Interaction Coordination and Adaptation

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A Biological and Social Imperative

Adaptation is a biological and social imperative—biologically, for the survival of a species; socially, for the survival of a society. Vertebrates and invertebrates alike come equipped with reflexes that produce involuntary survival-related forms of adaptation in the form of fight or flight responses. In the face of a threat, a frightened organism may sound an alarm call, emit an odor, or display a visual signal that is recognized by species mates as fear. The fear triggers behavioral mimicry that leads the entire flock, herd, swarm or school to take flight en masse. Or, rage by a single individual may fuel a contagion of aggression that turns into mob violence. These reciprocal actions may not be easily suppressed or controlled.

Other forms of adaptation are volitional, intentional and socially oriented. Humans may copy the speech patterns of their social "superiors" in hopes of being viewed as belonging to the same in-group. Or one person's antagonistic demeanor toward a target may elicit a docile, calming response by the victim.

Both forms of adaptation—involuntary and voluntary—undergird social organization. As Martin Luther King Jr. observed in his *Letter from a Birmingham Jail* (1963), "we are caught in an inescapable network of mutuality." By means of verbal and nonverbal communication, civilized societies negotiate access to scarce resources, work out their interpersonal relationships, and create their social organizations. Thus, communication is fundamentally an adaptive enterprise that reflects and channels these biological and social imperatives. How, when and why such adaptation takes place is the topic of this chapter.

Forms of Coordination and Adaptation

It is perhaps unsurprising that given its fundamental role in social interaction, terms describing various forms of adaptation have proliferated, leading to conceptual and operational disarray. The same terms have been applied to different phenomena and different terms have been applied to the same phenomena. Here we introduce the most common usage from scholars of communication, psychology and linguistics who over the course of 40 years have largely converged on these definitions. These conceptual and operational definitions are summarized in Table 1. The reader is directed to Burgoon, Dillman, and Stern (1993) and Burgoon et al. (1998) for more elaboration of definitions.

<Insert Table 1 about here>

Interaction Coordination

At a global level, all the terms we will introduce relate to interpersonal coordination, which Bernieri and Rosenthal (1991) defined as "the degree to which the behaviors in an interaction are nonrandom, patterned, or synchronized in both timing and form" (pp. 402-403). Though an apt descriptor, this label can connote surplus meanings beyond communication itself (e.g., marching in stride in a parade or avoiding other pedestrians when crossing a street). Our focus here is communicative forms of adaptation.

Matching, Mirroring and Complementarity

Matching refers to behavioral patterns that are similar between two or more actors, regardless of their cause. These need not be cases of parties coordinating with one another. Extremely cold temperature in a room may cause everyone to shiver but putting on a coat is a case of the actors independently adapting to the environment, not to each other. If the cause of behavior is unknown, the most objective label for it is matching. Mirroring is the more specific case of two actors displaying identical visual signals, such as both resting their head on their hand. It is more likely to represent one actor's behavior being contingent on the other's but that is not guaranteed: Both could be mirroring a third unseen party rather than each other. Finally, complementarity describes patterns that are opposite one another, such as one person leaning forward and the other leaning backward. These terms describe a static relationship without any temporal ordering or change.

Reciprocity and Compensation

These next patterns are ones in which actors are actually adjusting to one another. There is an observable change over time, one actor's behavior is directed toward and contingent upon what the other does, and their joint dyadic pattern can be described as interdependent (Burgoon et al., 1995). Although such patterns imply intent, they need not imply a high degree of awareness because they are so deeply ingrained that they can be executed easily and automatically. Compensation refers to adaptations in the opposite direction, such as returning shows of rudeness with shows of kindness. Behaviors need not be identical but should convey the same functional meaning, such as expressions of liking or expressions of

dominance. Nonverbally, many behaviors can substitute for one another without loss of meaning. For example, psychological closeness (called immediacy) can be signaled through close proximity, forward lean, direct facing, and eye contact, or a touch could be substituted for direct facing.

Reciprocity is itself a fundamental sociological principle in which members of a given society are expected to return good for good and to avoid harm in return for avoidance of harm (Gouldner, 1960). This "eye for an eye" or "tit for tat" philosophy is the essence of social exchange and foundational to social organization and communication. Communicators are expected to reciprocate one another's behavior and to do so rather automatically. Theories of intimacy development and escalation rely on this norm: One person's displays of relational intimacy are expected to beget displays in kind, just as aggression is expected to elicit reciprocal aggression. Burgoon et al. (1995) go so far as to declare reciprocity the default pattern in human interaction, noting that when one communicator deviates from the norm, a partner may display the expected and desired behavior as an attempt to elicit a reciprocal response. Relevant to observation of human interaction is that observers must be aware that what is often being witnessed is not an actor's deliberate and self-initiated communication pattern but rather a reciprocation of behavior initiated by the partner. As an example, interviewee behavior may be more a reflection of the interviewer's demeanor than the interviewee's own emotions and attitudes.

