an adult. Further, independent samples t-tests showed an effect of listener type for CD prosody trials, $t(14) = 2.33$, $p = .02$, $d = 1.23$, but did not show a statistically significant effect for AD prosody trials, $p = .66$. For child prosody trials, speakers addressing adults in CD prosody were rated as speaking more weirdly than speakers addressing children in CD prosody.

Effectiveness with the Game. Judgments about speakers' task-related effectiveness were assessed with ratings about participants' desire to have each of the speakers as communicative partners for the game. Results revealed a prosody*listener type interaction, $F(1, 14) = 6.64$, $p = .02$, $\eta_p^2 = .32$. Paired samples t-tests did not show a statistically significant difference between AD prosody and CD prosody for child listeners, $p = .18$, or adult listeners, $p = .08$. However, independent samples t-tests showed that speakers who used CD prosody to address children were rated as more desirable teammates than those who used CD prosody to address adults, $t(14) = 2.58$, $p = .02$, $d = 1.29$. There was not a statistically significant difference in desirability as a teammate between speakers who used AD prosody to address adults and those who used AD prosody to address children, $p = .13$. Thus, speakers who used CD prosody appropriately were rated as more desirable teammates than those who used CD inappropriately.

Listener Ratings

Communicative Competence. Participants rating listeners were asked about listeners' skill at listening. The ANOVA showed a significant prosody*listener type interaction, $F(1, 14) = 12.96$, $p = .003$, $\eta_p^2 = .48$. Paired samples t-tests showed that there was no statistically significant effect of prosody on ratings of listening skill for teams with child listeners, $p = .08$. However, adult listeners addressed in AD prosody were rated as being better listeners than those addressed in CD prosody, $t(7) = 2.97$, $p = .02$, $d = 0.78$. Independent samples t-tests showed no statistically

significant difference between ratings for child and adult listeners addressed in AD prosody, $p = .06$. Ratings of child and adult listeners addressed in CD prosody similarly showed no statistically significant difference, $p = .51$.

Effectiveness with the Game. Judgments about listeners' task specific effectiveness were assessed by querying participants' desire to have individual listeners as communicative partners for the treasure-finding game. The ANOVA revealed no significant effects for listener ratings, $ps > .16$.

Team Rating

Participants were asked about each team's chances of winning the treasure finding game. There was a significant prosody*listener type interaction, $F(1, 30) = 11.95$, $p = .002$, $\eta_p^2 = .29$. Paired samples t-tests showed a significant effect of prosody for the child listener teams, $t(15) = 4.37$, $p = .001$, $d = 1.22$, but not for the adult listener teams, $p = .36$. Teams with speakers who used CD (versus AD) prosody to address child listeners were rated as more likely to win.

Study 2 (Children)

Study 1 demonstrated adults' sensitivity to prosodic fit. Study 2 sought to provide a developmental context to this finding by exploring the inferences made by individuals of the age when expectations for prosodic fit first emerge (i.e., 7- to 10-year olds; Varghese & Nilsen, 2016). If similar impressions of speakers' and listeners' competence are found for children, it would suggest that attributions are formed at the time that expectations for prosodic use emerge.

Method

Participants. Sixty-four English-speaking children were recruited through a public school board: 32 7- to 8-year-old children ($M = 8$ years; 2.97 months, $SD = 7.11$ months; 16 males) and 32 9- to 10-year-old children ($M = 10$ years; .72 months, $SD = 6.86$ months; 16 males). All children had receptive vocabulary scores above the Low Average range (per WIAT-III, Wechsler, 2009).

Judgments Task. The task was the same as Study 1, except a few elements were added to facilitate understanding (e.g., extended explanations of the setup and rating scale).

Results and Discussion

Independent t-tests indicated no statistically significant differences in age or language ability between the groups, $ps > .16$. Data were analyzed in the same manner as Study 1, except that age group (i.e., 7/8 year-olds or 9/10 year-olds) was also included. (See Table 4).

Speaker Ratings.

