

Verbal and Nonverbal Communication: Distinguishing Symbolic, Spontaneous, and Pseudo-Spontaneous Nonverbal Behavior

By Ross Buck and C. Arthur VanLear

Verbal and nonverbal communication are seen in terms of interacting streams of spontaneous and symbolic communication, and posed “pseudo-spontaneous” displays. Spontaneous communication is defined as the nonintentional communication of motivational-emotional states based upon biologically shared nonpropositional signal systems, with information transmitted via displays. Symbolic communication is the intentional communication, using learned, socially shared signal systems, of propositional information transmitted via symbols. Pseudo-spontaneous communication involves the intentional and strategic manipulation of displays. An original meta-analysis demonstrates that, like verbal symbolic communication, nonverbal analogic (pantomimic) communication is related to left hemisphere cerebral processing. In contrast, spontaneous communication is related to the right hemisphere.

A general theory of communication should account for the natural biologically based aspects of communication as well as its learned and symbolically structured aspects. Further, such a general theory should include a feedback process—explanations of message production alone or message reception alone, although potentially useful, are incomplete. A corollary of these two criteria is that a general theory of communication should account for the coevolution of symbolic and nonsymbolic feedback processes and their integration into systems of communication characteristic of the human species. Whereas the explication of such a general theory is beyond the scope of this article, developmental interactionist theory (Buck, 1984, 1989, 1994) does aim to offer such an integrated view. The current article poses how developmental interactionist theory deals with the topic of this special issue of *Journal of Communication*—the relationship between verbal and nonverbal communication.

Ross Buck (PhD, University of Pittsburgh) is a professor of communication sciences and psychology at the University of Connecticut, where C. Arthur VanLear (PhD, University of Utah) is an associate professor of communication sciences.

In recent years there has been an explosion of interest and research in the role of nonverbal behavior in communication involving a wide variety of behaviors. However, the processes underlying nonverbal communication, and the ways in which they differ from verbal or linguistic communication, have not been adequately spelled out. Generally, a concept is imprecisely defined if it is distinguished by what it is not—which is the case with nonverbal communication. Often, different points of view have revolved more around different kinds of nonverbal behaviors, situational contexts, and the methodologies involved rather than around fundamental theoretical distinctions between verbal and nonverbal communication. Major textbooks in the area continue to employ as their basis of organizing the field the type of behavior measured (facial expression vs. body movement vs. spatial behavior, etc.) and the situational context (female-male, intimate vs. workplace; see, e.g., Remland, 2000; Richmond & McCrosky, 2000).

This article reviews evidence relevant to a theoretical distinction between the intentional use of learned symbols for the communication of propositions, versus emotional communication via spontaneous expressive displays which are non-symbolic and nonpropositional (Buck, 1984). We suggest in addition that, in pseudo-spontaneous communication, the sender manipulates nonverbal displays intentionally and propositionally. To the receiver, skillfully performed pseudo-spontaneous displays may be functionally equivalent to true spontaneous displays. We review findings on the communicative functions of the left vs. the right hemisphere of the brain, and an original meta-analysis of the relationships between pantomimic (analogic) communication and verbal abilities. We also discuss the receiving and feedback processes associated with spontaneous communication. Finally, we suggest implications for the understanding of the exchange of relational messages.

Defining “Communication”

Socially Versus Biologically Shared Signal Systems

We define communication following Wilson (1979) as occurring “whenever the behavior of one individual (the sender) influences the behavior of another (the receiver) . . . behavior can be defined as communicative to the extent that it reduces uncertainty in the behavior of another” (Buck, 1984, p. 4).¹ Some definitions of communication would exclude influences transmitted via spontaneous and nonsymbolic behavior. Thus, Weiner, Devoe, Rubinow, and Geller (1972) defined communication as necessarily involving a socially shared symbol system, or code, which is symbolic in nature. Also, Burgoon, Buller, and Woodall limited nonverbal communication to behaviors that “are typically sent with intent, are used with regularity among members of a social community, are typically interpreted as intentional, and have consensually recognized interpretations” (1996,

¹ Andersen (1999, p. 15) characterized this as a “receiver-based” definition of nonverbal communication. That is not correct, as a sender and display are necessary to the process. The present definition might be characterized instead as a “dyad-level” definition and the theory posits a social feedback process.

p. 113). In a useful review, Andersen, Garrison, and Andersen (1979) related nonverbal communication to processing associated with the right cerebral hemisphere (RH) and verbal communication to left hemisphere (LH) processing. They suggested that an “underlying nonverbal coding schemata” is analogic, nonlinguistic, and associated with RH processing (p. 83).

We suggest that these views do not adequately consider biologically shared, nonintentionally functioning, unconscious signal systems evolved for the specific function of communication. Such systems are implicit in Darwin’s (1872) analysis in *Expressions of the Emotions in Man and Animals*, which was basic to classical ethology (Eibl-Eibesfeldt, 1975; Hauser, 1996) and has been of great influence in the study of nonverbal communication (Ekman, 1973). Darwin argued that displays have adaptive value in social animals because they reveal something about certain inner states of the responder and are thus necessary for social coordination. This implies (a) that the inner state of the responder must be associated with an expressive display, (b) that the receiver must be able to pick up via sensory cues the expressive display, and (c) that the receiver must be able to respond appropriately to the display. Thus, Darwin’s thesis requires that sending, receiving, and feedback mechanisms coevolved, in order for the adaptive value of a system of emotion expression and communication to be realized.

