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Genetic, Neurological, and Social Bases of Empathy

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Abstract

The authors argue for an interdisciplinary approach to the construct of empathy. Recognizing that the construct has a long history as a biological construct, the idea is placed in a context of new approaches in the medical field. The social psychological approach is taken from the symbolic interaction theory of George Herbert Mead. By developing such a perspective, the authors suggest that communication researchers and educators can understand how empathy is a combination of symbolic processes, which individuals accomplish through their genetic structure, and neurological actions. While the person is empathizing with the other, the brain undertakes an empathic process of its own.

Genetic, Neurological, and Social Bases of Empathy

Writers and researchers have investigated the concept, known by a variety of names, which indicates that one individual can, in some way, comprehend the mind of another.[1] Because humans and some animals have this capacity, they can "feel into" the emotions of an other. Even when individuals disagree, one can "understand the other's viewpoint." This construct is integral to human communication. It is one feature without which there would be no human communication. Aristotle (Cooper, 1932) stated as a maxim to public speakers: "The speaker, therefore, must *feel* his way to the subjects on which his audience has prepossessions, and guess how these came about, and then must express the same views, on the same subjects, as general truths" (p. 154, italics added). Kenneth Burke (1966) felt that humans could *identify* with one another, to a point where they could become *consubstantial* with one another.

George Herbert Mead (1938) wrote that "meaning . . . arises in experience through the individual stimulating himself to take the attitude of the other in his reaction toward the object" (p. 545). Mead considered the ability to "take the role of the other" both a biological and a social process. While most of us consider empathy a symbolic and psychological phenomenon, Lipps (1907) indicated long ago that empathy is both a social and a biological process.

Buck and Ginsburg (1997, p. 19), though, feel strongly that there is a "communication gene," and Ridley (1999) is convinced that the placement of such a gene is likely to be found in chromosome 7.[2] De Waal (1996) believes that some mammals and birds have a similar talent. He has written: "Whether based on empathy or not, animal succorance is the functional equivalent of human sympathy, expected only in species that know strong attachment" (p. 41). Neubauer and Neubauer (1990) agree, quoting the work of Brothers (1989): "Empathy is a challenging concept to think of in genetic terms. One researcher, Leslie Brothers, makes it easier when she indicates that what may be called empathy among human beings is the same as 'socio-emotional communication (in animals and social signal processing in neurons'" (p. 47). Hauser (2000) disagrees writing: "Some authors think that animals experience the moral emotions, feelings such as guilt, shame, and embarrassment. I don't. Nor do I think animals experience empathy" (p. 250).

It is not our role here to takes sides in regard to other animals, but we do believe that *most people* are capable of empathy. Universally considered pro-social and beneficial, empathy also has been proposed as a vital element for effective communication (Floyd, 1985; Gompertz, 1960; Redmond, 1985). However, the degree to which any one person can empathize with any other one person, in a particular setting, varies considerably. Herein we shall attempt to outline the concept of empathy in humans as the first phase in the communication process. The construction of an idea and that construction's interlock with symbols to create messages.

The Dimensions of Empathy

Originally the concept of empathy came from *Einfuhlung* or “feeling into” (Lipps, 1907). The idea of “feeling into” is a state in which feelings and changes in bodily states are directed at someone, whether internally or externally. The word, "empathy," was a translation first used by Edward Titchener (Kohn, 1990). In the past, most definitions have centered on the idea of one individual feeling into the situation of another. For

example, Kohn (1990) claims empathy is the process of taking someone else's perspective. Perspective taking is a central theme in empathy. It is the cognitive part of the process of empathy that refers to the capacity of an individual to adopt the viewpoint of another and thus consider both or several sides of an issue. Taking the viewpoint of another leads to empathic concern, which influences emotional contagion and communicative responsiveness.

Three constructs of empathy established by Richendoller and Weaver (1994) were *empathic responsiveness*, *perspective taking*, and *sympathetic responsiveness*. Empathic responsiveness has been defined as "an explicitly affective response parallel to, and as a result of, observing another person's actual or anticipated display of emotion" (Stiff, Dillard, Somera, Kim, & Sleight, 1988, p. 199). Perspective taking, in this construct, is defined as "a process that broadly involves imagining oneself in the place of another," (Davis, 1980, 1983a, 1983b; Tamborini & Mettler, 1990; Zillman, 1991). Seen as "acting in your head," imagining requires the enactment of a narrative from that person's point of view (Goldie, 1999, p. 397). Sympathetic responsiveness is feeling "sympathy for another with a problem, [however] you do not actually experience emotions parallel to theirs'; instead, you experience different emotions that are associated with concern or sorrow [for example] for another" (Weaver & Kirtley, 1994, p. 132).

