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Individual Differences in Multimodal Child-directed Language: Unraveling Individual style, Empathy and the Big Five Personality Traits

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Abstract

We studied individual differences in broadcasters' multimodal adult-directed and child-directed communication. Forty-six female future broadcasters simulated live broadcasts for both adults and children. Effects of speakers' individual styles, empathy and the Big Five personality traits on adult-directed and child-directed language (e.g., prosody, linguistic features and gestures) were examined. Results showed that all multimodal cues in adult-directed and child-directed language were highly correlated, but there were larger individual variations in the degree of adjustments between the two language registers. Moreover, empathy and certain personality traits could not only predict multimodal language production, but also the degree of adjustments for child-directed communication. For example, higher-empathetic participants speak faster, louder with a higher pitch, use diverse but more frequent words, and produce more salient referential gestures. In conclusion, despite an individual language style, empathy and the Big Five personality traits influence speakers' multimodal language production and the degree of audience design.

Keywords: child-directed language; individual differences; prosody; gesture; empathy; big-five personality traits; style

Introduction

People adjust their language according to various audiences and contexts. For example, when speaking to children, caregivers use child-directed language (CDL). This form of language differs from adult-directed language (ADL) in several key aspects, including a higher mean pitch, a slower speaking rate, shorter length of utterances, and a reduced lexical diversity accompanied by more iconic gestures (e.g., Campisi & Özyürek, 2013; Cristia, 2013; Fernald et al., 1989; Snow, 1972). CDL is found across cultures (Cox et al., 2022), which not only expresses positive emotions (Kalashnikova et al., 2018), but also aids children's speech comprehension (Dimitrova & Özçalışkan, 2013; Fernald, 2000; Kuhl et al., 1997) and language learning (Dong et al., 2021; Donnellan et al., 2023; Shi et al., 2022).

However, not all CDL facilitates children's language acquisition. For example, Han et al. (2023) found that when introducing unfamiliar words to children, only mothers who had a relatively slower speaking rate, a lower pitch, and a larger pitch range compared to familiar words (thus using a salient prosodic contrast), predicted a larger vocabulary size in children (also observed in Shi et al., 2022). Additionally, while beat gestures can support memory (So et al., 2012), children can only benefit from them in pragmatically relevant contexts (Igualada et al., 2017), and their effectiveness may diminish with excessive repetition (Rohrer et al., 2020).

An interesting question arises is why some individuals are more inclined towards CDL than others, and why people do not make similar adjustments in language for children. To better understand such individual differences in CDL usage, in this study we investigated whether one's CDL is a personal style that is closely related to their ADL and examined whether the degree of adaptations is affected by the speaker's empathy and personality traits.

Individual style

Despite little research on individual style in CDL, studies on second language acquisition (L2) have shown that speech fluency is a defining feature of individuals. For example, speakers' L2 fluency may correlate to their first language's (L1) fluency (de Jong, 2018). It is uncommon for a person who is dysfluent in the L1 to be highly fluent in the L2 (Raupach et al., 1980). Thus, the relationship between the temporal characteristics of a speaker's L1 and L2 is a relatively stable trait specific to an individual (Derwing et al., 2009).

Besides speech, variability of gesture use in L1 is argued to be a vital predictor of gesture use in L2. For example, Nagpal et al. (2011) showed high correlations in gesture rate between speakers' L1 and L2. They also found that individual story-telling styles, including gesture rate and vocabulary, can be transferred from one language to another. However, they did not find any significant differences in the rate of iconic gestures in speakers' L1 and L2. Thus, other individual personality variables may affect it, such as empathy level and big-five personality traits. For instance, extraversion and neuroticism are positively correlated with representational gestures (Hostetter & Potthoff, 2012), while empathy predicts gesture frequency and saliency (Chu et al., 2014).

If certain speech and gesture patterns are stable characteristics of individuals, we will observe correlations not only between speakers' L1 and L2 but also in different

contexts, even within a language such as adult-directed vs. child-directed language. However, how individual variability in ADL may relate to CDL is entirely unknown.