The reasoning behind the evolution of sending mechanisms is that, given that the communication of a certain motivational or emotional state is adaptive to a species, individuals who show evidence of that state in their external behavior will tend to be favored. Over the generations these behaviors will become “ritualized” into displays (Eibl-Eibesfeldt, 1975). The same reasoning applies to the evolution of receiving mechanisms: Individuals who respond appropriately to these displays would tend to be favored, so that the perceptual systems of species members would become “preattuned” to the pickup of these displays. This reasoning is consistent with Gibson’s (1966, 1977) theory of perception. From a Gibsonian point of view, displays are “social affordances” that coevolve with perceptual systems (McArthur & Baron, 1983). The result of this evolutionary process is a biologically based system involving both sending and receiving mechanisms and based ultimately upon communicative genes (Buck & Ginsburg, 1991, 1997).

Communication via Gesture: Spontaneous Communication

In *Mind, Self, and Society*, George Herbert Mead (1934) argued that biologically based communication constitutes the primitive system from which human verbal ability evolved and was developed. In doing so he distinguished between communication via “gesture” and via “significant symbol.” Mead referred to the spontaneous expressive displays analyzed by Darwin as “gestures.” His example of a “conversation of gesture” was a dogfight, in which the antagonists circle each other, growling and snapping, responding instantly to signs of advance or retreat on the part of the other animal. Mead (1934, p. 16) argued that the gestures on which this conversation is based are not voluntary.

Moreover, these biologically based gestures are not symbolic in that their relationship to their referents is not arbitrary. In the language of semiotics they are “signs” that bear natural relationships with their referents: like dark clouds are a

sign of rain, or smoke is a sign of fire. Jenkins, Jimenez-Pabon, Shaw, and Sefer (1975) defined a symbolic gesture as one “which bears no necessary relationship to that for which it stands. The relationship is specified by convention or arbitrary association” (p. 70). A sign, in contrast, bears a natural relationship with its referent: Indeed, the sign (the display) is an external manifestation of the referent (the motivational or emotional state). A dog’s advancing and growling are externally perceivable signs of impending attack, just as dark clouds are an externally perceivable sign of impending rain and smoke is an externally perceivable aspect of fire.

The relationship of symbol and referent is relevant to the notion of *iconic* or *analogic* communication (Watzlawick, Beavin, & Jackson, 1969). Analogic behaviors are intentional and symbolic, but the connection between the symbol and its referent is neither fully arbitrary nor necessarily conventional—rather, the symbol is a natural analog or icon of the referent. Therefore, communicating the meaning of the symbol does not rely entirely upon social convention, but can be inferred from the nature of the symbol as used in context. Pantomime is an excellent example of analogic communication.

If signs are an external manifestation of an internal state, it makes no sense to inquire whether they are true or false, for if the internal state did not exist, the signs would by definition be absent. Thus communication via signs is *nonpropositional*. Bertrand Russell (1903) defined “proposition” as an indicative core of meaning that is capable of being true or false and is independent of the psychological act behind its conception, formulation, or instantiation (assertion or expression). In spontaneous communication the sign by definition cannot be false, and it is not independent of the underlying psychological state. However, expressions virtually identical to natural signs can be used propositionally; that is, in pseudo-spontaneous communication, an expression can be initiated in the absence of the corresponding internal state. A dog’s growl may sometimes be a bluff.

In summary, we define spontaneous communication as having the following major qualities: (a) It is based upon a biologically shared signal system, (b) it is nonvoluntary, (c) the elements of the message are signs rather than symbols, and (d) it is nonpropositional. Spontaneous displays include not only facial expressions and gestures, but micromovements, postures, vocalizations (including language prosody), and pheromones.²

Symbolic Communication

In contrast to the nonvoluntary, nonsymbolic, and nonpropositional spontaneous communication is intentional communication via symbols, in which the commu-

² A bright line between biologically programmed and learned responses is fundamental to the present theory: Spontaneous displays and preattunements are biologically programmed. This notion is testable and indeed has been extensively supported by empirical data. The cross-cultural universality of facial-gestural expression has been reliably established (Eibl-Eibesfeldt, 1975; Ekman, 1973). Other evidence involves data from early child development (i.e., Field’s [1982] work on facial expressions in newborns; Goodenough’s [1932] observations of expressions in deaf-blind infants, and Steiner’s [1979] studies of anencephalic newborns and recent studies of pheromonal communication in humans (Diamond, Binstock, & Kohl, 1996; Stern & McClintock, 1998). There is also extensive evidence in animal studies and in the emerging area of affective neuroscience (Buck, 1999; Cappella, 1991; Panksepp, 1998).

nitive behavior has an arbitrary socially defined relationship with its referent, knowledge of which must be learned and shared by sender and receiver.