From this variety of categories, we will discuss only perspective taking and empathic responsiveness, leaving sympathy for others to tackle. The first is perspective-taking or what George Herbert Mead has referred to as taking the role of the other. Mead (1934) has written: "The 'I' reacts to the self which arises through the taking of the attitudes of others. Through taking those attitudes we have introduced the 'me' and we react to it as an 'I'" (p. 174). Taking the perspective of the other means, in phenomenological terms, "bracketing" the "I."[3] The concern of the individual is not what he is going to say, *per se*, but how the other will interpret what he is saying. To an extent, an analogy to a game may be appropriate here. Mead used a baseball game as his example, but virtually any game will do, where one of the roles of each of the players is to *anticipate* the other or others in the game. It is important to note, though, that such anticipation must be based on what you think *the other* would say or do.

In addition to anticipating the moves of the other *from his/her perspective*, we must also take into account the definition of the situation. McHugh (1968) has written: "Remember that emergence includes, in the present, the changing of past events and future programs" (p. 35). For example, in a baseball game, a batter may realize that the pitcher has struck him out twice with a third strike that was low and inside. The pitcher, too, knows what he has done. In his third at bat, following two strikes, the batter may anticipate an inside, low strike. He shifts his body so that he can hit the low, inside strike. However, because the pitcher has anticipated that the batter knows what has happened in the past, he throws the ball low and outside, and the batter strikes out for the third time. The anticipation of deception is part, but only a part, of the empathic process. In a sense, the better empathizer "wins" (Neiva & Hickson, 2003).

The Levels of Empathy

Four levels of empathy occur as the brain develops through experience (Kohn, 1990). The first is *global empathy*, displayed by infants before they have a clear sense of

their individual identity. As a result, at this stage the empathic distress they experience may cause them to react as though what transpired with the other happened to them. Once children have a sense of personal identity, they enter into the *egocentric empathy* stage. At this stage they still lack a distinctive inner self and therefore assume that what they hold true within themselves holds true for others as well. *Empathy for another's feelings* comes once children gain the ability to respond to the cues of the feelings of others. Development at this point has heightened their ability to understand complex and even ambiguous emotions. The final stage is *empathy for another's life condition*, and this stage best embodies a sophisticated grasp of someone else's experiences and allows the individual to fully understand and respond to that person's general, unique, condition (Kohn, 1990). To reach this level of empathy, the limbic system and the neocortex must be present and working together.

Perceptual Fields

There appear to be binary types of decisions that one engages in when interacting. The first part of an *interactive engagement* is a decision about whether or not to engage. This is a binary decision. There is no question that most people make this decision rapidly and many make it without much reflection. Nevertheless there must be a decision to interact. A number of factors may enter into this decision. An important one is who the target person is. As an example, there may be many occasions for telling one's boss off. For most of us, we never make that decision. In fact, if anything, we choose an alternative target by telling a coworker at lunch or a spouse at dinner. Most often, though, an alternative target is chosen because the message itself is somewhat cathartic. But the target person is chosen initially because he or she is part of the *salient perceptual field.*

The salient perceptual field is composed of those stimuli in our internal field and our external field of which we are consciously aware in the moment. The *external field* is composed of those phenomena that are present in the here-and-now, outside of the "mind." For example, these factors might include the color of the wall in the room, the room temperature, the smell of someone's microwaving popcorn, the leather texture of the chair in which you are seated, the sound of telephones ringing, and the sight of the target person before you. In the *internal field*, we find the locations of thoughts in your "mind." These are stimuli which are *not* outside you. They are composed primarily of past and future events. For example, you may be thinking about where you will go for dinner tonight, you may think of the fact that you missed an appointment, you may think about your salary. While the number of stimuli at any given moment is not infinite, it certainly may be large, especially if you have "a lot on your mind." [If we were to add in those factors that are not salient, such as the amount of dirt on the floor, smudges in various places, all of the pictures that we perceive but we don't see, the number becomes astronomical.] From all of these *salient* phenomena, we choose the target person.

On Selectivity

Once having chosen the target person, you must somehow take the role of the other. You must be able to put your self in their place, at least temporarily, while you are constructing this engagement. Proponents of audience analysis in speeches, such as

Aristotle, tend to analyze the target in demographic terms. What do we know about the target? Sex, age, height, weight, dress, perhaps birth date, birthplace, socio-economic status, perhaps religion, and so on parts of such a demographic analysis. A few deal with experience and previous interactions. From all of that, though, you don't *always* know how that person feels on this particular day. However, such analysis results in statements such as "It's not a good day to approach the boss."

