



Vocal Accommodation and Mimicry

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Abstract

Interlocutors make a variety of verbal and nonverbal adjustments to facilitate comprehension and enhance relational solidarity. This article examines research on vocal accommodation and mimicry as a specific subset of scholarship on nonverbal adjustments. We begin by introducing communication accommodation theory and discussing how accommodation is similar to and distinct from other related constructs (i.e., reciprocity, synchrony, and mimicry). Next, we discuss a variety of contexts in which researchers have studied vocal accommodation and mimicry, namely romantic and family communication, stranger and friend communication, professional communication, and persuasion. We end by outlining directions for future research, such as examining the implications of vocal accommodation for intergenerational family relationships, and the a priori factors that influence people's ability and willingness to engage in vocal accommodation and mimicry.

Keywords Communication accommodation theory · Vocalics · Accommodation · Mimicry

Introduction

Interlocutors routinely adjust their communication in response to their interaction partners and the dynamic unfolding of interactions. *Communication accommodation theory* (CAT), which was spawned in the early 1970s (e.g., Giles 1973a), provides a robust lens through which to view the predictors, mechanisms, and outcomes related to these adjustments (see Gasiorek 2016a). Over the decades, CAT's empirical outpourings have accelerated, being achieved across numerous cultures, languages, applied social contexts *and* with methodological pluralism and eclecticism, both within its quantitative as well as interpretive, qualitative approaches (for a recent overview, see Giles 2016). Although adjustments occur in a variety of verbal and nonverbal domains (Giles and Wadleigh 2008), one particularly

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extensive line of CAT research concerns *vocal* adjustments. Vocalics pertains to that area of nonverbal communication concerned with speakers' non-linguistic use of voices, including their accents, volumes, pitches, speech rates, and pauses (Hinkle 2001; McGrath et al. 2007). Since its inception, CAT has regularly been invoked to examine and interpret vocalic adjustments. Alongside this body of research, scholars have investigated interlocutors' unconscious imitation or mirroring of various nonverbal behaviors, known as *mimicry* (e.g., Chartrand and Bargh 1999). Similar to the literature on vocal accommodation, a sizeable body of literature has accumulated that addresses vocal mimicry.

We begin by outlining some of CAT's main features, clarifying how accommodation is similar to and different from other types of adaptation. We then discuss the different topical areas that vocal accommodation and mimicry research addresses, including romantic and family communication, stranger and friend communication, professional communication, and persuasion. We end by discussing future directions that would help advance theory on vocal accommodation and mimicry. In doing so, we provide a history of vocal adaptation research and outline some of the most profitable avenues for the future.

An Overview of CAT

CAT addresses how and why people adjust their communication in the ways that they do, together with the social consequences of these adjustments. Over the decades, the theory has been elaborated and refined many times, leading to the crafting of the framework in propositional terms (see Dragojevic et al. 2016). *Accommodation* refers to appropriate communication adjustments made to others in interpersonal and intergroup situations, with each party assessing these moves based on sociohistorical factors, the relationship at hand, individual preferences, and the prevailing context (Gasiorek et al. 2015). When speakers accommodate, they enact (and can be perceived as enacting) behaviors that meet listeners' suspected needs and desires (Soliz and Giles 2014). Accommodation can serve two, sometimes overlapping, affective and cognitive functions: (1) decreasing social distance between interlocutors (which often manifests itself in the establishment or enhancement of a shared social identity or relational solidarity), and (2) facilitating comprehension or communicative efficiency between interlocutors (Street and Giles 1982; see also, Giles et al. 1979). As an example of how accommodation can fulfill both functions, a younger speaker might raise their voice when interacting with an older listener who is hard in hearing. The listener might appreciate this adjustment, thinking that it shows how the speaker had enough sensitivity to adapt their behavior in appropriate ways. As a result, the listener might experience greater relational and communication satisfaction with the speaker (affective function) and understand the speaker's message without needing the speaker to repeat their point (cognitive function).

Speakers, listeners, and third parties can all assess the extent to which a speaker has accommodated a listener. From the speaker's perspective, accommodation often manifests as *convergence* (i.e., becoming more communicatively similar to the listener in an attempt to decrease social distance and/or facilitate comprehension). Convergence can occur with respect to one or several communicative features, including the adoption of similar dialects, speech rates, volumes, pauses, and language as the listener (Coupland et al. 1988). Broadly, convergence is a speaker-oriented construct, yet it can be studied from several more specific vantage points. It includes speakers' intentions to adjust their communication in an appropriate manner as well as speakers' objective communication

behaviors that resemble behaviors of the listener (Dragojevic et al. 2016; Thakerar et al. 1982). To illustrate, convergence might occur when a national politician adopts dialects and speech rates that are similar to those of their constituents from a specific geographic region in an attempt to ingratiate themselves with the constituents, and, ultimately, win their votes.

From a listener's perspective, *accommodative communication* refers to perceptions that the speaker has adequately adjusted their message to meet the recipient's needs and preferences (Gasiorek 2015). Listeners are generally more favorable in their perceptions of speakers' accommodativeness when they perceive speakers have positive motives for communicating (e.g., when they believe speakers want to help them; Gasiorek and Giles 2015). Third parties (whether research participants or scholars) can also observe videotapes, audio recordings, and written transcripts and rate the extent to which the speakers accommodate listeners (Gallois et al. 2016). Another way to study accommodation is to experimentally manipulate the extent to which interlocutors converge to one another. For example, one study found that bilingual participants perceived people who posted negative comments below water conservation videos on YouTube as greater experts when their comments appeared in the same language as the videos (as opposed to when their comments appeared in a different language as the videos; Walther et al. 2018).