Empathy

Empathy refers to the degree to which one recognizes and understands other people's thoughts and feelings, which plays a critical role in fostering mutual understanding and sensitivity in close relationships (Britton & Fuendeling, 2005; Davis & Oathout, 1987). For instance, maternal sensitivity to infant distress and non-distress could affect children's behaviour (Leerkes et al., 2009), and infants of sensitive mothers who used more prototypical CDL prosody had better emotional regulation abilities (Spinelli & Mesman, 2018).

Similar to sensitivity, empathy in conversation relates to how much people care about and understand their addresses' feelings. More empathetic individuals are more likely to strive for clear and effective communication with others, including children. While research often explores how parent-child relationships or mothers' CDS influence children's empathy, little attention has been given to how speakers' empathy levels shape their language adaptation when talking to children. Kempe (2009) found that empathy positively correlates with adult-directed pitch, but this effect does not extend to interactions with infants. However, their narrow focus on the prosodic analysis of six sentences limits its applicability to naturalistic settings. Additionally, empathy levels predict individual differences in gesture frequency and saliency (Chu et al., 2014), suggesting that more empathetic speakers tend to use more gestures of larger size. Yet, the impact of individuals' empathy levels on their gesture adaptation for children remains unexplored.

Big Five personality traits

The Big Five personality traits consist of five personality representations (extraversion, agreeableness, neuroticism, conscientiousness, and openness to experience), which can account for most individual differences (McCrae & Costa, 1997). For example, people with particular personality traits are skilled at using intonation to achieve communication goals (Silnitskaya & Gusev, 2013); extraverted individuals speak more fluently and faster than introverted ones (Gawda, 2007).

However, there are at least three limitations in the literature: First, studies exploring the link between voice and personality have primarily focused on listeners' perceptions of personality rather than the actual personality traits of speakers (e.g., Mohammadi et al., 2010; Mohammadi & Vinciarelli, 2012; Polzehl et al., 2010). Second, while a few studies looked at how personality traits influence individuals' intonation, voice quality and gestures (e.g., Hostetter & Potthoff, 2012; Kopple, 2014; Pang et al., 2022), these studies often focus on a single modality. For example, extraversion and neuroticism have been found to correlate positively with the production of representational gestures (Hostetter & Potthoff, 2012). However, communication is multimodal, there is a gap in research regarding how the Big

Five personality traits influence communication behaviours in a multimodal context. Third, while individual differences may affect speakers' speech or gesture production, it remains uncertain how they influence child-directed communication, especially regarding the degree of adjustments made for children. For example, it is unclear whether the effects of personality traits remain consistent across ADL and CDL, or if they interact with contexts to affect the degree of adjustment. In other words, it is unknown whether there is any correlation between speakers' multimodal ADL and CDL (individual style). Thus, the goal of our study is to better understand individual differences in personal style, empathy and the Big Five in multimodal child-directed language.

We examined CDL in television programmes, an area that is significant but underexplored. As children increasingly engage with TV programmes, they acquire knowledge from various sources. The way broadcasters structure their language to attract their young audiences is crucial for the success of a CDL programme. Using a distinct speaking style marked by higher and more emphatic intonation and a faster speaking rate, broadcasters establish rapport and credibility with the audience. These prosodic cues are preferred by listeners (Gasser et al., 2019), and listeners are more accurate when identifying an advertising text narrated by professionals than by non-professional voiceovers (Medrado et al., 2005). Furthermore, while TV broadcasts are multimodal, only two studies have investigated adjustments in prosody, facial expressions and hand gestures (but nothing on individual differences) by broadcasters in child-directed programmes (Swerts & Krahmer, 2010; Zhang & Gu, 2023). To fill in this gap, we examined how individual differences influence broadcasters' multimodal adaptations in children's broadcasting programmes.

Method

Participants

Participants consisted of 46 Chinese female college students majoring in broadcasting (Mean age=19.7 years, SD=0.91).

Procedures

With a screen beside them, simulating an authentic broadcast setting, participants performed a live broadcasting programme aimed at adults and children respectively. They stood in front of a camera to deliver a one-minute programme about the picture on the screen to their imagined audiences. Before recording, they had two minutes to prepare for each picture. Participants broadcast four pictures for two programmes with a lunch break. The sequence of the programmes and pictures was counterbalanced. After that, participants finished an online questionnaire, which collected their empathy level (Baron-Cohen & Wheelwright, 2004) and the Big Five personality traits (Wang et al., 2011). Five participants did not fill in the personality traits and were excluded from those analyses.