Approach/Convergence

Approach is a form of adaptation that can be exercised by one or both participants in an interaction. One person can stand still while the other moves closer, or both people can move closer to each other. Convergence has the same meaning but is often used in the context of describing speech patterns. One person's speech converges toward another to the extent that they become more similar.

Avoidance/Divergence

Avoidance and divergence are, as one might expect, the opposites of approach and convergence. Moving farther away from someone who has moved in very close would be both a compensatory move and avoidance. Changing from one's usual Cockney accent to a more standard dialect to avoid strangers with a Cockney accent striking up a conversation in a pub would be a case of divergence.

Interactional Synchrony

The concept of interactional synchrony was developed in the 1960s, in part, from studying psychotherapy sessions, and Kendon (1970) is often regarded as a foundational contributor to understanding the mechanics and consequences of what he called this "complex dance." According to sociolinguists and anthropologists who first investigated it (e.g., Bullowa, 1975; Chapple, 1982; Condon & Ogston, 1971), interactional synchrony adds a rhythmic component to adaptation patterns. The most common form, simultaneous synchrony, is when a listener entrains his or her movements to the verbal-vocal stream of a speaker; the speaker's tempo becomes a metronome for the two of them. The behaviors need not be the same as long as the junctures at which change points occur are the same. A second kind of synchrony, concatenous synchrony, refers to a serial form of coordination from speaker to speaker in which one interactant's actions while are speaking are mimicked by the next speaker (Burgoon & Saine, 1978). This kind of synchrony can register when successive speakers "pick up" prior speakers' demeanor and language.

For conversation and dialogues to be effective, those involved need to coordinate not only their own personal channels of communication – both verbal and nonverbal – but to successfully achieve this interdependence together. Certainly, automatically and spontaneously matching, as well as calculatedly reciprocating the reward value of, the substance and rhythm of another's communicative behaviors and actions (e.g., facial expressions and word choices) can involve split-second timing, and be a process that meshes more and more as an interaction unfolds. Studies show that this can happen very early in life between parents and their children, some claiming this process to be innate.

Interactional synchrony, if seemingly effortlessly enacted, can foster the experience of being experientially on the same wavelength and can be, accordingly, an enabler of rapport. That said, it has been found that moderate or intermediate levels of coordination can be the most relationally beneficial and satisfying. Indeed, in situations where interpersonal goals are uncertain or ambiguous, intense levels of synchrony can reflect strain, discomfort, and anxiety where communicators may, with all good intent, be trying overly hard to coordinate their efforts. Various conceptualizations of empathy, rapport, and

emotional contagion and theories of interactional coordination rely on synchrony as one component of the process.

Maintenance/Nonaccommodation/Nonmatching

Of course, humans do not always adapt to one another. Cappella (1984) among others have noted that humans can be quite consistent behaviorally over time, maintaining their own characteristic communication style because they lack the communication skills to adjust. Or they can actively resist matching another's speech style, opting to maintain their own dialect, accent, tempo, and the like "to make a statement," as in the case of gang members refusing to speak grammatical English around authority figures. Whether displayed passively and inadvertently or actively and strategically, these patterns reflect nonaccommodation to the communication of others (Giles, Coupland, & Coupland, 1991).

Models and Theories of Adaptation

Having described the various patterns of coordination and adaptation that populate human interaction, we turn now to the theories and models that have been advanced to account for their existence, causes and effects. Our brief journey through these models is organized according to their causal mechanisms. We begin with the earliest models that featured reflexive reactions and arousal- or stress-driven factors under the governance of the oldest part of the brain; move through the addition of affect and valencers under the control of the limbic system and paleomammalian brain that moderate patterns; to the further addition of higher-order cognitive elements under the control of the neomammalian brain; and finally to the most complex communication-based models that incorporate all of the foregoing.

Biologically-based Models

At a biological level, humans, like other organisms, are equipped with reflexive forms of adaptation directed toward coping with threats and risks. These include reflexes that orient the organism to novel stimuli or trigger defensive reflexes preparing the organism for fight or flight (Sokolov, 1963). Thus, the earliest forms of interaction in the evolution of a species are forms of approach (fight) and avoidance

(flight) that enable survival in the face of threats. Approach and avoidance are shorthand terms for the cognitive and emotional activity that is oriented either toward or away from threat (Roth & Cohen, 1986).