Meta-analyses of much previous CAT research have shown that listeners' perceptions of speakers' accommodation are especially powerful predictors of relational solidarity, compliance, and other outcomes (e.g., Soliz and Giles 2014). Third-party evaluations of accommodation and speakers' assessments of their own accommodation are significant (although slightly weaker) predictors across CAT studies. As Soliz and Bergquist (2016) noted, listeners' perceptions may thus be particularly influential in shaping the course of interactions and relationships over time. This may be because listeners are well-poised to keep accommodative interactions moving on their same trajectory.

Nonaccommodation can be described as messages that do not match the communicative characteristics of a recipient (Gasiorek 2016a). A recurring theme underlying various instances of nonaccommodation is that dissimilarity, rejection, or disaffiliation is intended, communicated, or interpreted (Gasiorek 2016b). With respect to the affective function of communication, nonaccommodation may result in heightened salience of intergroup identities (Soliz and Harwood 2006), decreased relational solidarity (Speer et al. 2013), and less interaction satisfaction (Harwood 2000), among other (often unfavorable) outcomes. With respect to the cognitive function, nonaccommodation may often lead to miscommunication and inefficient communication (Coupland et al. 1991).

To continue with the previous example of a younger speaker raising the volume of their voice, the older listener might not appreciate this adjustment if the listener is not hard of hearing. Younger adults often speak to older adults with overly loud voices, overly exaggerated smiles, and overly simplified vocabulary. These patronizing tendencies might lead older adults to experience a loss of control over their personal lives, and, over time, reduced psychological and physiological well-being (Ryan et al. 1986). In this case, the younger speaker's communicative tendencies might negatively contribute to the affective function by heightening the salience of intergroup age identities and decreasing relational satisfaction. An example of how vocalic nonaccommodation might negatively contribute to the cognitive function involves interactions among people with different linguistic backgrounds. Some interaction partners might be fluent in the spoken language given that it is their native language, whereas other interaction partners might have only beginning or intermediate fluency in the spoken language given that it is not their native language. The native speakers might speak too rapidly for the

non-native listeners, thereby impeding the non-native listeners' comprehension (and perhaps also eroding feelings of goodwill or relational solidarity among the non-native listeners).

From the speaker's perspective, nonaccommodation often manifests as *divergence* (i.e., communicatively becoming more dissimilar from the listener) or *maintenance* (i.e., adhering to one's default communication tendencies without moving toward or away from the listener's communication tendencies; Coupland et al. 1988; Giles et al. 1991). Similar to convergence, divergence and maintenance can be based on speakers' intentions and perceptions, or based on speakers' objective behaviors (Dragojevic et al. 2016; Thakerar et al. 1982). Divergence based on speakers' objective behaviors is similar to *antimimicry*, a term that describes instances in which speakers engage in behaviors that are opposite their interaction partners' behaviors (see Kulesza et al. 2014b).

Listeners may perceive two other forms of nonaccommodation, namely *underaccommodation* (i.e., perceiving that speakers have not gone far enough in adequately adjusting their communication) and *overaccommodation* (i.e., perceiving that speakers have overshot or overstepped the level of adjustment appropriate for smooth interaction; Coupland et al. 1988; Soliz and Giles 2014). Underaccommodation and overaccommodation appear to differ in fundamental ways, such as underaccommodation invoking more negative evaluations of the speaker and interaction compared to overaccommodation under certain conditions (Gasiorek and Giles 2012). As another example, perspective-taking is the process by which a person tries to take on an interaction partner's mental state in order to better understand why the partner acted as they did (Galinsky et al. 2005). Perspective-taking has indirectly predicted more forgiving evaluations of overaccommodation via more favorable attributions of speakers' motives, but the same indirect effects did not emerge when examining underaccommodation (Gasiorek 2015).

Taken together, these recent findings suggest underaccommodation may be even more problematic and resistant to interactional and psychological remedy than overaccommodation. Akin to meta-analytic findings relating to accommodation, listeners' perceptions of speakers' nonaccommodation are more strongly associated with a lack of relational solidarity, compliance, and other outcomes compared to third-party evaluations of nonaccommodation and speakers' assessments of their own behavior (Soliz and Bergquist 2016). This may be because listeners are especially well-suited to further inflame nonaccommodative interactions rather than redirecting the interactions toward more neutral or positive ground. For example, when listeners attribute negative intent to speakers' underaccommodation, listeners are likely to stop the interaction or express negative affect nonverbally (e.g., responding to speakers in a tone of voice indicating that they think there is a problem with the speakers' communication; Gasiorek 2013).

The above section outlined CAT's main constructs, theoretical interrelationships, and scope, and these general discussions are useful for framing more specific discussions of vocal accommodation. Below, we mine the foregoing while focusing on vocal accommodation and mimicry as specialized areas of nonverbal scholarship. We begin by discussing how accommodation is similar to and different from other constructs relevant to vocal adaptation.

Comparing and Contrasting CAT with Other Perspectives on Vocalic Adaptation

Interpersonal adaptation involves the modification of one's communicative behaviors in response to an interaction partner. Research in communication, psychology, and other disciplines considers the antecedents, processes, and outcomes involved in various forms of adaptation, including accommodation, reciprocity, synchrony, and mimicry (for a review, see Manusov 1992). Toma (2014) noted that this research is rich and multifaceted, yet also claimed that the use of different concepts to describe adaptation adds confusion and makes the various lines of research disjointed from one another at times. Toma proposed four criteria to further distinguish between types of adjustment and lines of research (e.g., accommodation versus mimicry). The first involves the *types* of adaptive behaviors a given concept refers to (i.e., whether the adaptive behaviors are verbal or nonverbal, the degree to which the adaptive behaviors must be similar to the original behavior, and the number of adaptive behaviors that form a unit of analysis). The second criterion pertains to the *mechanisms* that underlie the production of adaptive behaviors. This criterion includes whether communicators are consciously or unconsciously adapting their behaviors, the goals that drive the adaptation of behaviors, and whether or not perspective-taking is involved in the adaptation of behaviors. The third criterion concerns the *reception* of behaviors, which refers to whether or not Person B must perceive and accurately understand Person A's adaptive behaviors. The fourth criterion describes the *effects* of the adaptive behaviors, including whether or not the adaptation enhances liking, rapport, and relational solidarity between interlocutors.