Annotation and data processing

There were 399.58 minutes of recordings and 9564 gestures. Speech was automatically transcribed via *Xunfeitingjian* (https://www.iflyrec.com/) with manual corrections.
Prosody Utterance boundaries were annotated through the silence function in Praat (Boersma & Weenink, 2019) and then corrected manually. *Mean pitch* (semitone, ST), *mean intensity* (dB), *speaking rate* (words/sec; Han, 2019) and *pauses* (the number of pauses and pausing rate of broadcasting each picture) were coded and computed.
Linguistic features We extracted *lexical frequency* (based on SUBTLEX-CH corpus; Cai & Brysbaert, 2010), *lexical diversity* (based on MATTR; Covington & McFall, 2010), *mean length of utterances* (MLU, the average number of words per utterance; Dickinson & Porche, 2011), and coded *sentence types* (question/statement; Dong et al., 2021).
Gestures were annotated through Elan (Wittenburg et al., 2006), coded into *referential* and *non-referential gestures*. Referential gestures can illustrate some aspects of the topic being spoken of (such as iconic, metaphoric, and deictic gestures), while beat and pragmatic gestures are non-referential (McNeil, 1992). We computed the adjustments from both *gesture rate* (per second) and *gesture saliency* (size of gestures in the vertical, horizontal plane and manual articulators; see Chu et al., 2014; Zhang & Gu, 2023).
Empathy and Big Five personality traits Empathy level was coded through the Empathy Quotient questionnaire with 60 questions and a total score of 80 (Mean=43.39, SD=9.68). The personality traits were measured through the Chinese Big Five Personality Inventory Brief Version. Each personality trait consisted of 8 questions (scores vary from 1-48) with a total of 40 questions (Extraversion: Mean=26.21, SD=5.63; Neuroticism: Mean=25.1, SD=7.7; Openness: Mean=36.95, SD=6.07; Agreeableness: Mean=24.24, SD=5.66; Conscientiousness: Mean=31.93, SD=5.47).

Analysis

All analyses were conducted in RStudio 9.0.351 (RStudio Team, 2020). To study the individual style, we first analysed the correlations between participants' adult-directed broadcast (ADB) and child-directed broadcast (CDB) in prosodic (e.g., F0, intensity, speaking rate, pausing), linguistic (e.g., lexical diversity, word frequency) and gestural (e.g., gesture rate, duration) production to assess the presence of stable traits across language contexts. Second, to measure the degree of adjustments, we computed a hyperscore by subtracting the differences between the two programmes for each broadcaster's multimodal behaviour. For example, the mean pitch hyperscore = (the mean pitch in CDB) – (the mean pitch in ADB). To analyse the effect of individual differences on broadcasters' multimodal adjustments between ADB and CDB, we constructed linear mixed-effects models. The DVs were multimodal adjustments (hyperscores) in prosody, linguistic features and gestures. The IVs were empathy and big-five personality traits. We put all the personality traits in one model, and then dropped insignificant IVs to check if the results remained the same. We compared the AICs of the models to find the best-fit model. Participants were included as a grouping variable with a random intercept. The four pictures and participants' studying year cohort (grade) were control variables.

Results

Correlations between ADB and CDB

First, as Table 1 shows, prosodic, linguistic features and gestural cues in ADB all had a strong correlation with their CDB production (all p's <.01). This implies that there is a stable individual multimodal communicative style across adult-directed and child-directed contexts.

Table 1: Correlation results (r and p) between different cues (between ADB and CDB programmes).

Cues	r and p	Cues	r and p
Mean pitch	0.84[***]	Statement	0.77[***]
Mean intensity	0.92[***]	Question	0.45[**]
Pause rate	0.83[***]	Ref. gesture saliency	0.82[***]
Speaking rate	0.73[**]	Non-ref. saliency	0.81[***]
Lexical diversity	0.68[**]	Ref. gesture rate	0.79[***]
MLU	0.80[***]	Non-ref. gesture rate	0.83[***]
Word frequency	0.53[***]		

Note: ***p<0.001, **p<0.01, *p<0.05.