Communicative Competence Composite. Two questions were aggregated to create a composite³. On this measure, the ANOVA revealed a significant effect of prosody, $F(1, 28) = 4.43$, $p = .04$, $\eta_p^2 = .14$. Speakers who used CD prosody received higher scores on the communication composite ($M = 2.39$, $SE = .09$) than speakers who used AD prosody ($M = 2.13$, $SE = .08$), suggesting that children judged speakers who used CD prosody as higher in communicative competence than speakers who used AD prosody, irrespective of whether the prosodic style was appropriate for the listener.

Communicative 'Weirdness'. There was a significant 3-way interaction between the variables, $F(1, 28) = 4.53$, $p = .04$, $\eta_p^2 = .14$. Separate 2(prosody) x 2(age group) ANOVAs were conducted for each listener type. Data from ratings of teams with child listeners showed a significant prosody*age group interaction, $F(1, 14) = 4.47$, $p = .05$, $\eta_p^2 = .24$. Subsequent paired samples t-tests were used to determine the effects of prosody within each age group. Seven- and 8 year olds' perceptions of speakers' weirdness were not affected by prosody, $p = .32$; however, 9/10 year-olds rated speakers who used AD prosody to address a child as weirder ($M = 1.69$, $SD = .70$) than speakers who used CD prosody to address a child ($M = 1.38$, $SD = .44$), $t(7) = 2.38$, $p = .049$, $d = 0.53$. In contrast, data for teams with adult listeners did not show a statistically significant prosody*age group effect, $p = .33$.

Effectiveness with the Game. There were no statistically significant effects or interactions, $ps > .12$.

Listener Ratings.

Communicative Competence. None of the main effects or interactions were statistically significant, $ps > .09$.

Effectiveness with the Game. There were no effects of prosody or listener type, nor interactions between these variables, $ps > .08$.

Team Rating. There was a significant effect of prosody, $F(1, 60) = 14.04, p < .001, \eta_p^2 = .19$: Children rated teams for which CD prosody was used ($M = 2.17, SE = .06$) as having a higher chance of winning than teams for which AD prosody was used ($M = 2.48, SE = .06$).

General Discussion

This study explored judgments about communicators' competence based on the prosodic fit between speaker and listener.

In the first study, communicators' use of inappropriate prosody affected adults' judgments of communicative competence and success with the communicative task. For instance, in keeping with recent suggestions that communicative accommodation reflects competence (Pitts & Harwood, 2015), speakers who addressed children using AD prosody and adults with CD prosody were viewed as less competent in their communication. Perhaps observers were attuned to the need to accommodate to child listeners' communicative needs (as CD prosody facilitates comprehension; Golinkoff & Alioto, 1995), and understood that these same changes would be inappropriate for adults (see related concepts of underaccommodation and overaccommodation; Gallois & Giles, 2015). Interestingly, adult participants also made judgments about *listeners* based on how they were addressed: adult listeners addressed with CD prosody were rated as worse listeners than adults addressed in AD prosody. Participants may have reasoned that adult listeners

were less skilled if a speaker presented information in the slow and varied pitch associated with CD speech. This finding suggests that people can judge individuals as less communicatively competent even in the absence of communicative cues from that person.

Adopting a developmental approach, in contrast to adults, there was little evidence to suggest that 7- to 10-year-old children use prosodic fit when rating communicators' competence. Though past research (Varghese & Nilsen, 2016) has shown that children of this age robustly associate a speaker's use of adult- and infant-directed prosodic styles with adult and infant listeners respectively, they have not developed a sophisticated understanding of the implications of using (or not using) these prosodic styles. That is, 7- to 10-year-old children might not have yet learned that CD prosody could be experienced as unpleasant by adults. Instead of considering prosodic fit, children seemed to hold somewhat positive impressions about speakers who used CD prosody regardless of the listener (i.e., showing more competence, having more team success), potentially due to their own preferences for CD (Cooper & Aslin, 1990).