Below, we distinguish accommodation from reciprocity, synchrony, and mimicry according to some of the main elements of these four criteria. Doing so will illustrate the value of CAT's contributions and provide the necessary foundations for a shared understanding and review of vocal accommodation and mimicry research.

Accommodation

Accommodation occurs across verbal and nonverbal domains and is often measured as individual behaviors. It includes the production of behaviors similar or identical to the interaction partner's behaviors (most notably, convergence) as well as the production of other situationally-appropriate behaviors (e.g., vocalizing "mm hmm" to signal affiliation and understanding when an interaction partner is speaking). Accommodation is more nuanced than simply any type of correlational or cause-and-effect shift in behavior. Rather, accommodation consists of appropriate adjustments that take into account the listener's needs, with these listener needs often based on the listener's personality traits, the listener's interpersonal history with the speaker, and the listener's intergroup histories with people from the speaker's social group memberships (Gallois and Giles 2015). This implies that a speaker's vocal accommodation does not need to be in response to vocal characteristics that the listener previously communicated to the speaker. Rather, a speaker's vocal accommodation can also be in response to a wealth of idiosyncratic, interpersonal, and intergroup knowledge that the speaker holds about the listener. CAT holds that speakers oftentimes accommodate listeners in order to be liked and/or to facilitate understanding, but speakers may or may not be consciously aware of the specific behaviors they employ

in these pursuits (Gamier et al. 2013; Giles et al. 1991; Ruch et al. 2018). When speakers consciously converge toward listeners' interaction behaviors in order to facilitate liking or build goodwill, these accommodative moves overlap with other forms of adaptation such as strategic synchrony or communicative motor mimicry (to be discussed below).

Gasiorek (2016a) identified the question of whether or not interlocutors are conscious of their accommodative behaviors as one of the largest unresolved issues awaiting future development by CAT theorists. However, as a general rule, Gasiorek proposed that people are usually unaware of their specific accommodative behaviors unless noteworthy circumstances (e.g., interacting in a job interview, going on a first date, interacting with a bilingual) intervene to bring such behaviors to consciousness. Regardless of whether speakers are aware of their behaviors or not, accommodation is motivated by the pursuit of affective and/or cognitive goals (for an application of these functions to vocalics in particular, see Scherer 1988). Perspective-taking is not necessary to engage in or perceive accommodation, yet perspective-taking on the part of listeners may lead to more favorable evaluations of nonaccommodative speakers and interactions (Gasiorek 2015; Gasiorek and Giles 2012; Giles and Gasiorek 2013). The listener may or may not perceive the speaker's behaviors as the speaker *intended* (potentially leading to discrepant assessments of accommodation and nonaccommodation between the speaker and listener). Borrowing from theorizing and research on the similarity-attraction link (Byrne 1971; Simons et al. 1970), CAT proposes that accommodation enhances interpersonal liking as well as rapport, relational solidarity, and shared ingroup identifications (Toma 2014).

Reciprocity

Reciprocity occurs when a person responds to an interaction partner with functionally similar behavior. The converse of reciprocity, *compensation* occurs when a person responds to a partner with functionally opposite behavior or with maintenance (Burgoon et al. 1995). As Toma (2014) noted, this focus on functionality implies that the behaviors of both interlocutors do not need to be visually or vocally identical (or even similar) to qualify as reciprocity. Rather, behaviors are reciprocal if they advance the same goal or function. For example, Toma described how a speaker telling a story in an animated voice and receivers intently listening to the story represent reciprocity because both parties are engaging in behaviors that serve the same function of establishing the story's merit and power. In this respect, behaviors that (visually or vocally) appear complementary can still qualify as reciprocity. However, in other circumstances, behaviors that (visually or vocally) appear similar or identical can also qualify as reciprocity (provided that these behaviors help advance the same function or goal). To illustrate with another example adapted from Toma, two parties hugging and vocally greeting one another demonstrate reciprocity because both parties' behaviors help establish warmth and affiliation. Hence, the defining characteristic of reciprocity is that both parties' behaviors serve the same goal or function, and these behaviors may appear similar, identical, or complementary to one another depending on the situation at hand.

Reciprocity and compensation are elements of *interaction adaptation theory* (IAT; Burgoon et al. 1995). IAT holds that each interlocutor enters an interaction with *requirements* (what the interlocutor needs to get out of the interaction), *expectations* (what the interlocutor anticipates getting out of the interaction), and *desires* (what the interlocutor hopes to get out of the interaction), which together form the interlocutor's *interaction position* (IP).

Each interlocutor observes the other person's behaviors and decides how to respond by assessing the alignment between the other person's behaviors and the interlocutor's own IP. One of the most important distinctions between reciprocity and accommodation pertains to the scope of behaviors each construct addresses. Reciprocity only applies to nonverbal behaviors from an IAT perspective, whereas accommodation can apply to both verbal and nonverbal behaviors from a CAT perspective. As an example of how accommodation can apply to verbal behaviors, a speaker might use the same types of slang as the listener in an attempt to establish or reinforce an ingroup affiliation with the listener. Another difference is that IAT primarily treats reciprocity in terms of the patterns of behavior that emerge over time rather than individual behaviors, whereas CAT allows for accommodation to occur through both individual behaviors and patterns of behavior (Toma 2014).