However, a close look at the individual's data reveals that the degree of adjustment in each cue between CDB and ADB was different across participants (Figure 1). Such individual differences were influenced by empathy and certain Big Five personality traits as reported below.
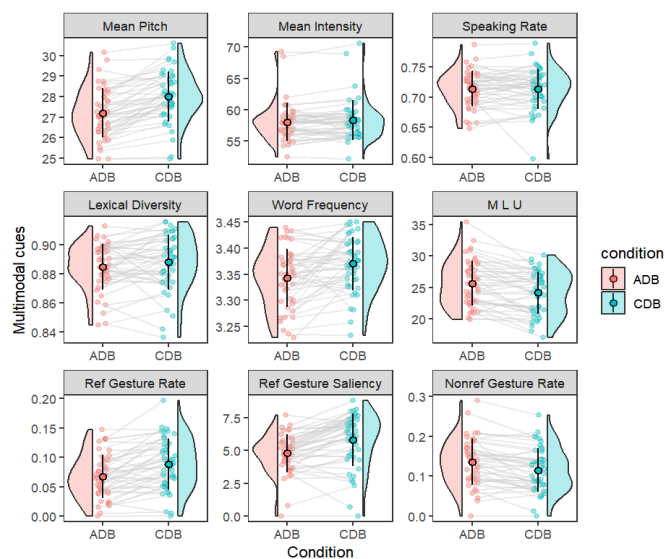

Figure 1: Individual differences in multimodal adjustments between ADB and CDB.

Prosody

Regression analyses showed that the adaptation of mean pitch was positively affected by empathy (β=.02, p=.03) but negatively affected by openness (β=-.05, p=.004), which means that higher-empathetic and less open participants modified their mean pitch more for children (Figure 2A). Participants with higher levels of empathy exhibited a higher mean pitch for CDB than ADB. Conversely, participants with high levels of openness showed the opposite adjustment.

The adjustment of mean intensity (Figure 2B) was positively predicted by empathy (β=.05, p=.005), and negatively predicted by agreeableness (marginal significant, β=-.08, p=.06). This suggests that speakers with high levels of empathy and low levels of agreeableness adjusted their mean intensity more for children than for adults, and they spoke louder in CDB than in ADB.

For pauses, the difference in the number of pauses in two programmes (Figure 2C) was negatively associated with empathy (β=-.18, p=.019) but positively associated with neuroticism (β=.22, p=.025). This indicates that lower-empathetic and highly neurotic participants adjusted their pausing times more for children, and they paused more times in CDB than in ADB. As for the pause rate, the adjustment was marginally influenced by neuroticism (β=.0006, p=.056).

The adjustment of speaking rate (Figure 2D) was positively predicted by both empathy (β=.02, p=.008) and neuroticism (β=.0006, p=.037). This indicates that higher levels of empathy and neuroticism predicted greater adjustments in CDB, resulting in faster speech than ADB.
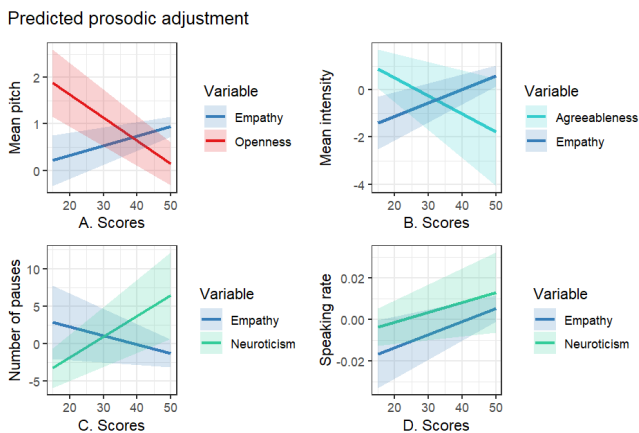

Figure 2: Predicted individual differences in prosodic adjustments between ADB and CDB (a hyperscore threshold is 0 on the y axis, only significant factors are plotted). For visualization, the range of each individual character in this figure and below is all set at (15-50).

Linguistic features

Figure 3A showed that the modification of lexical diversity (β=.001, p=.02) was positively predicted by empathy. This indicates that higher levels of empathy were associated with greater adaptation to children, such as using more diverse words when interacting with children compared to adults.