Phase One: The Selective Exposure of Affective and Cognitive States

The first phase of this analysis, then, is what McCroskey (1992) has referred to as *selective exposure.* This procedure is the selection to choose particular stimuli and make them *salient.* There is exposure to affective states (feelings) and exposure to data (thoughts). Of course, most of the times they are used together, but there are times when one is used in the absence of the other. For that reason, they are divided.. As we look at these phases, we should note that there are occurrences taking place at different levels. We will focus primarily on three of these levels. They are genetic, neurological, and social. Buck and Ginsburg (1997) have noted that this process of selective exposure is both biological and social. Noting that affective states (feelings) are primarily biological, from the communicative gene, in senders/receivers, one or more of the five senses selects information from the other. They refer to this process as "spontaneous communication." This is easily seen in the work of Darwin (1998) as well as Ekman and Friesen (1972). The other has a facial expression and that expression is classified as happy, unhappy, surprised, angry, afraid, disgusted, contemptuous, or neutral. Such an affect may be perceived through other aspects of communication.

For example, one late afternoon one of the authors and some several other men were gathered at a bar. The author noticed that there was a woman in the back of the room drinking. Noticing her was the initial part of the first phase. Eye sight, auditory ability, and acuity in the other senses are necessary; this is *sensation*. The second part, what is referred to *interpretation*, is concerned with the inferences made or the meaning of what has been seen. The author's interpretation went through several scenarios. First, perhaps she was waiting on someone. This scenario was dismissed, however, because of where she was seated. She could not see someone walking in, nor was it easy to spot her. In addition, she did not look toward the front of the room as if she were waiting to meet someone else.

The second potential scenario was that she was hoping for a stranger to come to the table. This, too, was dismissed because she was not glancing at us, the only other people in the bar. The third scenario was that she was depressed. This appeared to be the most obvious conclusion. The author probably inferred depression, having been depressed, and knowing how one looked when one was depressed. None of us approached the woman, thinking that she might misinterpret concern for a "pick up" line. The next day, it was reported in the local paper that the young woman, about an hour after we departed the bar, shot and killed herself sitting at that very table.

At the neurological level, different parts of the brain are utilized depending on what kind of emotion is interpreted. Restak (2001) has reported that this research, showing different PET scans for anger, happiness, sadness, and fear. This type of research is in progress both by Damasio (1994; 1999) for emotions in general and by LeDoux (1996; 2002) for fear, in particular. Many researchers claim that this “mindwork” is primarily undertaken by the right hemisphere of the brain. The type of

social action taken here, Mead would refer to as the work of the "I," that spontaneous part of the mind.

We will now consider cognitive states. According to Buck and Ginsburg (1997), the work of the communicative gene, as well as the brain mechanisms needed to empathize cognitively, is much more complex than what is needed to do so affectively. Cognition requires "knowledge by description" or "knowledge about the world" (p. 24). These types of selection require us to pose propositions. Whereas in the last case, we referred to the emotion of the woman in the bar and the author's empathy with that emotion, here we will use a different type of example.

Suppose one is searching for the name of one of the researchers mentioned in this book. I am having a conversation with one of the co-authors. At first, neither of us can remember who wrote the article. Salience, in this case, must be based on knowledge by description and is most often a process of elimination. Because the authors have read most of the same information, this information is *sharable*, that is, each knows that he knows the answer and each knows that the other knows the answer. Each can describe some element of the answer. One author may say: "I think we can dismiss Mead or any of the social psychologists." The other may follow with: "It seems that it was one of the brain people." The first retorts: "Because it is about emotion, I would first look at Damasio and LeDoux." The second responds: "Because PET scans are used, I would think that it is Damasio." The first responds: "It is Damasio! I know because I recall a discussion of the PET scan right before he wrote about the issue we are discussing." While such a process may sound similar to the concept of the "flashbulb memory," this has been an *interaction*, not just a conversation within myself, and the answer to the question has been the most salient of the stimuli, but each of the other stimuli (social psychologists versus brain people; emotion as important; Damasio versus LeDoux; PET scan versus non-PET scan) are also important for arriving at the one *most salient stimulus*.

Phase Two: Selective Attention

McCroskey (1992) has indicated that the second phase is selective attention. Here we are concerned with how one maintains the concentration of the most salient stimuli, given that some stimuli "stick out" moreso than do others. McCroskey (1992) has indicated that those most likely to "stick out" have to do with one's attention span, the novelty of the stimulus, the concreteness of the stimulus, the size of the stimulus, and the duration of the stimulus. Such attention involves what may be called *controlled empathy*, in which a person can put herself in the place of another or an object (Hodges & Wegner, 1997). Researchers have found that participants can attend to different aspects of a home based on whether they were told to recall those things from the standpoint of a home buyer or from the standpoint of a robber (Hodges & Wegner, 1997, p.324). *Automatic empathy*, write Hodges and Wegner, involves immediate responses, such as when an infant imitates a facial expression. In the brain, attention is carried out through the prefrontal cortex (Restak, 2001, p. 74; Gazzaniga, Ivry, & Mangun, 2002, p. 260).