Recent theorizing by Woody and Szechtman (2011) proposes that humans and other species have evolved a complex neurobiological circuit, dubbed the security motivation system, that can detect subtle indicators of threat and activate precautionary behaviors in response. This responsivity may be rooted in each organism's attunement to the presence of species mates (referred to as compresence or audience effects) that creates arousal and drive states known as social facilitation. Described by Zajonc (1965) as one of the most fundamental forms of inter-individual influence, social facilitation effects were observed as far back as 1987 by Triplett and 1925 by Travis, among others. These experimental psychologists found that organisms are responsive to the actual (or imagined) physical presence of species mates and that the mere presence of them can facilitate the performance of well-learned responses but impair performance of newly learned ones. For humans, this powerful effect on performance underscores how attuned humans are to one another and thus likely to modify their behavior when others are co-present. The complex reactions humans exhibit in interactional contexts can be attributed in part to this basic social facilitation effect.

In one of the first formalized theories of interaction drawing upon approach-avoidance forces, Argyle and Dean's (1965) equilibrium theory (also called affiliative conflict theory) posited that humans and other animals are biologically programmed to seek a state of homeostasis between competing cross-pressures for distance and proximity. Distance accords territory and privacy whereas proximity satisfies needs for affiliation and the safety of the group. Therefore, if one person approaches, the other should compensate respond with avoidance so as to restore equilibrium.

One other biologically based form of adaptation has been called the chameleon effect (Chartrand & Bargh, 1999), which refers to humans' apparently unconscious tendency to mimic the behaviors of others. Although often thought to be an innate reaction, Bavelas, Black, Chovil, Lemery, and Mullett (1988) showed that this phenomenon has been adapted in a uniquely communicative way to display empathy by showing what a listener perceives a speaker is feeling, as in wincing when hearing about the person tell of

running into a low-hanging tree limb. In these cases, the mimicry is not a direct match with what the

speaker is displaying at the moment but, rather, what the narrator of an incident is perceived to have

experienced.

Affect-Based Models

Emotions are fundamental to all human experience and represent a basic level of communication

about our well-being, internal states, and behavioral intentions (Nyklíček, Vingerhoets, & Zeelenberg,

2011). The affect-based theories reviewed here all concern how human responses to affective signals can

influence the outcomes of interactions with others and lead to compensatory or reciprocal behavioral

responses. Many of these theories are reviewed in more depth by Burgoon et al. (1995), but a brief

overview of each is provided here.

1. **Affiliative conflict theory**

Researchers have emphasized both intimacy and immediacy behaviors, both of which enhance

closeness, as the primary methods of communicating affective messages (Andersen & Andersen, 1984;

Coutts & Schneider, 1976). Argyle and Dean's (1965) affiliative conflict theory, ACT) (also called

equilibrium theory) suggests that approach and avoidance forces underlie the reciprocity of nonverbal

social behaviors as a signal of the intimacy of the relationship in that approach forces emphasize the

gratification of affiliative needs, while avoidance forces can be interpreted as the fear of being open to

scrutiny and rejection. If an actor's nonverbal expressions of intimacy or immediacy in the form of

conversational distance, eye contact, body lean and body orientation disrupt equilibrium, the partner is

predicted to compensate on one of the same behaviors to restore equilibrium (Coutts & Schneider, 1976).

The theory does not explain instances in which interactants would reciprocate intimacy nor subsequent

theories specify which conditions will cause equilibrium levels to increase, decrease, or be unaffected. It

also avoids discussing the causal mechanisms that will explain the relationship between approach or

avoidance tendencies. Thus, although ACT was a formative theory in the history of the study of

nonverbal communication, it has been subsumed by other theories and largely abandoned by researchers who perhaps heeded a request for "respectful internment" of the theory (Cappella & Greene, 1982, p. 93).

2. Discrepancy arousal theory

Social signaling is bi-directional, as captured by the term "mutual influence"(Cappella & Greene, 1984). Offered as an alternative to ACT is discrepancy arousal theory (DAT), which proposes that arousal is a key mediator of whether changes in one interactant's behavior elicit compensatory or reciprocal responses (Cappella & Greene, 1982). Changes in cognitive arousal are proposed to have an inverted-U relationship such that small discrepancies are accompanied by small changes in arousal that are experienced as rewarding (or perhaps neutral or unnoticed), with positive affect . Large discrepancies are accompanied by large changes in arousal, which are experienced as aversive and prompt negative affect. Positive affect leads to an approach response whereas negative affect leads to withdrawal and a reduction of behavioral involvement. Through DAT, it is postulated that these reciprocal and compensatory responses result from two sources: (1) the degree of discrepancy between a partner's behavioral involvement and the expectations derived from situational norms, individual preferences, and experience with the particular partner and (2) the degree of arousal caused by the discrepant behaviors (Cappella & Greene, 1984).