IAT holds that interlocutors are consciously aware of their own requirements, expectations, and desires, and that interlocutors communicate to fulfill goals related to their own requirements and desires. Unlike CAT, IAT does not focus on affective and cognitive functions as two overarching goals. IAT suggests that people may have a variety of idiosyncratic requirements, expectations, and desires (all, some, or none of which may involve shared affiliations and mutual understandings). Further, whereas CAT addresses both dyadic and group interactions, IAT only addresses dyadic interactions. However, similar to CAT, IAT proposes that interlocutors do not need to engage in perspective-taking when deciding how to behave. Another similarity is that both IAT and CAT hold that both parties perceive the other person's behavior, but receivers may or may not interpret senders' behaviors as the senders intended (Toma 2014).

Synchrony

Synchrony refers to the rhythmic coordination of behaviors or behavioral patterns (Condon and Ogston 1966). Synchronous exchanges must involve covariation between the interaction partners and are reciprocal and mutually rewarding. On the other hand, asynchronous exchanges are inappropriate, one-sided, or unresponsive. There are three types of synchrony (Bernieri et al. 1988; Bernieri and Rosenthal 1991): *interaction rhythms* (i.e., the coordination of identical behavioral sequences between interaction partners over time), *simultaneous behavior* (i.e., the identical imitation of a partner's behavior at the same point in time that the partner is enacting the behavior), and *behavioral meshing* (i.e., when two partners' behaviors form a single and meaningful whole). An example of behavioral meshing would be a speaker telling a joke in an excited tone and the listener laughing in genuine enjoyment, which is a mutually rewarding occurrence because both parties derive pleasure from the joke. As this example illustrates, behavioral meshing can involve complementary behaviors. All three types of synchrony generally focus on nonverbal behavior. Interaction rhythms involve behavior sequences as the unit of analysis; simultaneous behavior and behavioral meshing involve individual behaviors as the unit of analysis (Toma 2014).

Unlike CAT, scholars do not assume that interlocutors generally synchronize in order to affiliate with their partners or increase understanding (i.e., the affective and cognitive functions). Rather, scholars propose synchrony is unconscious and designed to fulfill more basic and innate needs for organization and predictability. However, although scholars assume unconscious synchrony to be the default by which most interactions operate, they also allow for people to consciously and strategically synchronize when they want to show engagement in social interactions or build goodwill. Similar to accommodation, synchrony

predicts outcomes such as increased positive affect and relational solidarity; nonaccommodation and the absence of synchrony predict negative affect and disrupted relationships (Toma 2014).

Mimicry

Mimicry is the direct imitation or mirroring of an interaction partner's nonverbal behaviors (Chartrand and Bargh 1999). At least two types of mimicry can be described. First, *communicative motor mimicry* refers to the strategic and conscious imitation of an interaction partner's nonverbal behaviors in order to convey to the partner that they are liked and understood (Bavelas et al. 1988). As such, communicative motor mimicry resembles accommodation in its fulfillment of affective and cognitive goals. Communicative motor mimicry allows for the mimicker to take the perspective of the interaction partner, and it also presumes that the interaction partner perceives and interprets the mimicking behaviors as the mimicker intended. There is likely a bidirectional relationship between communicative motor mimicry and phenomena such as rapport and relational solidarity. Toma (2014) argued that the differences between accommodation and communicative motor mimicry are less meaningful than the similarities, and that scholars should re-conceptualize this type of mimicry as an instance of successful accommodation in which both parties' evaluations align.

Second, *the chameleon effect* refers to the unconscious imitation or mirroring of an interaction partner's nonverbal behaviors, often without the pursuit of any particular goal (Chartrand and Bargh 1999; for a discussion of the corresponding *echo effect* in the realm of verbal mimicry, see Kulesza et al. 2014a). The presence or absence of interaction goals constitutes one main distinction between unconscious imitation in the chameleon effect and unconscious imitation in accommodation. In their seminal research, Chartrand and Bargh (1999) found that naïve participants mimicked the face rubbing and foot shaking of both smiling (perhaps likeable) and nonsmiling (perhaps unlikeable) confederates. Participants mimicked the nonsmiling confederates more frequently than they mimicked the smiling confederates, suggesting the adaptations were independent of any affiliation goal. When probed in an open-ended manner about what behaviors the confederates were engaging in, no participant mentioned being aware of face rubbing or foot shaking. In a follow-up study published in the same article, Chartrand and Bargh found that participants reported greater liking for a confederate and greater perceptions that the interaction flowed smoothly when the confederate mimicked the participant compared to when the participant was not mimicked. Of the 37 participants in the mimicking condition, only one participant was consciously aware of the confederate's imitating behaviors. Taken together, these two studies suggest that mimicking is not necessarily tied to an identifiable set of goals and that mimicking almost always lies beyond the awareness of both the mimicker and the person being mimicked.

The chameleon effect is thought to arise from the perception-behavior link, whereby the mental representations and areas of the brain involved in observing others' behaviors are also the mental representations and areas of the brain involved in later producing one's own behaviors (Paus et al. 1993; Piaget 1946; for a discussion of how some instances of accommodation and mimicry might involve more detailed mechanisms than the perception-behavior link, see Moody and McIntosh 2011; Ruch et al. 2018). Listeners do not have to perceive and accurately interpret this form of mimicry. In fact, the

chameleon effect seems to apply to the mimicking of fictional television characters and characters from novels. Unconscious mimicry and outcomes such as liking, relational solidarity, and rapport appear to demonstrate bidirectional relationships, with mimicry causing these phenomena and these phenomena also causing mimicry (Toma 2014; see also, Chartrand and Lakin 2013; Lakin and Chartrand 2003). People who are mimicked have been more inclined to engage in prosocial behaviors for the mimicker's benefit (e.g., helping the mimicker clean up a mess, accompanying an apparently lost mimicker to a train station) compared to people who are not mimicked (Kirschner and Tomasello 2010; Müller et al. 2012). People who are mimicked are also more willing to help third parties, suggesting that mimicry may lead to a general prosocial orientation that confers benefits beyond those conferred to the mimicker (van Baaren et al. 2004).