Gazzaniga, et al. (2002) have defined attention as "a cognitive brain mechanism that enables one to process relevant inputs, thoughts, or actions while ignoring irrelevant or distracting ones" (p. 247). They break down attention into two different types: voluntary and reflexive. *Voluntary attention* involves our conscious motivation to attend to some stimulus, such as a boring mathematics teacher. *Reflexive attention* is a sensory

event which captures our awareness, such as when a waiter drops food on the floor. These two types of attention appear to be related to the two types of empathy expressed by Hodges and Wegner (1997): reflexive attention being related to spontaneous empathy and voluntary attention being associated with controlled empathy.

Phase Three: Selective Perception

McCroskey (1992) has written that: "Perception is the process of ascribing meaning to messages" (p. 88). We will change that just slightly to say that it is about assigning meaning to selected stimuli. McCroskey (1992) has indicated that several factors inhibit this assignment of meaning. The factors that inhibit assigning meaning include ambiguity of the stimulus itself, lack of redundancy, lack of schema, lack of related experiences, and certain expectancies and biases. Ambiguity, such as in the case of the woman at the bar, creates a situation where the other person must establish a variety of interpretations instead of just one. When a stimulus is not repeated, the level of salience must be very high for one to make accurate interpretations.

The lack of schema means that the person has "no place" to put the stimulus; there is no category. Johnson's (1987) concept that we have schemata embodied in our minds allows us to place certain information within those schemata (or categories). Not having related experiences is often the reason for the lack of available schemata. If the receiver has expectations or biases, she may misinterpret the nature of the stimulus.

Phase Four: Selective Recall

Once the salient stimulus is placed in the mind (*and* in the brain), the next is to be able to recall it. McCroskey (1992) has noted the difference between selective retention and selective recall. He has written: "Selective retention has to do with the *storage* of information, while selective recall has to do with the *retrieval* of information" (p. 93). The brain is structured in such a way that recall is affected different ways in different parts of the brain, depending on where there is damage.

> Patients with higher-order visual deficits have related deficits in imagery.
>
> > Consider two patients, one with bilateral lesions of the temporal cortex and left-sided occipital involvement and another with bilateral lesions of the parieto-occipital cortex. The patient with the more ventral, parieto-occipital lesions had difficulty imaging faces or animals. He described an elephant as having long legs and a neck that could reach the ground to pick things up, and Abraham Lincoln as having a short, rounded face. Despite these difficulties, this patient could readily draw a floor plan of his house and locate major cities on a map of the United States. In contrast, the patient with the damage to the dorsal pathways produced vivid descriptions when he was asked to image objects, but failed spatial imagery tasks. He described the elephant as being big with a long nose, big floppy ears, a little tail, and four thick legs. Yet this patient was unable to describe his own neighborhood or provide knowledge of more extensive geographic regions. Chicago was described as being north of Boston. Together, these patients provide evidence of a dissociation in imagery of what-where processing that closely parallels that observed in perception (Gazzaniga, et al., 2002, p. 238).

Undoubtedly, the storage and recall of information is socially-related. We sometimes make a conscious decision to remember or *not to remember* something. When we meet a person that we know we are highly unlikely to meet again, we tend to forget quickly that person's name, if we ever remembered it in the first place. When the two do

meet again, with a third party present, the introduction is likely to go something like "This is the man I was telling you about whom I met at the Rotary Club a couple of months ago." At this point, then, we have a great deal of information from which we may empathize with another. When the perceptual fields are operative and we can focus our attention on the stimulus that is salient, we can send a message to another person. Mead (1934) has told us that we use the generalized other in addition to the impulsive "I," most of the time that we are trying to gain socially. Interestingly, we have the concepts of planned versus spontaneous functioning at several levels (See Table 1).

An issue common to the approaches mentioned above is that those who can empathize *adapt.* An absence of this quality in a communicator likely develops a personality who is considered deviant. If there is a brain problem with these kinds of adaptability, it is likely to cause obsessive-compulsive disorder (Gazzaniga, 2002, p. 495). Most red-blooded Americans believe that decisions are made solely on the idea of a cost-benefit ratio (Homans, 1974).

Gazzaniga, et al. (2002) have indicated that this is *not* the case, using the concept of the framing effect (Wang, 1996). In their demonstration of this effect, Tversky and Kahneman (1988) asked groups to make decisions regarding a risky situation. They presented two choices involving a potential medical disaster. In one case, framed in a positive manner, they were told how many lives would be saved (the positive approach) and in the other they were told how few would die (the negative approach). The two different types of groups made different types of decisions. The groups with the positive stimulus chose the sure bet. The groups with the negative stimulus chose the less probable option. We have mechanisms for choosing as an individual, which most often go back to survival instincts, and we have ways to make decisions as a group, which are based on social contracts (Hickson & Neiva, 2002).