The most obvious example of symbolic communication involves language, and indeed verbal communication is clearly within the symbolic realm. Verbal communication involves generative transformational rules and is clearly associated in most persons with the brain's LH. Also, there are a wide variety of nonverbal behaviors, including analogic behaviors and behaviors directly related to language, that are not displays of internal motivational-emotional states. These include systems of sign language and pantomime, as well as body movements and facial expressions associated with language, for example, emblems, regulators, and illustrators (Ekman, 1979; Ekman & Friesen, 1969). Such conversational expressions may involve habits which, like many aspects of language, may be learned so well that they operate virtually automatically and outside conscious awareness, but they are not signs of an existing motivational-emotional state. The Weiner et al. (1972) definition of nonverbal communication presented above would appear to be restricted to this sort of symbolic nonverbal communication.

Pseudo-Spontaneous Communication

Pseudo-spontaneous communication involves the intentional and propositional manipulation on the part of the sender of expressions virtually identical to spontaneous displays, which to the receiver can be functionally equivalent to valid spontaneous displays. Pseudo-spontaneous communication is based upon a communication system shared biologically by sender and receiver, and the elements of pseudo-spontaneous communication are naturally occurring displays, or signs. However, in pseudo-spontaneous communication the sender intentionally manipulates the displays to send a specific message, or proposition, that can be false. The Burgoon et al. (1996) definition of nonverbal communication presented earlier could refer to pseudo-spontaneous communication, as well as symbolic nonverbal communication. Pseudo-spontaneous communication is often used by the vast array of entertainers, actors, politicians, advertising agencies, and media professionals, with more successful performances being those that are successful in manipulating the emotions of the audience.

The proposed model, that communication involves simultaneous and interacting "streams" of symbolic, spontaneous, and pseudo-spontaneous communication, is summarized in Figure 1 in simple linear form. Later we discuss the addition of feedback to the model. In symbolic communication, the sender encodes the intended message into symbols, and the receiver decodes those symbols to decipher the intended message. At the same time, the motivational-emotional state of the sender is "read out" spontaneously and automatically in displays, which, given attention, are picked up directly by the receiver via perceptual preattunements. The resulting affective message is not necessarily known consciously by the receiver, but may be experienced as vague gut feelings or "vibes." At the same time, the sender may attempt strategically to manipulate the display by pseudo-spontaneous communication, to control the receiver's response in accordance with the intended message or other social goals. Note that the distinction between verbal and nonverbal behavior is not critical here. In-

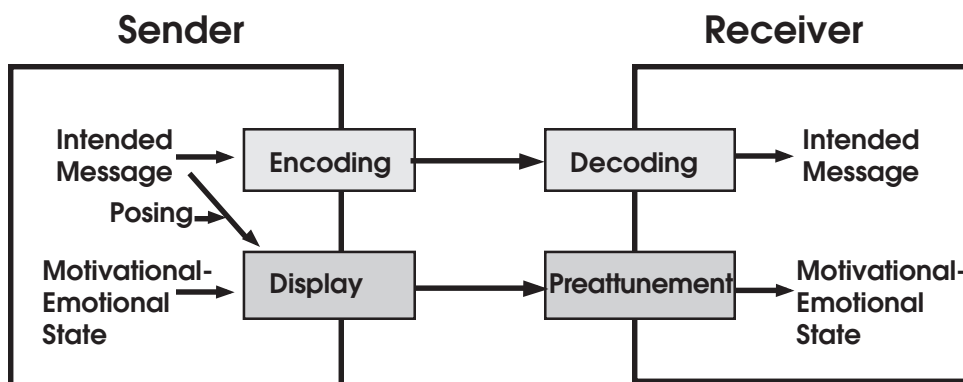


Figure 1. Simplified view of symbolic communication, spontaneous communication, and posing.

deed, nonverbal behavior ordinarily contributes to all three sorts of communication processes.

For example, the sender might be a hostess concerned with giving her guests a good time, but at the same time she may be experiencing a splitting headache. She tries not to show her discomfort, and succeeds for most of her guests, although they might sense a certain tension. A friend of the hostess, however, may know her usual modes of expression well enough to realize that something is wrong. Such an interchange illustrates the simultaneous “streams” of symbolic and spontaneous behavior. The ability to read accurately the emotions of another through their spontaneous display is an important aspect of a personal relationship (Buck, 1989; Sabatelli, Buck, & Dreyer, 1982).

Spontaneous Versus Conversational Nonverbal Behavior:

The Slide-Viewing Technique

Spontaneous communication was first demonstrated experimentally by Robert E. Miller in his studies of cooperative conditioning in rhesus monkeys (Miller, Caul, & Mirsky, 1967). The paradigm was extended to human participants in the slide-viewing technique (Buck, Savin, Miller, & Caul, 1972). In the slide-viewing technique, a “sender” views, and then describes his or her emotional response to, each of a series of emotionally loaded color slides while being filmed by a hidden camera. “Receivers” viewing the (silent) expressions of the sender make judgments about the type of slide presented on each trial and the sender’s emotional response. The receivers’ judgments are compared to the actual slide viewed and to the senders’ rated emotional responses, resulting in communication accuracy scores (Buck, 1976, 1979a). Also, segmentation techniques can be applied to the filmed expressions to assess the ebb and flow of facial-gestural behaviors across time (Buck, Baron, & Barrette, 1982; Buck, Baron, Goodman, & Shapiro, 1980).