A recent meta-analysis (Vicaria and Dickens 2016) found that interpersonal coordination (which encompassed both synchrony and mimicry) reliably predicted more positive evaluations of the interaction (e.g., believing that the interaction went smoothly, feeling emotionally close to the interaction partner when conversing), more positive evaluations of the interaction partner (e.g., increased liking and trust in the interaction partner), and more prosocial behaviors (e.g., increased prosocial behavior in subsequent economic games). Synthesizing these findings, the authors concluded that "interpersonal coordination is indeed the 'social glue' that promotes social cohesion among interaction partners" (p. 353).

Mimicry implicated in the chameleon effect is similar to and different from accommodation. One similarity between unconscious mimicry and unconscious accommodation is that neither type of adjustment requires perspective-taking. One major difference is that the chameleon effect (in its original form) was proposed to occur without any affiliative goal (see Chartrand and Bargh 1999), whereas accommodation is theorized to help fulfill affiliative and cognitive goals. Subsequent scholarship, however, has challenged the notion that unconscious mimicry occurs without affiliative goals. From an evolutionary perspective, Lakin et al. (2003) proposed that mimicry evolved to serve a social function of increasing affiliation with interaction partners, thereby helping foster close relationships. Consistent with this notion, Lakin et al. (2008) found that people excluded from an online game were more likely to nonconsciously mimic the foot-shaking behaviors of a subsequent interaction partner more than people who were included in the game. They reasoned that the increased foot-shaking behaviors of excluded participants constituted an attempt to address threatened belongingness needs (see also Cheng and Chartrand 2003; Lakin and Chartrand 2003). Given the differences between seminal (e.g., Chartrand and Bargh 1999) and subsequent (e.g., Lakin et al. 2008) research, we would suggest that unconscious mimicry can occur with or without an affiliation goal. When it occurs with an affiliation goal, unconscious mimicry heavily overlaps with convergence. When it occurs without an affiliation goal, unconscious mimicry is distinct from convergence.

To summarize, several distinct yet overlapping constructs describe and explain interpersonal adaptation. Accommodation, reciprocity, synchrony, and mimicry were interpreted with special attention to the similarities and differences between accommodation and the three other constructs. Below, we outline the topical areas in which vocal accommodation and mimicry have been studied. Although the review primarily consists of scholarship on vocal accommodation and mimicry, we also incorporate research on reciprocity and synchrony when appropriate given that various forms of adaptation have predicted outcomes such as rapport and positive impressions of the interaction partner (Tickle-Degnen and Rosenthal 1987, 1990).

Areas of Study

Romantic and Family Communication

A considerable amount of research has addressed how parents (especially mothers) and infants vocally adjust to one another. Mothers and infants have a rich capacity to adjust their voices toward one another and engage in other accommodative behaviors (e.g., mutual gaze; Locke 1993). Both mothers and infants appear more likely to begin vocalizing when the other party is vocalizing or has just finished vocalizing (as opposed to when the other party has been silent for quite some time), suggesting that both parties broadly adopt the other party's patterns of silence (Anderson et al. 1977). Another study found that the ratio of nine-month-old infants' non-simultaneous vocalizations (i.e., infant vocalizations that occur when the mother is not currently talking or otherwise making noise) to interruptive vocalizations (i.e., infant vocalizations that simultaneously occur when the mother is talking or otherwise making noise, thereby taking the floor away from the mother) is 15.8:1 (Jasnow and Feldstein 1986). The authors argued that these results speak to a pattern of accommodation whereby infant-mother interactions resemble the norms and formats of adult-adult interactions, and that babies' vocal accommodation emerges prior to their linguistic mastery.

Mothers' adjustments toward infants have also been the subject of research. Moderately talkative mothers have evoked more infant vocalizations compared to highly or lowly talkative mothers, and moderately talkative mothers have also been more responsive than lowly talkative mothers to such infant vocalizations (Roe and Drivas 1997; Roe et al. 1990). Moderate talkativeness on the part of mothers may, thus, be most conducive to fostering vocal competence (as evidenced by the higher number of infant vocalizations) and secure attachment (as evidenced by the mothers' higher responsiveness to the vocalizations) in infants (see also Ainsworth 1979). However, another strand of research has found that although mothers and fathers accommodate their voice pitch to infants, infants do not, in turn, accommodate their voice pitch back to their parents (McRoberts and Best 1997; Siegel et al. 1990). Hence, although the literature has documented many instances of mutual accommodation between parents and infants, vocal nonaccommodation also exists and appears to be largely one-sided with parents accommodating and infants not accommodating.

Spouses and dating partners also coordinate and adjust their voices in intricate ways. During discussions of marital problems, for example, spouses in chronically distressed marriages have synchronized the pitch and energy of their voices at higher levels when they held positive attitudes about the discussions as opposed to negative attitudes (Lee et al. 2010). Another study found that third-party coders performed significantly better than chance at determining whether people were talking to a dating partner or a same-sex friend over the telephone based on 20-second clips of natural conversations (64.6% accuracy) and on clips in which the caller is saying, "How are you?" (60.2% accuracy). Women also deepened their pitches when saying, "How are you?" to a dating partner compared to a female friend, whereas men increased their pitches when saying that phrase to a dating partner as opposed to a male friend. Further, participants' self-reported intimacy for their dating partner (a sub-dimension of love) positively predicted coders' ratings of romantic interest in the 20-second clips which, in turn, positively predicted coders' accuracy in judging relationship type in these clips (Farley et al. 2013).