Table 1
Categories of Spontaneous Versus Voluntary Behavior

Spontaneous versus Voluntary	Researcher(s)	Variable	Action
Spontaneous	Mead	"I"	Impulsive tendency to say or do something without much conscious thought.
Spontaneous	Hodges & Wenger	automatic empathy	Immediate reaction to the stimuli.
Spontaneous	Gazzaniga, et al.	reflexive attention	Attending without conscious impulse.
Voluntary	Mead	"Me"	Taking the role of the other.
Voluntary	Hodges & Wegner	voluntary empathy	Consciously deciding to think about the other.
Voluntary	Gazzaniga	voluntary attention	Choosing the stimuli to focus upon.

Whether our empathic concerns are only for ourselves or for the group with which we are associated, we must learn to define the situation. The symbolic interactionists have indicated that there are two constructs of concern in constructing this definition. They are emergence and relativity.

Emergence

The concept of defining the situation involves time (emergence) and space (relativity). Each of these concepts is composed of several parts. *Emergence* involves a *theme*. The theme is based in the present, but with the idea that there will be future actions, and the future, too, is considered in that there are developed patterns. "Theme is the past and future homology that informs the present" (McHugh, 1968, p. 38).

Key and Theme

Part of the theme is what Goffman (1974) has referred to as a "key." Goffman (1974, p. 40) has cited Bateson (1955) writing: "During visits to the Fleishaker Zoo beginning in 1952, Gregory Bateson observed that otters not only fight with each other but also play at fighting." It is important for otters, and for humans, to know whether this particular activity is a "*real* fight" or a "*play* fight." The difference is the key. Goffman (1974, p. 43) has defined the key in this way: "a set of conventions by which a given activity, one already meaningful in terms of some primary framework, is transformed into something patterned on this activity but seen by the participants to be something quite else" (p. 44). The key, then, may be considered both in terms of the key that unlocks the door and as a key in music. The key is integral to the theme. The participants can usually key on certain verbal and nonverbal behaviors to establish the theme.

Elaborations, Fit, and Authorship

The key is established is through *elaboration*, a second quality of emergence. If one is told, for example, that there will be a secret service agent at the cocktail party, you are likely to look for someone who is dressed in a certain way (navy or black suit), ecology (always around the edges, not center stage), and gaze. You have a notion of what a secret service agent looks like, even if you have never before seen one. Certain elaboration, such as the suit or the ecology may help you identify this person. The third quality of emergence is *fit*. This is a case where you are trying to verify that the man is, in fact, a secret service agent. You may carry on a conversation with him; in a sense, you are seeking out contradictory information as well as confirming evidence to determine fit. You dare not just ask him. The fourth quality of emergence is *authorship*. To an extent, this is the degree to which your participation is part of the event.

Revelation

In a revelation, meaning is attributed to an event in the form of "insights." It is here that we must digress, for revelations may arrive through a marker in the brain, known as a *somatic marker*.[4] We are not likely to gain significant insight into another person by gaining demographic information. Sometimes, however, demographic data may lead into the disclosure of some event, to which we may attribute substantial insight. Certain self-disclosures may reveal what Damasio believes are literally "in their head."

Emergence of Revelation through the Brain

Recognizing the role of emotion identification in empathy and desiring to discover possible links to the biological and neurological perspectives to empathy, a

study of Damasio's (1994) somatic marker hypothesis was undertaken. In *Descarte's Error: Reason, Emotion and the Human Brain*, Damasio examined cases of individuals whose neural connections between the emotional and cognitive centers of the brain no longer functioned properly. The ventromedial frontal region of the brain is responsible for emotional processes and social cognition through its connections with the amygdala and hypothalamus in the limbic system. Despite the fact that the individuals' knowledge of social situations remained, they were unable to make appropriate choices regarding everyday life because they were overwhelmed with trivial and parenthetical information. To explain his findings, Damasio (1994, p. 173) presented the somatic marker hypothesis:

> Consider again the scenarios I outlined. The key components unfold in our minds instantly, sketchily, and virtually simultaneously, too fast for the details to be clearly identified. But now, imagine that *before* you apply any kind of cost/benefit analysis to the premises, and before you reason toward the solution of the problem, something quite important happens. When the bad outcome connected with a given response option comes to mind, however, fleetingly, you experience an unpleasant gut feeling. Because the feeling is about the body, I gave the phenomenon the technical term *somatic* state ("soma" is Greek for body) and because it "marks" an image, I called it a *marker*. Note again that I use *somatic* in the most general sense (that which pertains to the body) and I include both visceral and nonvisceral sensation when I refer to somatic markers.