Because the sender is alone while watching the slides and the camera is hidden, it is unlikely that pseudo-spontaneous nonverbal behaviors will occur because, from the sender's point of view, there is no one to manipulate. However, differences between spontaneous and conversational nonverbal behaviors do occur. Segmentation studies show marked differences in expressive behavior in the slide period when people are only looking at the slides, versus the talk period when, following a signal, they describe verbally their feelings. Essentially, the expressions in the slide period were relevant to the slide, while the expressions in the succeeding talk period, when senders verbally described their feelings, showed effects of language-related conversational behaviors such as emblems, illustrators, and regulators (Buck et al., 1982).

Right Versus Left Hemisphere Brain Functioning and Communication

There is considerable evidence that the distinction between spontaneous communication, symbolic communication, and pseudo-spontaneous communication is relevant to the distinction between LH and RH brain processing. LH damage is associated in most people with deficits in language expression and comprehension: *aphasia*. Aphasia apparently does not involve the capacity to conceive propositions, as it is generally acknowledged that aphasia need not involve intellectual impairment. Aphasia may involve the ability to formulate propositions, and it certainly involves the ability to assert propositions via language. Jenkins et al. (1975) defined aphasia as an "impairment of the ability to formulate propositions in the symbolic mode" (p. 81).

Pantomime Recognition and Expression in Aphasia: A Meta-Analysis

The aspect of aphasia research relevant for our purposes involves the relationship between pantomimic communication abilities, which are nonverbal and analogic, and verbal-linguistic abilities. The question of the relationship between pantomimic and verbal-linguistic abilities in aphasia involves two issues of practical and theoretical importance. The first involves whether aphasia is only a verbal-linguistic deficit, or whether it involves a central deficit of some kind. The second question involves the nature of the central deficit: whether it is a cognitive-symbolic deficit, a deficit in intentional movement, or both.

The first question is important for practical reasons because, if aphasia is only a verbal-linguistic deficit, aphasic patients may be trained to circumvent their communicative difficulties by learning to use alternative nonverbal systems, such as pantomime. Unfortunately, there is little evidence that such training is successful. Communication deficits suffered due to LH brain damage have been demonstrated in symbolic nonverbal behaviors as well as verbal behaviors. For example, deaf mutes who suffer LH damage have been found to lose their abilities at signing and finger spelling (Critchley, 1975, pp. 26–29).

Furthermore, studies have demonstrated deficits of gesture and pantomime recognition and/or expression in aphasic patients and shown that the degree of pantomime impairment is significantly related to the degree of verbal impairment.

A list of such studies and their results is summarized in Table 1. Pantomime recognition is typically assessed by pantomiming the use of a commonly recognized object (i.e., drinking glass, scissors, gun) and asking the patient to point to a picture of the object in use (the Pantomime Recognition Test [PRT], Duffy, Duffy, & Pearson, 1975). Pantomime expression is usually assessed by asking the patient to pantomime the functional use of common objects when shown pictures of the objects (the Pantomime Expression Test [PET], Duffy & Duffy, 1981).

Table 1 shows that, across a variety of studies and measures, the correlations between pantomimic skills and verbal abilities are uniformly positive and mostly substantial. Where possible, homogeneity tests were used to assess whether the correlations of specific verbal abilities were similar from study to study and could be summarized in an average correlation, or whether substantial variance is unaccounted for. Auditory comprehension showed the most consistent correlations from study to study, with variations likely being due to sampling error. The average correlations with auditory comprehension were $r = .566$ for pantomime recognition and $r = .703$ for pantomime expression.³ The correlations between pantomimic abilities and the overall aphasia scores—the Porch Index of Communicative Ability (PICA) and composite language scores from the Boston Diagnostic Aphasia Examination (BDAE)—although consistently positive were heterogeneous. Table 1 shows that the PICA showed larger correlations than the BDAE.

The Central Deficit in Aphasia: Asymbolia Versus Apraxia

The consistently positive relationships between pantomimic and verbal abilities suggest that aphasia involves a central deficit affecting both verbal-linguistic and nonverbal analogic, pantomimic, communication. There is some controversy concerning the nature of this central deficit. Some have suggested that the close relationship of pantomimic and verbal deficits implies a general symbolic disorder, involving a “central organizer” that controls both verbal and pantomimic behavior. Such a deficit was first suggested by Finkelnburg (1870), who coined the term “asymbolia” to denote a general inability to express and comprehend symbols in any modality (see Duffy & Liles, 1979). In contrast, Goodglass and Kaplan (1963) suggested that, rather than reflecting a general symbolic disorder, pantomimic deficits in aphasic patients could be explained as the results of a concurrent but independent disorder, apraxia. Apraxia involves an inability to perform voluntary movements (see Heilman, Rothi, & Ochipa, 1991).