Although the theory attempts to predict when reciprocity and compensation will occur, the two publications on the theory (Cappella & Greene, 1982, 1984) are inconsistent in equating reciprocity with approach or with small deviations (approach or avoidance), and also give examples in which certain situational and contextual variables reverse the predictions. For example, contextual or individual difference variables could cause one to compensate for the affect displayed by one's partner even though the discrepancy appears to be slight. Granting that DAT is an improvement over ACT, Patterson (1983) nonetheless noted that it suffered from structural limitations and indeterminacies and proposed the sequential functional model as an alternative.

3. Sequential functional model

The sequential functional model (SFM; Patterson, 1982, 1983) divides interaction into preinteraction and interaction phases. Antecedents comprised of personal characteristics, past experiences, and relational-situational constraints govern the interaction prior to it beginning. Certain mediating processes influence the differential involvement of interactants both at the preinteraction stage and during the interaction itself by (a) determining behavioral predispositions for differential involvement, (b) precipitating arousal change, and (c) developing cognitive and affective expectancies (Patterson, 1982). These three mediators limit the range of involvement that is initiated and determines when behavior adjustments are required or when they are not needed to maintain the stability of the cognitive-arousal processes. The resultant outcomes of the mediating processes affect whether or not a certain function such as expressing intimacy, social control, or performing a service or task is served (Edinger & Patterson, 1983). Cappella and Greene (1984) argue in a critique of Patterson's work that absent direct assessment of cognitions, a number of rival explanations for outcomes could be entertained; Giles and Street (1994) offered similar critiques of the indeterminacies in both DAT and SFM. Though the model did not generate much traction empirically, it stands as an excellent depiction of key variables that much be taken into account when predicting and explaining adaptation processes.

4. Attachment theory and emotional regulation

According to attachment theory, emotional reactions innately govern human interactions through infancy forward in the form of the attachments that are formed between infant and caregiver. Attachment theory holds that people are born with an innate tendency to seek closeness to others and that the physical, emotional and social support they receive from caregivers affects their ability to form secure relationships in adulthood. Children who receive consistent parental support develop secure attachment styles, whereas those who receive inconsistent support develop anxious attachment styles, and those who lack parental support develop avoidant attachment styles (Bowlby, 1980, 1982). The conceptualization of adult attachment evolved from crossing a model of self with a model of others. People with a negative model of

self experience anxiety, whereas those with a favorable view of self are characterized by optimism and confidence in times of distress. Those with a negative model of others avoid attachment and are characterized by hyper-vigilance to the social and emotional cues of others (Richards & Hackett, 2012), whereas those with a positive model of others seek rather than avoid connection. The resultant typology includes the "secure style, " in which both the anxiety and avoidance dimensions are low; the "anxious style," in which anxiety is high and avoidance is low; the "avoidant style," which is characterized by high anxiety and high avoidance (Mikulincer, Shaver, & Pereg, 2003); and the "detached style," characterized by low anxiety and high avoidance. Others have distinguished between "dismissing avoidants" and "fearful avoidants" in which both experience high avoidance, but fearful avoidants experience high anxiety as well (Bartholomew & Horowitz, 1991). These different attachment styles, which are fairly stable, have been shown to have powerful effects on the social signals a person sends and the interpretations assigned to others' signals.

For example, several scholars have linked attachment styles to emotion regulation (ER) which "refers to the process by which individuals attempt to influence their own emotions; when they experience them, and how they express them behaviorally" (Richards & Hackett, 2012, p. 686). ER includes the regulation of affective states covering dimensions such as: overt to covert (how perceivable to others it is), explicit to implicit (whether it is conscious or unconscious), and voluntary to automatic (whether there is intent behind the display or not) (Nyklíček, et al., 2011). Secure individuals are better able to regulate emotions than are either anxiously and avoidantly attached individuals, but even individuals with an anxious attachment orientation will form higher quality relationships when they use emotion regulation strategies such as suppression (altering emotional responses to felt emotions) and reappraisal (re-thinking a situational to control the emotional response) (Richards & Hackett, 2012).