The somatic markers serve as an automatic function to "speed up" the interaction between individuals, and therefore to engage in *empathic responsiveness* more readily (Hickson, Powell, Turner, Neiva, & Adams, 2002). Damasio (1994) has written:

> After forming mental images of key aspects in the scenes (the encounter with a long lost friend; the death of a colleague), there is a change in the body state defined by several modifications in different body regions. If you meet an old friend (in your imagination), your heart may race, you skin may flush, the muscles in your face change around your mouth and eyes to design a happy expression, and muscles elsewhere will relax. If you hear of an aquaintance's death, your heart may pound, the muscles in your neck and back tense up while those in your face design a mask of sadness (p. 135).

The somatic marker, then, is a special slice of memory, which also has other functions. It may contain information about an especially sad occasion, such as the death of a child's first pet. It may contain information about an especially happy occasion, such as the wedding of a close friend or sister. The somatic marker may cover a positive or a negative event, but the event is given salience by its user, both in terms of how long the marker remains and the emotional strength of it. In addition, as Damasio has stated, there is something about the mention of the marker that changes the muscles in the body. Whereas Johnson (1987) has talked about "the body in the mind," it may well be that the somatic marker is "the mind in the body." The somatic marker is somewhat of a "radar screen" for the body, perhaps going back to natural selection. As a human radar screen, though, it brings back the mental state and the physiological state, it assesses the other person or object, including the mind's perceptions of the intentions of the other, and it suggests actions. Whereas with a military radar screen, despite the fact that a missile may be coming toward you, you do not know whether the firing of it was intentional, the

somatic marker makes that inference for you. The sharing of a somatic marker allows the two individuals to commune with one another in a way that they could not otherwise achieve.

A specific location for *somatic markers* is yet to be determined, but these kinds of memories may exist in a fashion similar to other memories. Damasio (1999, p. 220) has written:

> The brain forms memories in a highly distributed manner. Take, for instance, the memory of a hammer. There is no single place of our brain where we find an entry with the word *hammer* followed by a neat dictionary definition of what a hammer is. Instead, as current evidence suggests, there are a number of records in our brain that correspond to different aspects of our past interaction with hammers; their shape, the typical movement with which we use them, the hand shape and hand motion required to manipulate the hammer, the result of the action, the word that designates it in whatever language we know. These records are dormant, dispositional, and implicit, and they are based on separate neural sites located in separate high-order cortices. The separation is imposed by the design of the brain and by the physical nature of the environment. Appreciating the shape of a hammer visually is different from appreciating its shape by touch; the pattern we use to move the hammer cannot be stored in the same cortex that stores the pattern of its movement as we see it; the phonemes with which we make the word *hammer* cannot be stored in the same place either. The spatial separation of records poses no problem, as it turns out, because when all the records are made explicit in image form they are exhibited in only a few sites and are coordinated in time in such a fashion that all the recorded components appear seamlessly integrated.

Empathy exists where the journeys of two unique individuals converge. Empathy exists where realities meet, serves as a guide to the truth of the other person, and furnishes insight and understanding to where one's reality ends and the other's begins (Ciaramicoli & Ketcham, 2000). In this manner, empathy is taking the physical reality of another that one perceives through his senses and translating it cognitively to the symbolic reality of the other. If all physical boundaries could be removed, empathy would occur as the expansion of one life into the other by placing one's ear directly on the soul of another to listen to exactly what it had to say (Ciaramicoli & Ketcham, 2000).

The message of the sender is unique to that individual and cannot be understood outside the individual's specific circumstance. Empathy takes into account the fact that the feelings, actions, and expressions are unique to that individual and the individual's perspective (Kohn, 1990). With empathy, the message received by the destination is not just a feeling or action, but the unique feeling or action of that other. The only thing the destination can know for certain about the sender is that the message received is composed of images (schemata) that are real to the destination and thus the sender must have had comparable images in her mind. Humans share an image-based concept of the world and the exceptional consistency in the constructions made by distinct individuals is a crucial part of the mechanism of empathy (Damasio, 1994). The ability to recognize and respond to the unique expression of another is an *innate capacity* of the human mind that resonates in the likeness shared by humans (Kohn, 1990).

Emotional contagion is the affective aspect of empathy that occurs when the individual experiences a parallel emotion as a result of observing another person. The communicative responsiveness is based on the emotion experienced, but is not necessarily parallel to that of the other person (Stiff, Dillard, Somera, Kim & Sleight,

1988). Feshbach defined empathy as a process that begins with identification of the affective cues of another, continues with understanding the situation from that person's perspective, and ends with emotional responsiveness (Kohn, 1990). These ideas inspire the definition that empathy is the capacity to perceive, understand, and respond to the unique experience of another.