From a CAT perspective, Farley et al. (2013) noted that their study was among the first to simultaneously examine the *match* between how romantic partners adjust their voices to convey certain impressions and feelings, and how outside observers are able to pick up on these actual accommodations. Their findings on pitch also complement work on how vocal convergence and mimicry are associated with affection, affiliation, perceptions of communication quality, and other correlates (Chartrand and Dalton 2009; Floyd and Ray 2003; Gregory et al. 1997). Going forward, Farley et al. noted that more *within-subject* research is needed to understand how certain motives (e.g., to affiliate, to deceive) and emotional states (e.g., loneliness) predict romantic partners' vocal variations over time. In large part, past researchers have assumed goals such as affiliation underlie vocal mimicry or accommodation, or have tested the associations between affiliation goals and vocal adjustments through cross-sectional correlations or between-group comparisons.

In addition to more carefully examining the within-person unfolding of the associations between motives and vocal adjustments, future researchers should examine how multiple motives and/or social identities interactively predict vocal adjustments in family relationships, an understudied process known as *layering* (Soliz and Rittenour 2012; see also Oakes et al. 1994). Previous researchers have studied how accommodation and nonaccommodation are associated with the salience of a single social identity, such as religious identity (Colaner et al. 2014) or ethnic identity (Soliz et al. 2009). However, much less is known about how two or more social identities might additively or interactively predict accommodation and nonaccommodation. For example, how do grandchildren vocally adjust to grandparents when grandchildren share a common family identity with their grandparents while simultaneously viewing their grandparents as outgroup members with respect to age group memberships? Does one of the identities overpower the other identity in influencing grandchildren's vocal adjustments, or do both identities interact with one another to predict vocal accommodations in more nuanced ways? Are there certain subsets of grandchildren (e.g., cognitively complex grandchildren) who are more likely to ignore the discrepant age identities and instead focus on the shared family identity? Such questions seem worthy of study given that multiple social identities may be salient in everyday life (see Crisp and Hewstone 2007).

Stranger and Friend Communication

Other research has considered how strangers and friends adjust to one another, with much of this research focusing on gender issues in particular (e.g., Hogg 1985). Examining how previously-unacquainted college students completed a problem-solving task, Bilous and Krauss (1988) found that women laughed more than men, both while in same-sex and mixed-sex dyads. Women's frequency of laughter was especially pronounced while interacting with a male partner rather than a female partner. Men's frequency of laughter was low in both dyad types, but it was slightly lower when interacting with a male partner. The researchers reasoned that women's accommodation through laughter may have represented attempts to foster favorable impressions in their interaction partners. Also in the realm of accommodations to strangers, observers have rated female participants as converging to strangers' voices more than what male participants' voices converged, and females' convergence was especially pronounced when they were interacting with male strangers (Namy et al. 2002). Some of these differences persisted after controlling for social motives, suggesting that vocal accommodation to strangers may partly be due to gender differences in perception sensitivity.

A related subset of research pertains to how people mimic or are mimicked by strangers with whom they might want to become romantically involved (for an example of such research examining verbal and nonverbal mimicry outside the realm of vocalics, see Guéguen 2009). Analyzing conversations between a highly attractive female interviewer and male interviewees about a range of personal and impersonal topics, Farley (2014) found that men who were more romantically interested in the interviewer nonconsciously mimicked her face-touching behaviors more than men who were less romantically inclined. Some evidence also suggested that interviewees who were not exclusively dating a partner in real life sounded more vocally pleasant than interviewees who were exclusively dating a real-life partner. Thus, vocal and other nonverbal cues may have been signaling the men's availability for a potential romantic relationship. Karremans and Verwijmeren (2008) uncovered a potential mechanism for these effects: male participants currently in romantic relationships are less attracted to female interaction partners, and this lowered attraction, in turn, is associated with less nonverbal mimicking (see also the devaluation hypothesis; Johnson and Rusbult 1989). Moreover, as Farley (2014) notes, the single men's vocal pleasantness may have served as an affiliative cue. This affiliative cue might have facilitated the affective function of accommodation by decreasing the social distance between the single men and the female interviewer.

Similar to Farley et al.'s (2013) findings on accuracy in discerning relationship type, Montepare and Vega (1988) found that observers exposed to segments of conversations accurately identified whether women were conversing with their boyfriend or a casual male friend significantly better than chance. Although Montepare and Vega found no differences for language use (e.g., word simplicity), observers rated women's voices as higher pitched and more feminine, babyish, pleasant, and relaxed when they were conversing with boyfriends as opposed to casual male friends.

From a CAT perspective, Montepare and Vega (1988) argued that women may objectively diverge more when talking to their boyfriends rather than casual male friends in order to accentuate their female and sexual identities (Thakerar et al. 1982). Recognizing that divergence is very often associated with disaffiliation and other anti-social outcomes, Giles (1980) introduced complementarity as a speaker-focused strategy on par with convergence, divergence, and maintenance to better account for this unique phenomenon. *Complementarity* refers to the accentuating of valued communicative differences between interlocutors and often occurs when romantic partners communicate in opposite ways (such as men lowering their pitches and women raising their pitches in romantic encounters). Complementary strategies may be less likely when men and women are in casual or strictly platonic friendships that they do not want to escalate into romantic relationships, given that behaviors such as flirtation are less likely in these contexts (Guerrero and Chavez 2005; Messman et al. 2000; Weger and Emmett 2009).