Together, findings open avenues for future work. First, it would be interesting to examine the extent to which context influences sensitivity to prosodic fit. For example, might observers demonstrate differential sensitivity to prosodic fit in a social context (introductions/greetings) relative to a context which is instructional in nature (somewhat like this task)? Second, a shift in methodology from third-person perspective to first-person would explore whether adults addressed in a childish tone *feel* less competent and even perform less successfully. Third, extending work showing how prosody impacts behavior (Gregory & Gallagher, 2002; Klofstad, Anderson, & Peters, 2010; Tigue, Borak, O'Connor, Schandl, & Feinberg, 2012), of interest is whether communicators' inappropriate prosody use affects others' behaviour toward speakers/listeners. For example, after observing an adult being spoken to in a child-like fashion, is do others treat this person differently?

In conclusion, findings add to the growing body of work showing the important ways in which prosody is used within communication. Prosodic cues operate as a window into the characteristics of the speaker (Fowler et al., 2009; Friedman, Oltmanns, Gleason, & Turkheimer, 2006). Here, we demonstrate that such judgments (by adults, not children) both depend on, and have implications for, the listener.

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Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Notes

1. Additional questions about social characteristics were asked, but not discussed here.
2. Pearson correlation coefficient (r) values for the two questions that comprised the communicative competence composite (speaker) were .79, $p < .001$ (adult prosody variables) and .76, $p = .001$ (child prosody variables). The question about “weirdness” was removed from the communication composite and analyzed separately, as omitted item statistics showed that the Cronbach’s alpha improved for the communication composite variables in both the adult and child samples after its deletion. Increases in alpha ranged from .01 to .11.

3. Similar to the adult data in Exp. 1, questions within the communication correlated with each other, (speaker): .64, $p < .001$ (adult prosody) and .74, $p = .001$ (child prosody).

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Table 1. Descriptive Statistics from Stimuli Acoustical Analyses

Measure	Adult Prosody	Child Prosody
	<i>M</i> (SD)	<i>M</i> (SD)
Pitch Mean	190.25 (18.50)	257.43 (22.27)
Pitch Standard Deviation	46.39 (7.67)	77.50 (9.40)
Volume Mean	73.44 (3.14)	77.62 (1.01)
Volume Standard Deviation	12.03 (2.15)	13.36 (1.32)
Utterance Duration (in seconds)	9.53 (.70)	16.05 (1.73)

Note. Analyses were conducted using Praat (Boersma & Weenink, 2016).

Table 2. Judgments Task Questions

Domain	Question	Target of question
Communicative Competence	Compared to other grown-ups/kids, how good is she at speaking to this grown-up/kid?*	Speaker
	Compared to other grown-ups/kids, how good is she at listening?	Listener
	If you were telling this listener about the treasure, how much would you speak like this speaker?*	Speaker
	Was there anything weird about how she talked?	Speaker
Individual Effectiveness	If you really wanted to win the treasure-finding game, how much would you want to be on a team with this speaker/listener?	Both
Team Success	How much do you think that this team will win the treasure-finding game?	Both

*Included in communicative competence composite

Table 3. Means for Judgments Ratings in Study 1 (Adult Participants)

Question	Adult Listener		Child Listener	
	<u>Adult</u>	<u>Child</u>	<u>Adult</u>	<u>Child</u>
	<u>Prosody</u>	<u>Prosody</u>	<u>Prosody</u>	<u>Prosody</u>
	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)
Speaker Questions:				
Communicative Competence*	2.50 (.48)	1.44 (.44)	1.53 (.51)	2.56 (.32)
Weird communicative style	1.31 (.37)	2.19 (.46)	1.63 (.58)	1.56 (.56)
Be on a team with	2.44 (.56)	1.63 (.64)	1.94 (.68)	2.38 (.52)
Listener Questions:				
Good at listening	2.69 (.46)	2.25 (.65)	2.25 (.38)	2.44 (.42)
Be on a team with	2.19 (.46)	1.75 (.53)	2.00 (.53)	2.13 (.52)
Team Questions:				
Win	2.25 (.48)	2.06 (.68)	1.91 (.64)	2.59 (.46)