The adaptation of MLU was positively predicted by conscientiousness (β=.13, p=.04, Figure 3B), indicating that highly conscientious participants adapted their utterance lengths more in CDB such that their MLU was longer in CDB than in ADB.

The adaptation of using statements was negatively predicted by empathy (β=-.002, p=.08, Figure 3C), indicating that lower levels of empathy were associated with greater adjustments in statement use in CDB. Conversely, it was positively predicted by openness (β=.005, p=.006), suggesting that higher levels of openness were associated with increased statement use in CDB.

In terms of word frequency, the adjustment was positively predicted by empathy (β=.004, p=.045) and marginally negatively predicted by extraversion (β=-.006, p=.09; Figure 3D), indicating that higher-empathetic and less extroverted participants modified their word frequency more for children. Highly extroverted participants had an opposite pattern compared to higher-empathetic participants.
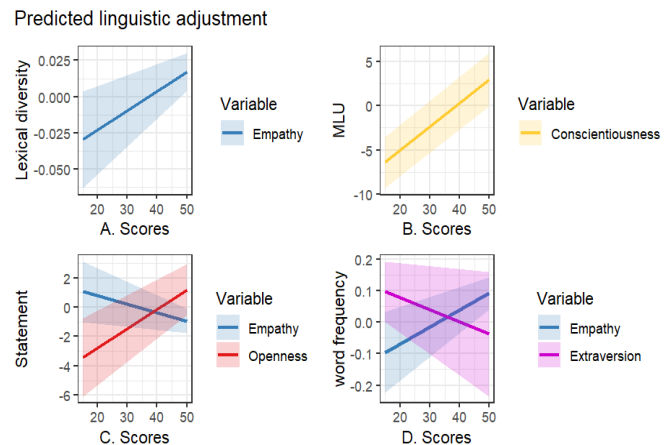

Figure 3: Predicted individual differences in linguistic adjustments (hyperscores) between CDB and ADB.

Gestures

First, the adjustment for saliency of referential gestures (Figure 4A) was positively predicted by both empathy (β=.04, p=.026) and extraversion (β=.08, p=.01), but marginally negatively predicted by agreeableness (β=-.06, p=.07). This indicates that higher levels of empathy and extraversion were associated with greater adjustments in the saliency of referential gestures.

Second, the adjustment of referential gesture rates was negatively predicted by neuroticism (β=-.002, p=.017; Figure 4B), indicating that participants lower in neuroticism adjusted their frequency of referential gestures more in CDB than ADB. Conversely, highly neurotic participants used referential gestures at a lower frequency in CDB than in ADB. However, for the adjustment of non-referential gestures in both saliency and rate, there were no significant relationships. Further examining beat and pragmatic gestures separately, the adjustment for saliency of beat gestures was influenced by empathy level (β=.04, p=.0038; Figure 4C). Specifically,

higher-empathetic participants adjusted their beat gesture sizes more saliently for children than for adults.
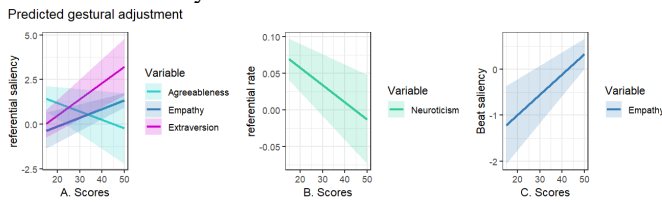

Figure 4: Predicted individual differences in gestural adjustments (hyperscore) between CDB and ADB.

Discussion

We investigated the effects of individual differences on broadcasters' multimodal adjustments between child-directed and adult-directed language. Despite high correlations in cues between two language contexts, not all broadcasters adjusted for child-directed programmes. Empathy levels and personality traits did affect broadcasters' degree of multimodal adjustments between CDL and ADL.

Individual style

This is the first study examining individual styles in CDL and ADL. We showed that a broadcaster's language style in all modalities is quite consistent across language contexts. Thus, individual adjustments between different programmes can be viewed as a stable trait that a person would perform in different registers. For example, participants who used a higher pitch in ADB would be more likely to produce a higher pitch in CDB, regardless of empathy and personality traits. Given that our participants were well-trained future broadcasters, it remains to be seen whether such an individual language style is similar to caregivers' CDL and ADL.