Professional Communication

Vocal accommodation and mimicry have been examined in a variety of organizational and other formal settings, including the hospitality industry (Sparks 1994; Sparks and Callan 1992), call centers (Rueff-Lopes et al. 2014), U.S. presidential debates (Gregory and Gallagher 2002), and courtrooms (Gnisci 2005). For example, one CAT study of culturally-heterogeneous work groups found that excessive attention to team members' accents and interruptions contributed to destructive conflict management. More specifically, one of the work groups had an average of 20 interruptions an hour, with interruptions often

characterized by disagreement and frustration. On the other hand, long pauses were helpful as a way to mull information and take breaks from mentally taxing information (Ayoko et al. 2002).

One theme that has emerged in this line of research is that interlocutors might use convergence or mimicry to ingratiate themselves with the interaction partner, perhaps accruing interpersonal and professional benefits (e.g., Curhan and Pentland 2007). When leaving voicemails for professors about class projects, students have left longer messages when their professors' answering machine scripts were longer (Buzzanell et al. 1996). These scholars reasoned that this convergence in total speaking time helped students establish similarity with the professors, potentially leading professors to view the students more favorably and enhance their evaluations of the students' work. In another study of *Larry King Live* episodes, Gregory and Webster (1996) showed that Larry King was more deferential toward higher-status guests (e.g., presidents, presidential candidates, famous singers) by converging his pitch toward them, whereas lower-status guests (e.g., lesser-known politicians and athletes) were more deferential toward King by converging their pitch toward King's pitch. Put differently, King accommodated higher-status guests but, conversely, was accommodated to by lower-status guests. Gregory and Webster interpreted these findings as consistent with CAT's notion that convergence will increase when speakers have a greater desire to gain the listener's social approval (Giles and Coupland 1991). Still, there remain instances in which lower-status people do not converge to higher-status people's vocalics. During job interviews, male interviewees who were highly identified with their specific accent objectively diverged from interviewers who held a different accent (Willemyns et al. 1997). Intergroup distinctions were likely very salient, and the interviewees may have diverged in order to demonstrate their lack of identification with the interviewers' communicative characteristics.

Persuasion

From its inception, CAT has addressed how vocal accommodation might influence people in certain ways. Giles (1973b) showed how speakers with a standard British accent (known as Regional Pronunciation, or RP) were more persuasive than speakers with less-prestigious regional accents in changing participants' moral views about capital punishment. In a follow-up study on a different political issue (i.e., approval of the Industrial Relations Act, which regulates relationships between employers and employees), Powesland and Giles (1975) found that the only group of participants to change their attitudes consisted of people who heard RP-accented speakers arguing against the Act (as opposed to people who heard RP-accented speakers arguing for the Act, and people who heard regional-accented speakers arguing for or against the Act). People who heard RP-accented speakers arguing against the Act reported more unfavorable views of the Act after the speech compared to before the speech. Powesland and Giles reasoned that many of the participants were themselves RP-accented and, thus, likely thought of themselves as similar to the RP-accented speaker. Further, given that RP-accented citizens were generally thought to be in favor of the Act in larger society, the mismatch between stereotypes associated with the RP accent and the actual message advocated by the RP-accented speaker also seemed influential in prompting participants to reconsider their opinions. Thus, the unique combination of being able to see oneself as similar with the speaker *and* being exposed to an unexpected or

counterintuitive message seemed important in changing participants' attitudes (for a connection to language expectancy theory, see Burgoon et al. 2002).

Researchers have continued to consider how non-linguistic aspects of messages can persuade people under certain circumstances (e.g., Aune and Kikuchi 1993; Buller and Aune 1988, 1992; Gregory et al. 1997). Blending CAT with other perspectives, Buller and Burgoon (1986) found that nonverbally sensitive decoders were willing to donate more time to academic research when interviewed in pleasant (rather than neutral) voices, whereas nonverbally insensitive decoders were willing to donate more time when interviewed in neutral (rather than pleasant) voices. Their findings point to a foundational assumption of CAT, namely that speakers' intentions and objective communication patterns are not always translated into listeners' perceptions and judgments in a straightforward and consistent manner. CAT research also frequently investigates how motives and perceptions of interaction partners predict communicative adjustments. Examining the reverse and less-studied direction, Adank et al. (2013) considered how imitating sentences in speakers' accents versus merely repeating sentences (without accent imitation) influence people's attitudes toward the speaker. Participants perceived speakers as more humorous, friendly, and attractive after imitating sentences in the speakers' accents rather than simply repeating sentences, but no differences were found for power and competence. Given this mix of significant and null effects, future scholars should ask whether heightened perceptions of social attractiveness alone are sufficient for inducing attitudinal and behavioral change.

Additional Avenues for Future Research

Work on vocal accommodation and mimicry has yielded insights in an important variety of domains, yet several opportunities await to continue expanding this work. In addition to the directions outlined in previous sections, one area awaiting elaboration concerns the mechanisms through which vocal accommodation predicts various outcomes in intergenerational family relationships (see also Giles and Soliz 2015). Compared to the research on mother-infant and romantic relationships, less research has examined the implications of younger family members' vocal adjustments toward parents and grandparents (see Bernhold and Giles 2017).

This is a consequential gap given the aging of the population nationally and internationally (National Institute on Aging 2015). It is also consequential because family members' patterns of (non)accommodation have predicted pragmatic issues such as the willingness of younger family members to provide instrumental and emotional care for older family members (Rittenour and Soliz 2009). In one of the few studies specifically examining vocal accommodation in intergenerational family relationships, Montepare et al. (1992) found that women did not differ in their verbal language choices when talking with their parents and grandparents over the telephone, but third-party observers rated their voices as higher in pitch, warmer, more babyish, more unpleasant, and more deferential when interacting with grandparents as opposed to parents. The researchers speculated that these nonverbal differences in accommodation may have been due to familial norms and obligations surrounding politeness to older generations. A second potential explanation may involve negative assumptions about older adults' cognitive abilities motivating shifts to patronizing vocal patterns, which the listener may interpret as overaccommodation (Coupland et al. 1988; Giles and Gasiorek 2013; Ryan et al. 1986).