Often it is assumed that empathy is conducted only by humans and perhaps by animals. However, this definition sets a pattern that has remained constant through evolution and therefore can be traced from to single-cellular organisms to the modern *homo sapien*. With simply a structural interpretation of the definition, empathy can be seen on the level of single-celled organisms that do not have a "brain." These organisms can perform actions either spontaneously or in response to a stimulus in the environment (Damasio, 1994).[5]

A similar mechanism occurs in the development of the human fetus in the womb. Chemotaxis occurs among undifferentiated cells as they move to respond to chemical signals of cAMP and hormones released by some cells to form specialized tissues. It has been supposed that a "communicative" or "social" gene regulates this merging of cells in embryonic active cell migration. These genes encourage the cells to establish relationships as a tissue that would encourage survival of the organism (Ciaramicoli & Ketcham, 2000).

The presence of a brain is required for cognition, but even complex brains may have many intervening steps in the circuits between stimulus and response and still lack a mind capable of thought. The essential element of thought is the ability to internally display images perceived through the senses (Damasio, 1994). True empathy, then, requires that a higher part of the brain mediate the stimulus and response process.

Empathy works through several parts of the brain, including the limbic system, amygdale, and the neocortex, which are interconnected.[6] The amygdala are located on either side of the brain and are a part of the primitive limbic system that controls emotional, hormonal, involuntary responses and other *survival-oriented aspects* of the organism (Ciaramicoli & Ketcham, 2000). The automatic responses of wincing at another's pain is controlled by the limbic system and may represent the raw material of empathy and its developmentally primitive precursors, but these sort of responses lack the necessary cognitive processes characteristic of true empathy (Kohn, 1990).

Around one hundred million years ago, mammals began evolving a new layer of brain cells that wrapped over the limbic system, called the neocortex. The neocortex was dedicated to the pursuit of higher cognition and allowed mammals to think about their feelings and react accordingly (Ciaramicoli & Ketcham, 2000). The activity of the modern brain's neocortex is experience-driven and is needed to produce neural representations on which images and mindful actions are based. Yet, the neocortex cannot do this without the interaction with the "feeling makers" of the hypothalamus and brain stem. The brain stem and the cerebral cortex above it operate behind the scenes along with the early sensory cortices to have the most immediate experience of an image, either from perception or recollection (Damasio, 1994).

An important point about the evolution of the brain is that the synapse of every neuron is not genetically predetermined. There are not even enough genes (10^5) to determine the exact structure and order of every synapse in the brain (10^{15}) (Damasio,

1994). The genome sets a general arrangement of systems and circuits in the modern brain sectors, but the precise arrangement is under the influence of the environment.

Environmental influences are both coupled and bound by the influence of precisely set innate circuits that pertain to biological regulation and survival (Damasio, 1994). The genetic composition provides an innate method for empathy to survive by facilitating connection with one another for survival and reproduction, but the cognitive part comes with the development of the neocortex (Neiva & Hickson, 2003; Ciaramicoli & Ketcham, 2000).

This progression of cortex development occurs as the infant interacts with the environment, which is equivalent to the specifics the genes regulate in the circuitry of the brain stem and hypothalamus (Damasio, 1994). Despite historical evidence to the contrary, it is now believed that new neurons are created in the brain throughout life. The development of humans parallels the evolution of the brain in that infant humans are born with an almost fully developed limbic system, but with a neocortex that develops and dominates over years of learning and growth (Ciaramicoli & Ketcham, 2000).

The innate circuits of the limbic system, as well as the environment, shape the circuits of the neocortex because the limbic system is the medium in which the experiences are recorded from the environment. The circuits of the neocortex are thus shaped and evaluated by the experiences perceived by the fundamental set of preferences that are genetically instilled as best for survival. Different experiences affect the strengths of the synapses as they are formed across the neural systems and in that way shape the design of the circuits. As experiences increase, the circuits are shaped and modified by subsequent experiences (Damasio, 1994).

Person A and Person B

Empathy is a three-step process of perception, understanding, and response that proceeds in a manner similar to that of logical reasoning. Perception involves the use of the five senses in the indirect observation from the perspective of one individual of another individual. For simplicity, the observer is person A and the subject is person B (see Table 2).

Perceiving is the formation of images of varied sensory modes (Damasio, 1994). The senses of A take in a complicated combination of predicates that arise from B in the form of sensible physical (including visual, vocal, olfactory, haptic, etc.) entities. These senses enter A as a single conception of B (Peirce, 1878). The nerve terminals, such as those in the retina of the eye, send signals to circumscribed entrances in the brain called the early sensory cortices. Each sensory region is an aggregation of several areas and thus cross-signaling occurs in each sensory collection among the collection of areas (Damasio, 1994).