To address this issue, several studies have investigated relationships between measures of pantomime recognition/expression, aphasic impairment, and apraxia. Duffy and Duffy (1981) found that aphasia (measured by the PICA) accounted for 80% of the variance in pantomimic performance, with limb apraxia accounting for only an additional 3%. Wang and Goodglass (1992) criticized the use of the PICA as a global measure of aphasic impairment, arguing that it includes a gesture subtest that could introduce artifacts into the correlational analysis. However, as

³ For pantomime expression, four correlations came from two studies. The r s within the studies were averaged and tested for difference. This test resulted in a nonsignificant z of 1.84, suggesting sufficient homogeneity.

Table 1. Correlation Coefficients Between Tests of Pantomime Recognition/Expression and Verbal Measures in Studies of Aphasic Patients

| Study | N | Nature of verbal ability measure | r ^a |
|--------------------------|--------------------|----------------------------------|--|
| Pantomime recognition | | | |
| Duffy et al. (1975) | 44 | PICA* overall | .79 |
| | 44 | Verbal recognition test | .83 |
| | 29 | Naming test | .59 |
| Duffy & Duffy (1981) | 47 | PICA overall | .73 |
| | 47 | Verbal recognition test | .73 |
| | 30 | Naming test | .50 |
| Gainotti & Lemmo (1976) | 22 | Verbal recognition test | .54 ^b |
| Guilford et al. (1982) | 8 | Auditory comprehension (BDAE*) | .72 ^c , .96 ^d |
| | 8 | Language subtests (BDAE) | .37 ^c , .51 ^d , .43 ^e |
| Pickett (1974) (test G2) | 28 | PICA overall | .89 |
| Seron et al. (1979) | 27 | Oral comprehension | .48 ^b |
| | 27 | Reading comprehension | .64 ^b |
| Varney (1978) | 40 | Reading comprehension | .87 |
| | 40 | Aural comprehension | .61 |
| | 40 | Visual naming | .60 |
| Wang & Goodglass (1992) | 30 | Auditory comprehension (BDAE) | .51 |
| | 30 | Reading | .37 |
| | 30 | Naming | .40 |
| | 30 | Composite language | .52 |
| Pantomime expression | | | |
| Coelho & Duffy (1987) | 12 | PICA overall | .86 ^f |
| Duffy & Duffy (1981) | 47 | PICA overall | .89 |
| | 47 | Verbal recognition test | .63 |
| | 30 | Naming test | .78 |
| Guilford et al. (1982) | 8 | Auditory comprehension (BDAE) | .91 ^c , .97 ^d |
| | 8 | Language subtests (BDAE) | .53 ^c , .29 ^d , .42 ^e |
| Pickett (1974) (test G4) | 28 | PICA overall | .86 |
| Wang & Goodglass (1992) | 30 | Auditory comprehension (BDAE) | .64 ^g |
| | 30 | Reading | .27 |
| | 30 | Naming | .30 |
| | 30 | Composite language | .57 |
| | 30 | Auditory comprehension (BDAE) | .73 ^h |
| | 30 | Reading | .25 |
| | 30 | Naming | .44 |
| 30 | Composite language | .71 | |

*Note: PICA: Porch Index of Communicative Ability
BDAE: Boston Diagnostic Aphasia Examination

^a Pearson product-moment correlations unless noted otherwise

^b Spearman rank-order correlations

^c American Indian Gestural Code (Amerind)

^d American Sign Language (ASL)

^e Overall receptive (combined Amerind and ASL)

^f Learning of manual signs

^g Transitive PET—pretend to use pictured object

^h Intransitive PET—respond to verbal command ("salute," "shiver")

Table 1 indicates, they also found pantomimic measures to correlate positively with their own composite language impairment index, albeit not as strongly as the correlations with the PICA.

In their own analysis of relationships between pantomime, apraxia, and aphasia, Wang and Goodglass found that apraxia, measured by a movement imitation test, contributed the most variance to both pantomime expression (42%) and pantomime recognition (54%). However, aphasia also contributed significant variance to both pantomime measures (18% and 24%, respectively). Thus, although apraxia contributed considerable variance to pantomimic deficits, language impairment contributed significant variance as well. Wang and Goodglass (1992) conceded that “pantomime movements do appear to depend on the ability to translate a concept into representational form” (p. 417). They concluded that, in the end, both factors are important, that pantomime involves both “the formulation of a concept to be communicated as well as the planning of a purposeful movement” (p. 414).

The asymbolia hypothesis suggests that aphasia is a causal factor directly influencing pantomime performance. As most research involving brain damage in human beings is necessarily nonexperimental, determining causal relationships is not straightforward. To address this problem, Duffy, Watt, and Duffy (1994) used path analyses to study relationships between pantomime recognition and expression, aphasic impairment (PICA), intellectual deficits, and limb apraxia. They found the most parsimonious model to be that treating the aphasic deficit as the primary determinant of the other variables. They concluded that pantomime disorders are the result of both a central symbolic disorder (asymbolia) and specific neurophysiological motor and visual dysfunctions.

In summary, patterns of positive relationships between pantomimic and verbal abilities are consistent with the hypothesis of a central organizer of symbolic behavior that is associated in most persons with the LH. The fact that analogic pantomimic communication is associated with the LH is not congruent with the contention of Andersen et al. (1979) that nonverbal communication is analogic, nonlinguistic, and RH oriented.