To better understand how vocal accommodation relates to contemporary family issues, future researchers might ask questions such as the following: To what extent do assumptions and stereotypes about competence, warmth, and other characteristics motivate family members' vocal (non)accommodation toward parents and grandparents? How do the older family members respond to these interactional moves, and do older family members' attributions of intent qualify their responses? Over time, do the responses of older family members then predict younger family members' care for older family members or the willingness of younger family members to turn over care to formal services such as nursing homes? Research on how older adults evaluate unrelated interaction partners' patronizing talk and the vocalics accompanying such talk may also help inform the directions such research takes (Ryan et al. 1991, 1994a, b).

Another avenue for future research involves making sense of interlocutors' simultaneous convergence on some vocal characteristics with divergence on other characteristics (Bilous and Krauss 1988). Interaction partners' simultaneous convergence, divergence, and random variation across different vocal attributes has sometimes led to inconsistent findings within and across studies, which complicates the process of drawing larger conclusions about vocal accommodation (Pardo et al. 2012). To combat these difficulties, Pardo et al. recommended that researchers routinely consider ordinary listeners' holistic perceptions of vocal accommodation and mimicry, as well as examine how such perceptions relate to automated analyses of more micro characteristics and how such perceptions predict theoretical outcomes of interest (see also Jones et al. 1999). Relatedly, some research suggests imperfect or little correspondence between subjective ratings of accommodation provided by third-party human coders and objective ratings of accommodation provided by computers (e.g., automated analyses of acoustic accommodation; Babel and Bulatov 2011). Researchers should, therefore, examine which factors predict the (mis)alignment of lay observers' ratings with automated analyses. In addition to methodological implications, this area of inquiry may hold theoretical implications. For example, one factor that predicts such (mis)alignment might be the degree to which the human coders share ingroup and outgroup identities with the interlocutors being observed. To the extent that observers belong to different social groups than the interaction partners being observed (or, perhaps more accurately, see themselves as belonging to competing social groups than the groups to which the interaction partners belong), the observers may unconsciously underestimate the occurrence of vocal accommodation and mimicry.

More attention is also needed to what a priori characteristics influence people's vocal accommodation. CAT holds that each interlocutor enters an interaction with an *initial orientation*, or their default tendency to engage in (non)accommodation based on their personality, interpersonal history with the interaction partner, intergroup histories with the interaction partner's social groups, cultural norms, and other preexisting characteristics (Gallois and Giles 2015). A more careful examination of what speakers bring with them to interactions would be helpful in teasing apart how people accommodate or fail to accommodate (Beckner et al. 2016; McGettigan et al. 2013). In one study, for instance, the researcher did not collect data on where participants grew up, but the researcher noticed that the vast majority of participants appeared to be from California while three participants were from the Midwest. Of all the participants in the study, the three participants who demonstrated the most vocal imitation were the three participants from the Midwest (Babel 2012). Babel reasoned that geographical and dialectical histories mattered for how much participants were able to imitate a speaker (see also Vallaba and Tuller 2004). In one of the few studies examining the role of personality, Aguilar et al. (2014) found that people high in rejection sensitivity (RS; a personality trait characterized by a strong need for acceptance and fear of

rejection) vocally accommodated to their lower-RS interaction partners more than what the lower-RS partners accommodated to them. Along with probing how RS influences vocal accommodation (e.g., comparing the predictive power of need for acceptance versus fear of rejection), future researchers can also follow Aguilar et al.'s under-utilized methods for generating separate vocal accommodation scores for each dyad member in order to complement work that uses a single vocal accommodation index for the dyad.

Additional methodological questions also await future exploration. In their meta-analysis of the consequences of mimicry and synchrony, Vicaria and Dickens (2016) found that mimicry studies reported stronger effect sizes than synchrony studies when predicting people's feelings of connectedness to and liking of their interaction partners. Mimicry studies were also more likely to utilize one first-time interaction partner combined with one trained confederate, whereas synchrony studies were more likely to utilize two first-time interaction partners. Vicaria and Dickens noted that one possible methodological explanation for the stronger mimicry effect sizes is that confederates are naturally more effective than first-time participants at coordinating behavior given their extensive training and practice in previous conversations. However, the researchers also noted that one potential theoretical explanation for the stronger mimicry effect sizes is that mimicry involves the identical copying or imitation of behaviors, whereas many instances of synchrony (most notably, behavioral meshing) do not involve identical imitation. The exact copying of behaviors characteristic of mimicry may be a more potent form of communication compared to certain forms of synchrony that do not involve such stringent mirroring of the interaction partner. Future researchers should design studies that help disentangle the possible methodological and theoretical explanations for these effect sizes.

Conclusion

In sum, research on vocal accommodation and mimicry has advanced a long way over the decades. We assessed the state of such research by first overviewing CAT and comparing and contrasting accommodation with other constructs. Then, we showed how scholars have advanced the understanding of vocal adjustments in a variety of domains, from the most intimate family and romantic relationships to more formal contexts, such as interactions with strangers and professionals. Future researchers can continue advancing this subfield of nonverbal communication research in a variety of ways, such as using more within-person designs and examining the long-term implications of vocal (non)accommodation in intergenerational family relationships. Continuing the study of vocalic adjustments offers the potential to advance theoretical understanding of CAT and garner real pragmatic benefits for the involved parties.

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