Cognitive Theories

Andersen's cognitive valence theory (CVT; Andersen, 1998; Andersen, Guerrero, Buller, & Jorgensen, 1998) is focused on the intimacy or immediacy expressed by either party in a dyad and the resultant outcomes in three areas: the degree to which people change their cognitive appraisals of their

partner, the degree to which they reciprocate or compensate for their partners' behavior, and the changes in relational closeness that result from the intimacy expressed (Andersen, 1998). Any increase in intimacy by one partner that is perceived and processed by the other partner activates what Andersen calls six "cognitive schemata:" (1) the appropriateness of the behavior according to cultural norms, (2) personality traits, (3) interpersonal valence or reward of the communicator, (4) relational or (5) situational appropriateness according to the context, and (6) transitory psychological or physical states. If *any* of the cognitive schemata are evaluated negatively (i.e., the behavior is deemed culturally or relationally inappropriate), then the result would be negative appraisals, compensation, and/or diminished relational closeness (Andersen, 1999). Only if all six schemata are evaluated positively would positive relational or behavioral outcomes occur. In a study of opposite-sex friendship dyads designed to test competing hypotheses from CVT, EVT and DAT, one of the friends was instructed to display high immediacy or a more moderate level of immediacy. The results did not comport fully with CVT predictions because the high immediacy condition produced a mix of compensatory and reciprocal responses (Andersen, et al., 1998).

Communication Theories

These last theories include many of the foregoing principles and constructs. Whereas preceding theories originating from communication scholars had factors such as arousal or cognition as their centerpiece, however, these last two theories accord centrality to communication.

1. **Communication accommodation theory**

Communication accommodation theory (CAT) is a framework for describing and explaining why people do or do not adapt their communication with each other, together with the personal and social consequences of these practices; see McGlone and Giles (2011) for one of the histories of CAT's development. An important element of the theory is that speakers and writers accommodate to where they *believe* the others "stand" communicatively and, consequently, sometimes this can be miscarried

and, thereby, be a source of contentions and/or conflict. In this way, the theory has some highly *subjective* twists to it.

CAT devoted a significant proportion of its early attention to examining how and why we converge to or diverge from each other to various degrees (mutually or asymmetrically). The former occurs when interactants' communication styles become more similar to another by choice of slang, jargon, accent, pitch, hand movements, and so on. When the features involved connote social value (e.g., a fast speech rate is associated with competence, while a slow rate with incompetence), convergence can be termed "upward" or "downward." The former occurs, for example, when an individual approximates another's more formal, prestigious communicative style, while the latter refers to matching another's more colloquial, informal, and or nonstandard-accented message. For example, a speaker of standard British English who adopts the Cockney accent of his taxi driver is using downward convergence.

The convergent process is considered to be a barometer of an individual's desire to signal attraction to, identification with, and/or to glean social approval from another. Such moves convey respect (and sometimes effort when consciously crafted) which in turn engenders appreciative responses from those accommodated (e.g., liking and altruism). An important element in the approval-seeking process is social power: for instance, interviewees will be inclined to converge more towards their interviewers than vice-versa; newly-arrived immigrants more towards the host community than the converse, and salespersons more than clients. These accommodations--whether they be matching another's utterance length, smiling, or hedges--can be regarded as an attempt on the part of communicators to modify, conjure up, or disguise their personae in order to make it more acceptable to the listeners and readers so addressed. Furthermore, cross-cultural studies show that accommodation from both younger as well as same-aged peers can enhance older adults' reported life satisfaction.

Speech convergence may also be a mechanism whereby speakers make themselves better understood and can be an important component of the influential construct "communicative competence" and other related social skills. The more a sender reflects the receiver's own mode of communication, the more easily their message should be understood. In addition, interactants can take into account their partner's

knowledge of, or sophistication about, a particular topic being discussed (called the "interpretability

strategy") as well as attuning to their emotive states and conversational needs. Hence, accommodating

one's partner's desire to talk about certain topics or themes rather than others (called the "discourse

management strategy") can increase comprehension, coherence, as well as communication and relational

satisfaction.

CAT proposes that people do not resonate to *non*-accommodating others. This can signal, other things

being equal, that the non-converger does not need the other's approval or respect, a perception that does

not easily enhance self-esteem for a recipient. Indeed, this often results in negative attributions about, and

personal derogation of, the non-accommodator. Attributions, however, can play an important role in the

evaluative and interpretive process of judging accommodators and non-accommodators. For instance,

should the non-accommodator be known for not having the language repertoire to effect convergence,

then the lack of it can be explicable, discounted, and perhaps even forgiven.