Note. Mean scores for all questions ranged from 1 – 3. A score of ‘1’ indicated a response of “not at all”, whereas a score of ‘3’ indicated a response of “very much”. *Composites: Communication – “Good at Speaking” & “Speak Like”;

Table 4. Means for Judgments Ratings in Study 2 (Child Participants; Collapsed Across Age)

Question	Adult Listener		Child Listener	
	Adult	Child	Adult	Child
	Prosody	Prosody	Prosody	Prosody
	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)
Speaker Questions:				
Communicative Competence*	2.17 (.34)	2.27 (.65)	2.08 (.56)	2.52 (.44)
Weird communicative style	1.38 (.39)	1.53 (.62)	1.53 (.59)	1.50 (.63)
Be on a team with	2.09 (.58)	2.31 (.70)	1.97 (.62)	2.31 (.54)
Listener Questions:				
Good at listening	2.84 (.30)	2.66 (.44)	2.72 (.31)	2.56 (.44)
Be on a team with	2.31 (.51)	2.34 (.40)	2.28 (.45)	2.19 (.54)
Team Questions:				
Win	2.18 (.58)	2.53 (.46)	2.17 (.43)	2.43 (.52)

Note. Mean scores for all questions ranged from 1 – 3. A score of ‘1’ indicated a response of “not at all”, whereas a score of ‘3’ indicated a response of “very much”. *Composites: Communication – “Good at Speaking”

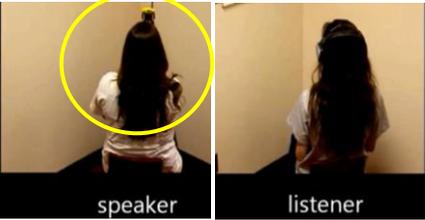
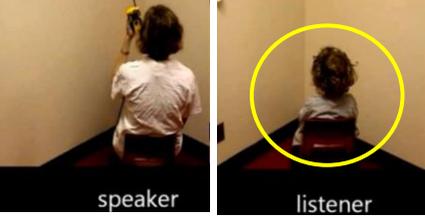
Listener Type (between subjects)	Speaker Prosody (within subject)
 <p data-bbox="289 615 516 646">ADULT Listener</p>	<p data-bbox="634 394 906 426">AD prosody (2 trials)</p> <p data-bbox="634 468 906 499">CD prosody (2 trials)</p>
<i>OR</i>	
 <p data-bbox="261 1056 472 1087">CHILD Listener</p>	<p data-bbox="634 909 906 940">AD prosody (2 trials)</p> <p data-bbox="634 982 906 1014">CD prosody (2 trials)</p>

Figure 1. Examples from task. First column contains screenshots from videos. To orient participants to the player about whom they would be questioned, a yellow circle was placed around either the speaker or the listener. The screenshot on the top depicts an adult speaker and an adult listener, on a trial in which the participant was asked to rate the speaker (as indicated by the yellow circle). The screenshot on the right depicts an adult speaker and a child listener, on a trial in which the participant was asked to rate the listener.

Appendix

Content Scripts

Script	Content
1	First, find the road with rocks and mud on it. You'll see that the road is windy. At the end of the road, you'll see a big pile of dirt. That's where the treasure is.
2	First, walk past the pot with the flower in it. You'll see a bag with lots of stones in it. Walk around the bag and you'll see a bucket. That's where the treasure is.
3	First, walk past the beach, and past the big boats. You'll see a small pond and a dock. Walk to the middle of the dock, and you'll see an X. That's where the treasure is.
4	First, walk past the car, and past the big trucks. You'll see some wheels and a shed. Walk to the middle of the shed, and you'll see an X. That's where the treasure is.

Author Biographies

Anisha Varghese, Ph.D., was a graduate student in Clinical Psychology at the time this research was conducted and is now a Registered Psychologist. Her research interests include the interplay between children's perspective taking, communication, and cognitive skills.

Elizabeth Nilsen, Ph.D., C. Psych., is an Associate Professor within the Psychology Department at the University of Waterloo and is a registered clinical psychologist. Her research focuses on the cognitive skills that enable children and adults to be successful communicators.