However, there were large individual differences within a programme and the degree of adjustments between programmes was different. Below we discuss how empathy and the Big Five personality traits influence prosody, linguistic features and gestures.

Prosodic adjustments and individual differences

Mean pitch Participants with higher empathy adjusted their mean pitch more for children than for adults. In line with previous research, CDS usually carries a higher mean pitch, more empathetic speakers may be more motivated to adjust their pitch. Although Kempe (2009) suggests that higher-empathetic females displayed a high pitch in ADS but not in CDS, our study provides evidence that higher-empathetic participants indeed raise their mean pitch for children compared to adults. This discrepancy may be due to contextual factors in Kempe's study, where participants producing ADS were aware of children in the room, potentially influencing their pitch patterns.

However, participants high in openness adjusted reversely. Different from other personality traits, participants with a high level of openness had a smaller mean pitch in CDB. Openness is associated with traits such as creativity, innovation and untradition (McCrae, 1987; Zhao & Seibert,

2006), leading individuals to adopt unconventional prosodic patterns. More opener broadcasters are thus more likely to deviate from traditional speech patterns to create a unique communication style.

Mean intensity Participants who were higher in empathy and lower in agreeableness adjusted more for their child-directed mean intensity than adult-directed ones. This suggests that individuals with higher empathy may be more attuned to the emotional needs of children and adjust their speech intensity accordingly. Agreeableness, however, showed a different pattern. Individuals high on agreeableness, characterized by trusting, forgiving and caring tendencies (Toegel & Barsoux, 2012), tended to have a higher mean intensity for adults than for children. Mohammadi and Vinciarelli (2012) suggested that speakers with higher formants are perceived as less agreeable and more neurotic, thus, broadcasters with high agreeableness may restrain their loudness while speaking, especially when facing children, as they try to build a trusting and kind atmosphere.

Pauses Broadcasters with high neuroticism adjusted their duration and frequency of pauses more in CDB than in ADB. Neuroticism represents a tendency to experience negative emotions and has been associated with behaviours such as more frequent fidgeting and self-touching (e.g., Ekman & Friesen, 1972). Moreover, speakers' anxiety was related to disfluency in speech (Mora et al., 2023), and highly neurotic individuals are more likely to feel unaware of their own actions (Boyce & Parker, 1989), which leads to more frequent pausing. However, broadcasters with high empathy levels exhibited less adjustment in the duration of pauses when speaking to children. Higher-empathetic participants may prioritize conveying more information to children within a time constraint. For example, if they realise that children are typically less knowledgeable than adults, they should strive to provide more contextual information to ensure understanding, thus reducing their use of pauses.

Speaking rate The adjustment of speaking rate between programmes was affected by both empathy and neuroticism. Previous research has shown that CDS is not always slower than ADS (Han et al., 2022; Zhang & Gu, 2023), highlighting the importance of considering individual differences in adjustment. Higher-empathetic participants adjusted more in CDB and had faster speaking rates for children. Broadcasters strive to make their facial expressions congruent with verbal content that is more expressive when addressing children than adults (Swerts & Krahmer, 2010). If broadcasters tried to convey their content more expressively and happier in CDB, they could increase their speaking rate as it increases with emotions for happiness, sounds more attractive, and decreases for boredom (Pell, 2001; Scherer, 2003; Street & Brady, 1982).

Moreover, highly neurotic participants also talked faster in CDB than in ADB. Neuroticism is often associated with negative emotions, including sadness, anxiety, and fear (Nettle, 2007). Speakers' anxiety was shown to result in a faster speaking rate (e.g., Apple et al., 1979). Also, people with higher neuroticism are associated with more emotional

instability (Leary & Hoyle, 2009), they can suffer more emotional fluctuation in CDB (e.g., being more excited or nervous), which leads to a faster speaking rate.