CAT also sheds light on why interactants may sometimes choose to *accentuate* communicative

differences between themselves and others. This may occur through so-called "speech maintenance"

where people deliberately avoid using another's communicative style and, instead, retain their own

idiosyncratic stance or that of their social group's; for instance, by not switching languages when they

easily have the capability of doing so. Moving along a social differentiation continuum, people can

diverge from others by adopting a contrasting language, dialect, jargon, speech rate, or gestural style.

Drawing upon social identity theory (see Giles, Bourhis & Taylor, 1977), CAT has argued that the more

a person psychologically invests in or affiliates with a valued ingroup (be it ethnic, gay, religious,

political, or whatever), the more they will want to accentuate positively their identity by communicatively

divergent means when confronting contrastive (and especially threatening) outgroup members. This will

be evident when the dimensions diverged are salient components of their social identity, or when the

relevant In this way, CAT acknowledges evolving and dynamic historical, cultural, socio-structural and

political forces (see Giles & Giles, 2012) and, thereby, is able to theorize about both interpersonal and

intergroup encounters. Such a stance can explain why people can simultaneously or sequentially converge on some communicative features, while diverging on others.

All in all, it appears that satisfying communication requires a delicate balance between convergence--to demonstrate willingness to communicate--and divergence--to incur a healthy sense of group identity. A final distinction introduced here is that CAT distinguishes between objective and psychological accommodation; the former is that which can be measured, and the latter that which is subjectively construed. For instance, sometimes objective divergence can fulfill positive psychological functions as in the case of a speaker slowing down an overly-fast talking other by adopting a very slow, measured rate. And in the case of a male diverging with a deeper pitch from a romantic female acquaintance and her increasing her pitch and expressed femininity, both with a view to promoting their appeal (a phenomenon known as "speech complementarity"). Thus, divergence or compensation need not be negatively valenced. Furthermore, calibrating the amount of perceived non-, under-, and over-accommodations one receives can be an important ingredient in continuing or withdrawing from an interaction and making decisions about anticipated future ones.

CAT now has a forty year history, been revised and elaborated frequently (see Dragojevic, Gasiorek, & Giles, in press), and many of its propositions have received empirical support across an array of diverse languages and cultures, electronic media (for a statistical meta-analysis of CAT studies, see Soliz and Giles, in press), and even amongst different non-human species (e.g., Candiotti, Zuberbűler, & Lemasson, 2012). There has been a recent focus on unpacking different processes of *non*-accommodation (see Giles & Gasiorek, 2013) as well as the neural and biochemical underpinnings of accommodative practices (Giles & Soliz, in press). For instance, given recent work on the neuropsychology of intergroup behavior (e.g., Fiske, 2012), would interpersonal accommodations and adjustments lend themselves to a neural signature of medial prefrontal cortex activity, while seeing valued peers, on the other hand, diverge away from or avoid members of disdained groups lead to neural activity in areas of the brain associated with reward processing, such as in the ventral striatum? Relatedly, would the adverse affective reactions to being a recipient of nonaccommodation be associated with, or be the precursor to, neural activity in the

anterior cingulate cortex, a region associated with pain and punishment? Finally here and from a more evolutionary perspective (see Reid et al., 2012), could divergence be predicated in part on individuals' levels of pathogen-disgust or the survival value trait of avoiding disease and infection risks (See Reid et al., 2012)?

Needless to say and as ever, much still needs to be achieved. Although the theory's capacity to pay homage to linguistic specifications is of course limited--it emerged after all from social psychology--its prospects for helping us understand, both theoretically and pragmatically, communicative phenomena and processes in a wide range of applied contexts is exciting (Giles et al., 1991).

2. Interaction Adaptation Theory

Interaction adaptation theory (IAT; Burgoon et al., 1995) grew out of a desire to reconcile these various models and theories of interaction adaptation while also producing a theory with broader communication scope than its predecessors. The theory incorporates both biological principles (e.g., compensatory arousal-driven reactions) and social principles (e.g., reciprocity) and builds upon the scaffolding of expectancy violations theory (EVT; Burgoon, 1983).