Emotional Communication and the Right Hemisphere

Whereas LH damage leads to deficits in propositional and symbolic verbal and nonverbal-analogic communication, spontaneous nonpropositional communication still occurs. Right hemisphere (RH) damage, in contrast, does not normally lead to deficits in verbal behavior or pantomime (Duffy & Duffy, 1981; Duffy, Duffy, & Pearson, 1975), but it is associated with disruptions of emotional expression and recognition (Borod, 2000; Ross, 1981, 1992).

Sending accuracy. Most formal studies of nonverbal communication in aphasic patients have studied only the deliberate and intentional use of gestures and pantomime as opposed to spontaneous nonverbal behavior. However, Buck and Duffy (1980) used the slide-viewing paradigm in brain-damaged patients to assess abilities at spontaneous communication. As noted, the slide-viewing technique employs color slides to evoke emotional expressions (see Buck, 1979a, 1979b). This study found that receivers could determine the category of slide viewed by

the aphasic patients as well as they could from the facial expressions of non-brain-damaged comparison patients, despite considerable facial paralysis in some of the aphasic patients. Furthermore, RH-damaged patients showed significantly lower sending accuracy scores relative to LH-damaged patients and comparison patients. In fact, RH-damaged patients did not differ significantly in sending accuracy from a sample of patients with Parkinson's disease, a disorder long associated with a "mask-like" dearth of facial expression.

Duffy and Buck (1979) investigated relationships between the PET, PRT, PICA, and spontaneous sending accuracy in LH-damaged patients. The PRT and PET were very strongly related to the PICA measure of verbal ability ($r = .90$ and $.99$, respectively) and to one another ($r = .91$) in these patients, mirroring the results of previous research. However, the spontaneous sending accuracy scores of these patients were essentially unrelated to verbal ability ($r = .00$), the PET ($r = .00$), or the PRT ($r = .09$). The correlations between spontaneous sending accuracy on one hand, and verbal ability and pantomime on the other, illustrate the independence of spontaneous communication as opposed to verbal and analogic-pantomimic symbolic communication. The high positive correlations with verbal ability found in studies of pantomime expression and recognition demonstrate that the fact that both are symbolic overrides the fact that pantomime is analogic and nonverbal. Moreover, the results demonstrate that spontaneous sending accuracy is associated with the RH, and symbolic verbal and pantomimic abilities are associated with the LH.

Receiving ability. Our argument that spontaneous receiving involves innate preattunements implies that emotional displays must be recognized rapidly, automatically, and unconsciously. There is abundant evidence for such a biologically based, direct receiving process. Studies using classical conditioning procedures have shown that human facial expressions of anger and fear are more readily associated with aversive events than are happy or neutral expressions (Ohman & Dimberg, 1978). Also, an angry face is picked out of a group of happy faces more quickly than a happy face is picked out of a group of angry faces, presumably because of the evolutionary advantages such recognition affords (Hansen & Hansen, 1988). Studies have shown that different facial stimuli evoke specific neural activity in the human amygdala (Morris, Ohman, & Dolan, 1998; Whalen et al., 1998), and that amygdala damage in humans impairs the recognition of specific facial expressions (Adolphs, Tranel, Damasio, & Damasio, 1994, 1995). Dimberg, Thunberg, and Elmehed (2000) demonstrated that unconscious presentations of happy and angry facial expressions elicit corresponding unconscious responses in the facial muscles of observers.

There are many studies implicating the RH in emotion recognition, both in normal subjects and brain-damaged patients. In normal persons, it has been found that the left ear better recognizes emotion expression in speech in dichotic listening tasks (i.e., how the statement is expressed as opposed to what is expressed. Carmon & Nachshon, 1974; Haggard & Parkinson, 1971; Safer & Leventhal, 1977). Also, there is a left visual field superiority for the processing of faces (indicating RH involvement), particularly faces expressing emotion (Ley & Bryden, 1979; Suberi & McKeever, 1977). This result was confirmed by Burt and Perrett (1995, 1997),

who used computer averaging or morphing techniques to produce realistic chimeric face photographs in which the right and left sides differed in age, attractiveness, gender, expression (smile-neutral and sad-neutral), and lipreading. Results indicated that judgments of age, attractiveness, gender, and expression were influenced more by the left side of the face (judge's viewpoint), indicating RH involvement on the part of the judge. In contrast, the right side of the face, indicating LH involvement, was more influential in judgments of lipreading. Burt and Perrett (1997) concluded:

the LH seems to predominate during processing of facial information about speech (lip-reading), and the RH seems to predominate during processing of other facial dimensions (age, gender, expression, and attractiveness). Both of these findings are concordant with the neuropsychological studies of brain damaged subjects. (p. 15)

Indeed, RH brain-damaged patients have particular difficulty comprehending and discriminating affective speech (how it was said) but not propositional speech (what was said). Similarly, RH-damaged patients have difficulty recognizing and discriminating emotional faces and pictures (see reviews in Gainotti, 2000; Heilman, Blonder, Bowers, & Crucian, 2000). In contrast, LH-damaged aphasic patients have been found to be superior to non-brain-damaged controls in detecting deceit in posed nonverbal behavior (Etcoff, Ekman, Magee, & Frank, 2000). Patients were shown a film of a woman describing a pleasant scene she was supposedly watching. In one version she was actually viewing a beautiful and relaxing scene; in the other, she was actually watching gruesome images of burn victims and amputees. Using facial cues, controls had only about a 50–50 chance of detecting when the woman was lying about her true feelings, whereas LH-damaged aphasic patients spotted the lying 73% of the time.