Linguistic adjustments and individual differences

Lexical diversity and word frequency Higher-empathetic participants used more frequent and diverse vocabulary in CDB than in ADB. Participants with a high empathy level may be more concerned about ensuring their child audiences can understand their speech in the time-limited programme, leading them to use more frequent words and explain their content more diversely. However, extraversion showed a different relationship. Highly extroverted participants adjusted their words less frequently for children than for adults, while more introverted participants adjusted oppositely. Introverts tend to exhibit a more careful, precise, and focused style, while extraverts may adopt a more imprecise and "looser" style (Gill & Oberlander, 2002). Additionally, extraverts may show faster but less accurate performance in complex cognitive tasks, whereas introverts excel in tasks requiring focus, vigilance, and reflection (Eysenck & Eysenck, 1985; Harkins & Geen, 1975). These differences in cognitive processing are likely reflected in language use, with extraverts potentially being less accurate in adjusting their word frequency according to audiences.

MLU While CDL is claimed to be shorter, we unexpectedly found that only conscientiousness predicted the adjustment of MLU, with more conscientious participants actually exhibiting longer MLU in CDB than in ADB. Highly conscientiousness refers to the higher ability of impulse control, orderliness, goal-directed behavior, and consideration of future consequences (Costantini & Perugini, 2016; Fujita, 2011; Strathman et al., 1994). As a result, highly conscientious participants may be more inclined to organize their utterances in advance and present them in a logical and coherent manner when talking to children, who typically have limited understanding capabilities. Consequently, sentences carefully crafted and well-organized are longer than usual.

Sentence type Higher-empathetic participants adjusted their use of statements more in ADB but their use of questions more in CDB. By contrast, more open participants adjusted their statements more in CDB. Openness is correlated with self-confidence (Otten, 2017), suggesting that when speaking to children, who are generally less knowledgeable audiences compared to adults, individuals may feel more confident about their speech.

However, higher-empathetic participants may prioritize arousing children's engagement in CDS. Questions used in CDS are helpful as they challenge children to reason and provide verbal explanations (e.g., Duong et al., 2021; Purpura & Ganley, 2014; Tompkins et al., 2017). Even though broadcasters had imagined audiences, higher-empathetic participants still considered the benefits of using questions to engage children. By contrast, when speaking to adults, more empathetic participants adjusted their use of statements, as adults may not need additional questions to engage with the content. This suggests that higher-empathetic participants

adapt their communication style based on the perceived needs of their audiences.

Gestural adjustments and individual differences

Both higher-empathetic and highly extroverted participants adjusted their saliency of referential gestures more in CDB than in ADB, while highly neurotic participants adjusted their referential gestures less frequently in CDB than in ADB. Highly extroverted speakers are often perceived as more outgoing and energetic (Borkenau & Liebler, 1992), and they use more expressive and salient gestures to fully engage their audiences, especially when facing children. As for broadcasters with higher empathy, taking children's language ability into account, they made referential gestures more saliently for children as such gestures clearly and directly represent the semantic content of speech (Rohrer et al., 2022).

The presence of many psychological disorders, especially anxiety and mood disorders, is correlated with neuroticism (Watson et al., 2005). Individuals scoring high on neuroticism are characterized by excessive rumination, low self-esteem, and shifting self-concepts, which can affect their gesture product even though referential gestures are helpful for successful communication.

The current study did not find relationships between the adjustment of overall non-referential gesture production and individual differences. However, the adjustment of saliency of beat gestures was strongly predicted by empathy. Higher-empathetic participants adjusted their beat sizes more saliently for children. We did not find a relationship between the frequency of beat gestures and empathy. While beat gestures can signal a variety of pragmatic and discourse meanings (McNeill, 1992; see also Prieto et al., 2018) and help children recall words (Igualada et al., 2014), too frequent beats are not helpful for children (Rohrer et al., 2020). Higher-empathetic participants considered children audiences more than their lower-empathetic counterparts, and they adjusted their gesture sizes more for children in both referential and beat gestures.

Conclusion

This study offers the first comprehensive analysis of how individuals' language style, empathy and the Big Five personality traits affect their multimodal modulation of child-directed and adult-directed broadcasting. While many multimodal cues in CDB highly correlate to ADB, there are larger variations in broadcasters' adjustments for child-directed programmes, depending on their empathy and personality traits. Our results reflect the importance of considering individual differences in the design and delivery of child-directed communication. For broadcasters, the ability to adapt multimodal communication to the needs of their audiences can enhance the educational and entertainment value of their programmes, particularly for children who might benefit from them. Understanding these differences can inform broadcasters with target training and improve the quality of child-directed programmes.

Acknowledgments

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