The theory, like EVT, SFM and CAT, recognizes a number of pre-interactional factors that set the stage for interaction. The three central classes of features are requirements (R), expectations (E), and desires (D). Requirements refer to biologically-based factors such as protection and sustenance that must be satisfied and override other considerations. A person who is hungry, tired or fearful will behave according to those needs rather than adapting to a partner's communication. Expectations are the anticipated communication displays by self and partner given the characteristics of the actors, their relationship, and the context. Female friends in an informal setting will expect a moderately intimate interaction pattern (e.g., close proximity, frequent eye contact, smiling). Desires refer to what the actors want out of the interaction. Friends may desire a friendly chat; a patient may want respectful and empathic listening from a physician. These classes of RED factors combine to determine the projected starting point or interaction position (IP) that people take vis á vis one another. Whether their ensuing

interaction is reciprocal or compensatory depends on the actual (A) communication person adopts. If the A is more desirable than the IP, an actor is predicted to reciprocate the A; if if the A is less desirable than the IP, the actor is predicted to compensate. To use a concrete example, if a friend is expected to engage in a warm and friendly interaction but is instead stand-off-ish, the A is less desirable than the IP and the actor is predicted to compensate by becoming even warmer and friendlier. Alternatively, if the friend is even more expressive and happy than expected, the actor is predicted to reciprocate the good mood.

There are many additional elements to the theory, including the hierarchy of the RED factors, and factors such as social skills of actors that can alter patterns (see Burgoon, Dunbar, & White, in press; Burgoon & White, 1997, for further elaborations), but the overriding points of the theory are that interaction adaptation is a complex process and that both compensatory and reciprocal patterns can occur simultaneously or serially on different behaviors. Any attempt to analyze adaptation processes must take into account the actor, relationship and contextual forces in play at the point of observation and recognize that interaction adaptation is a necessarily a dynamic process that will show changes across the timescape.

Current State-of-the-Art and Main Trends

Culture and Communication

Social groups, such as adolescents, cops, and ethnic groups, often have their own distinctive cultures that include specialized foods, customs and rituals, literature, dance and music, while other intergroup situations (e.g., artificially-constructed groups) constitute social categories that cannot claim such rich cultural artifacts. Importantly, communication practices of the ilk caricatured above are the basis of what is meant by a "culture" (Conway III & Schaller, 2007).

Intercultural communication has been studied for well over 50 years and has developed to focus on how different cultures are distinguished from each other through their management of communicative behaviors, such as personal space and gestures. Particular attention has been devoted to articulating the cultural values that underpin these different communicative practices, including individualism-collectivism and low-high contexts (Gallois, Giles, Jones, Cargile, & Ota 1995; Watson, 2012), and what ingredients of intercultural communication competence are involved. Wiseman (2002) detailed these in a

way that embraced a skills training perspective. Premises underlying this are that: individual must have a knowledge of the culture with which they engage, the motivation to effectively communicate (including intercultural sensitivity and empathy), together with the appropriate communication skills. A mainstream concern in this literature is how immigrants adapt to the dialectical pulls and pushes of preserving their heritage communicative habits while acquiring those of a host community.

One challenge for the future is that intercultural communication theory does not really engage and explain when misunderstandings and mis-coordinations could, in some cases, be inevitable despite any the individuals' skills and cultural knowledge. Socio-psychological theories that emphasize the intergroup nature of intercultural communication (with its focus on stereotypes, prejudice, ingroups and outgroups), rather than rely only on its interpersonal parameters, may be fruitfully applied to understand when such misattributions, and even conflict, arise (Giles, 2012; Giles & Watson, 2008). The challenge is to move toward bringing the disparate theoretical viewpoints of intercultural and intergroup communication (whose scholars, in turn, neglect the important dynamics of culture) together. The further value in coalescing these approaches is in going way beyond the typically-studied national and ethnic groups to embrace an array of different cultural categories, including older people, homosexuals, bisexuals, academics from different disciplines and so forth, as well as those embedded in different religious and organizational cultures.

Deception and Synchrony

One of the possible applications in the use of behavioral synchrony is in the detection of deception. Burgoon et al. (1995) make the argument that we are naturally inclined toward synchrony or mutual adaptation but we posit that this process will be hindered somewhat when one person introduces deceit. Guilty suspects have an incentive to cooperate and try to point the interviewer toward another suspect and might attempt to maintain the rapport that has been established by the interviewer (Vrij, Mann, Kristen, & Fisher, 2007). Truth-tellers may not maintain synchrony if they are surprised or offended by the accusation, so there might be a greater detriment to nonverbal synchrony for truth-tellers than liars, especially if deceivers are highly skilled and can use the rapport established to appear innocent (Dunbar,

Jensen, Tower, & Burgoon, in press). Research of this genre suggests that highly skilled liars are in fact

quite different from unskilled liars because they both report and display less cognitive effort than the less

skilled (Dunbar, Altieri, Jensen, & Wenger, 2013). In two separate analyses comparing liars that were

either sanctioned by the experimenter or chose to lie on their own, those who chose to lie (and were

presumably more skilled) were more difficult to detect than those who were told to lie by the

experimenter, both using automated detection of synchrony (Yu et al., 2013) and manual coding of

behavioral cues (Dunbar, et al., in press).