The evidence seems convincing that the LH and RH are differentially involved in symbolic and spontaneous information. Combined with the evidence reviewed above of differential RH and LH involvement in the spontaneous display versus symbolic propositionizing, it appears that the symbolic encoding–decoding process represented in Figure 1, including analogic-pantomimic communication, is particularly associated with the LH. Conversely, spontaneous displays and preattunements appear to be particularly associated with the RH (Buck, 1984). We might note that the RH does things other than mediate emotion, and we do not argue that all RH-mediated responses are biologically programmed. As Andersen et al. (1979) noted, the RH is involved in processing spatial, directional, and proxemic information; shape and form information; nonlinguistic tactile information; kinesic cues, facial expressions, and physical appearance; nonlinguistic sounds; and music.

Brain Mechanisms of Pseudo-Spontaneous Expression

We have reviewed evidence that both verbal-linguistic and nonverbal analogic (pantomimic) communication are associated with LH mechanisms, whereas spontaneous communication is associated with the RH. The receiving processes associated with pseudo-spontaneous are identical to those associated with spontane-

ous communication, indicating RH involvement. However, one would expect that, because pseudo-spontaneous expression is voluntary and intentional, the LH may be involved. The available evidence, although scanty, suggests that the expressive aspect of pseudo-spontaneous communication indeed involves the LH. For example, Buck and Duffy (1980) found that LH-damaged aphasic patients did not modulate their expressive responses to the slides according to conventional display rules as did other groups (control, RH-damaged, Parkinson's disease patients).

Feedback and Mutual Adaptation in Interaction Systems

The final component in the verbal-nonverbal communication process is the adaptive feedback response of the receiver, which may involve either reciprocity or compensation. The behavioral display and the preattuned reception is an advantage to the species only if the response to the situation tends to be adaptive. The vulnerability of animals born immature requires a natural attachment and the ability to communicate needs and secure nurturance from adults (Buck, 1989; Cappella, 1991, 1996; Panksepp, 1982)—nurture could not exist without nature. Further, it is apparent that the social organization and behavioral coordination of higher animals are of great survival value.

Other reviews have provided credible circumstantial evidence for the biological origin of certain adaptive responses (Buck, 1984; Burgoon, Stern, & Dillman, 1995; Cappella, 1991) including (a) the interaction of caregivers and neonates or infants; (b) evolutionary adaptiveness; (c) physiological structures; (d) cross-cultural similarities; and (e) ethological analogies and homologies. Cappella (1991) has argued that (a) biologically programmed emotional responsiveness is the mechanism through which effective caretaking and monitoring of infants is achieved; and (b) an innate system of adaptive stimulation regulation is the means through which attachment between caretaker and infant is achieved. Young human infants are born capable of communicating their needs to their caregivers. Infants only hours old show the ability to respond differentially to emotional expressions and very young infants are capable of coordinating their behavior to caregivers (Cappella, 1991). Parents who are more responsive to their children produce children who are more secure in their attachments later in life (Bowlby, 1969; Hazan & Shaver, 1987). The capacity to send, receive, and respond appropriately constitutes a feedback process that is a natural part of our biological legacy.

Specific behaviors emanating from specific types of emotional experiences being received with specific preprogrammed responses may constitute the basis for an appropriate relational system for special relationships (e.g., parent-infant; courtship and mating; dominance-submission) and special purposes (e.g., vulnerability-protection; exploration-surveillance monitoring; need-succor; sexual availability-sexual interest; modulation of aggression). The deep structures of essential processes for such basic relational systems may be innate and highly patterned, though even here there is likely to be some variance in enactment to allow for situational contingencies. For example, even a primitive species may in some

situations counterattack a threat (reciprocal response) and in others flee or hide (compensatory response).

Human beings retain their natural biologically programmed response patterns, and this is adaptive for providing for attachment and emotional responsiveness. It also provides a basic pattern or deep structure within which we coordinate our behaviors with others that allows for more complex social structures and more intricate patterns of social coordination. Yet these special purpose processing systems (SPPSs) are (a) reactive and not proactive; and (b) less flexible, having a limited range of responses and not guided by a generative rule system. In general, more complex species have the capacity to overwrite the basic blueprint of SPPSs with learned, intentional, and symbolic responses generated from the general purpose processing systems (GPPS).

Developmental interactionism posits an “emotion-reason continuum” in the control of behavior. We are always subject to the basic motivations and responses of the SPPS. However, as we develop and are subject to the process of “emotional education” (Buck, 1984), more of our behaviors and responses come to be governed by GPPS and, ultimately in humans, by verbal-linguistic processes associated with the LH of the upper cortex.