Automated Tools for Detecting Adaptation

This chapter should make abundantly clear that interpersonal interaction is fraught with various

patterns of adaptation and that analyzing any social signal or collection of signals in its midst poses

significant challenges. Until recently, manual systems for behavioral observation were the primary tools

for detecting and tracking individual behaviors, and analysis of dyadic interaction often defied analysis.

However, the explosion of research into automated identification and tracking of nonverbal behaviors

now makes possible the discovery of very subtle and transitory patterns of adaptation. An illustration is

the analysis conducted by Dunbar, Jensen, Tower and Burgoon (in press) using computer vision analysis

to analyze interactional synchrony between interviewers and their truthful or deceptive interviewees.

Using techniques that create bounding boxes and ellipses around each person's head and hands, gross

postural and gestural movements can be identified and changes and velocities can be tracked frame-by-

frame. Separate techniques that locate landmarks on the face can track temporal changes and combine

features to identify specific expressions. Time series analyses can then find points of synchrony between

each person's behaviors and calculate the degree of interactional synchrony that exists within each dyad.

Similar kinds of analyses can be applied to other nonverbal signals such as the voice. These techniques,

which are the focus of the remaining sections of this volume, promise to revolutionize the analysis of

nonverbal behavior and to uncover heretofore undetected interrelationships between interactants during

social exchanges.

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Table 1. Conceptual and operational definitions of forms of adaptation, with examples

Term	Description	Example	Operational Definition
Matching	Verbal or nonverbal behavioral similarity between actors	A and B both whisper in a theater at Times 1 and 2	$A_1 = B_1$ and $A_2 = B_2$ or $A_1 - B_1 = 0$, $A_2 - B_2 = 0$
Mirroring	Visual nonverbal similarity between two or more actors	A and B both sit with left leg crossed over right knee at Times 1 and 2	$A_1 = B_1$ and $A_2 = B_2$, or $A_1 - B_1 = 0$, $A_2 - B_2 = 0$
Complementarity	One actor's verbal or nonverbal behavior is opposite the other(s)	A yells and B speaks softly at Times 1 and 2	$A_1 = -B_1$, $A_2 = -B_2$
Reciprocity	Changes in one actor's verbal or nonverbal behaviors are met with similar changes of comparable functional value by the other(s)	A shows liking by increasing gaze; B reciprocates by smiling	$(A_2 - A_1) \cong (B_2 - B_1)$ or $\Delta A \cong \Delta B$ if and only if $\Delta A \neq 0$, $\Delta B \neq 0$
Compensation	Changes in one actor's verbal or nonverbal behaviors are met with opposite behaviors of comparable functional value by the other(s)	A shows liking by increasing gaze; B shows dislike by compensating with backward lean and a frown	$(A_2 - A_1) \cong -(B_2 - B_1)$ or $\Delta A \cong -\Delta B$ if and only if $\Delta A \neq 0$, $\Delta B \neq 0$
Approach/ Convergence	One actor's verbal or nonverbal behavior becomes more like another(s) over time	A and B begin with indirect body orientations and limited gaze at Time 1; A and B face each other more directly and increase eye contact by Time 2	$(abs(A_1 - B_1)) > (abs(A_2 - B_2))$ where abs = absolute difference
Avoidance/	One actor's verbal or	A and B smile a lot at Time	$(abs(A_1 - B_1)) < (abs(A_2$

Divergence	nonverbal behavior becomes less like another(s) over time	1; A becomes increasingly inexpressive and stops smiling by Time 2	$- B_2$)) where abs = absolute difference
Synchrony	Degree to which behaviors in an interaction are nonrandom, patterned, or synchronized in both timing and form	A's and B's head nods beat in time with A's verbal-vocal stream	$(Y_A = X_{A1} + X_{A1}^2 + X_{A2} + X_{A2}^2) \approx (Y_B = X_{B1} + X_{B1}^2 + X_{B2} + X_{B2}^2)$ where Y_A and Y_B are nonlinear time series regression lines for A and B
Maintenance/ Nonaccom- modation/ Nonmatching	An actor makes no change in his or her communication behavior in response to changes by another	Person A shifts from dialect-free speech to using a Southern accent; Person B maintains dialect-free speech	$A_1 = A_2$ or $B_1 = B_2$ $\Delta A = 0$ and $\Delta B = 0$