Behavior responses range from specific hardwired responses, to responses that can consider limited contingencies (e.g., Is the stimulus threatening?; Is there room to flee?), and responses learned through conditioning, to proactive, strategic, contingent responses (e.g., a chess game). GPPS provides for greater flexibility of responses and the ability to adapt to the affordances and contingencies of a wide variety of situations. Even when the response type is strongly patterned, the GPPS allows for considerable variation in the style and manner of its enactment. Several communication models exist for predicting whether responses will be reciprocal or compensatory (Burgoon, Buller, & Woodall, 1996; Burgoon, Stern, & Dillman, 1995; Cappella & Greene, 1982) that consider both biological defaults and contingent selection.

Implication for Relational Messages and Relational Patterns

When we communicate symbolically, we do so with intent, to accomplish some purpose or goal. The purpose is accomplished vis-à-vis the other communicator and, therefore, the pragmatic force of the message communicates a relational message (Rogers & Bagarozzi, 1983; Watzlawick, Beavin, & Jackson, 1967). Our analogic symbolic behavior is particularly important in conveying relational messages, as it can also accomplish a pragmatic function or clarify the pragmatic function intended by a verbal message (Watzlawick et al., 1967).

Clearly, spontaneous and pseudo-spontaneous nonverbal behaviors often convey powerful relational messages. Given that some of our most basic emotions evolved to enable social attachment and the attendant spontaneous displays evolved to facilitate social organization, it follows that spontaneous behaviors displayed in the presence of others communicate, albeit unintentionally, relational messages. We have feelings about others and the behavior of others, and these feelings engender spontaneous displays that in turn constitute relational messages. Such phenomena as interpersonal synchrony, equilibrium, and reciprocity (often in-

volving extremely subtle micromovements, postures, gestures, and eye behaviors) are emergent phenomena often based upon the interplay between spontaneous displays and preattunements during the course of interaction that express important emotional aspects of a relationship. In this way, we cannot not communicate and we cannot avoid defining our relationship (Watzlawick et al., 1967).

Through emotional education, people place symbolic meanings on their emotions and spontaneous behaviors. People have the ability to override their natural spontaneous responses by suppressing them or by counterfeiting them as pseudo-spontaneous displays. This is a key motivation for the inhibition of spontaneous behaviors and enactment of pseudo-spontaneous behaviors. If suppression of spontaneous displays is successful, unwanted emotional reactions are avoided, but potentially at the cost of unhealthy physiological arousal (Buck, 1979b). If pseudo-spontaneous displays are successful, they elicit the desired emotional response—they are strategic, but natural-appearing relational messages.

The actual nature of a relationship emerges through the patterned exchange of relational messages in all of these modalities (Watzlawick et al., 1967). Communicators may reciprocate similar relational messages in a symmetrical pattern (e.g., a smile begets a smile, a glare begets a glare), or they may exchange behaviors with opposite relational messages in a complementary or compensatory pattern (e.g., a dominance display followed by a display of submission, or approach by avoidance). Consistent symmetrical patterns may constitute a mutually friendly or mutually hostile relational system. Consistent complementary patterns may come to define a structured role relationship. Contingent responses create flexible relational systems called “parallel relationships” in which both symmetrical and complementary patterns coexist and positions in complementary exchanges are not rigidly fixed (VanLear & Zietlow, 1990). The ability to adapt appropriately to a wide array of situations and contingencies while retaining the basic behavioral repertoire that provides our basic social needs requires the interaction of both RH and LH, as well as the reptilian, limbic, and neocortical regions of the brain.

Conclusions

Communicators interact simultaneously on both a spontaneous and symbolic level and these intertwining threads of mutual adaptation comprise the infrastructure of human communication. A spontaneous and nonpropositional stream of communication is particularly associated with RH functioning and knowledge by acquaintance, and a symbolic and propositional stream is particularly associated with LH functioning and knowledge by description. Linguistic-verbal communication clearly involves the latter stream, whereas nonverbal communication occurs in both, but carries the entire burden of spontaneous communication.

The two streams have both expressive and receptive aspects. One stream is not more important than the other. Rather, the kinds of meanings communicated by the two streams are different, and in some situations the propositional message may be more important, in others the spontaneous message may take prece-

dence. In any case, they interact and modify one another. However, the spontaneous stream is perhaps more important than we heretofore realized.

One might inquire what the present theory about symbolic, pseudo-spontaneous, and spontaneous communication behaviors does for us in understanding human communication in everyday life. For example, can we identify when “authentic” spontaneous as opposed to “deceptive” pseudo-spontaneous behaviors are occurring, using, for example, microanalytic methods? One of the important implications of this theory is that, in principle, there may in fact be no way to distinguish spontaneous and pseudo-spontaneous behaviors with certainty because pseudo-spontaneous behavior involves the very same biologically programmed display as that which is shown spontaneously. A talented thespian or skillful liar may prove to be extremely difficult to detect, although there may be ways to read less skilled impostors. In the end, an adroit psychopath can probably fool anyone or anything, including a polygraph.

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