The act of A thinking of each of these predicates is connected to a particular sensation. This complicated feeling of thinking sensations is replaced by a more intense singular feeling that belongs to the act of perceiving B. When A's nervous system is excited by the reception of complex sensory information, with the elements excitation being related to one another, an emotion results as a single, harmonious disturbance.

Every observation of B, or any other object or individual, results in the formation of an emotion through the linkage of sensory excitations of feelings. A's senses draw an hypothesis about B through the complicated sensory elements A perceives that are connected into a main concept about B. This concept enters the mind and excites the

nervous system to produce a feeling that is combined with other feelings to produce an emotion connected to the act of thinking of perceiving B. The formation of this hypothesis about B is based on the sensory elements B sends from B's perspective. To follow Peirce's model of hypothesis, this action of B is kin to a *rule*; A's sensory perception is like the *result,* and the feeling and concept-inspired emotion excited in A is like *case*.

Understanding the perception is the next step. This is the point where cognitive processes arise. The goal of A, at this step, is to infer the existence of previously observed circumstances which were similar to the current case. A takes this case and compares it to a result or perception experienced in the past to come up with a rule to understand and classify the current perception. These perceptions, or images, or schemata are based directly on neural representations and allow for the interpretation of the signals sent to the early sensory cortices into organized categories (Damasio, 1994), because cases and things such as this have been "effective" in the past.

The recollection of past experiences of emotion is not an exact reproduction; rather it is an interpretation of the object or emotion that has been reconstructed. As experience changes the pattern of synapses in the neocortex, the versions of past experiences change as well. The strength of the momentary reconstruction depends on the circumstances under which the event was experienced and therefore originally classified. Some circuits change and others remain stable to form the backbone of A's concept of the world within and without. This is why perceptions of certain events change with age and experience (Damasio, 1994). As an analogy, one may consider that the brain maintains files of videotapes, some of which are "edited" with time and circumstantial change.

It is through classification with previous experience that A understands this perception of the unique perspective of B. Physiologically, the current representations in the form of a neural pattern orders other neural patterns to galvanize neural activity in other circuits of the same system in the brain where a strong neural interconnection has been forged in the past. This can also be termed that dispositional neural patterns will be acquired by the topographically organized representations (Damasio, 1994).[7]

These dispositional representations are potential neuron activity patterns for a set of neurons Damasio has called "convergence zones" and hold A's full repository of both innate and acquired knowledge. These convergence zones are located throughout the higher order association cortices such as the occipital, temporal, frontal, and parietal regions of the brain, the basal ganglia, and the limbic structures. Again, this displays how the higher and lower brain levels are used in empathic understanding (Damasio, 1994).

The rule induced in this stage matches an emotion or body state to an image based on past emotional states and images. This is what Damasio termed a "somatic marker" (1994). The somatic marker, which can be compared to the idea of convergence zones, works to reduce the number of alternatives to be considered in classification because it has been generated from the secondary emotions that are connected with past experiences and thus follows the same pattern (Damasio, 1994).

The final and somewhat defining step of empathy is response. The response is the physiological nervous discharge that induces a physical response in A, be it inward or outward. A's action is a response to the rule derived through understanding the unique perspective of B. The strategy for reasoning the response is the rule A reached through

understanding the perspective of B's mind based on A's somatic markers of neural patterns and convergence zones (Damasio, 1994).

It is the cognition that separates the input and output sectors of the brain. The output brain sectors in the brain stem and hypothalamic nuclei work more with innate homeostatic chemical signals. Modulator neurons in the brain stem and basal forebrain distribute neurotransmitters such as dopamine, serotonin, acetylcholine, and norepinephrine to the cortex and subcortical nuclei. The rule A induced tells these parts of the brain about the situation so they can influence the rest of the brain and body with the appropriate neurotransmitters. The M_1, M_2, and M_3 cortices coordinate body-aimed movements. The activation of the dispositional representations formed through understanding can generate a body movement by activating a motor cortex as well (Damasio, 1994).

In empathy, the purpose of A's reasoning is deciding what rule will be used to select a response option from the nearly infinite possible options of movement available in connection with B's given situation (Damasio, 1994). Deduction serves as a check and balance system to see if the rule selected is actually appropriate to the case. The only way A will know if the response is appropriate, and thus that the rule was induced on valid emotions based on accurately perceived premises, is through feedback from B. If B gives A positive feedback, then it can be stated that A accurately perceived, classified, and responded to the unique situation of B through from B's perspective. This is an example of successful empathy.

Table 2

Relationships Between Empathic Stages and Kinds of Logical Reasoning

Perception	Understanding/Classification	Response
Hypothesis:	Induction:	Deduction:
Rule: B's physical action from B's unique perspective	**Case**: A's feeling- and concept-inspired emotion	**Rule**: A's classification of current emotion
Result: A's perception through sensory mechanisms	**Result**: A's past sensory perceptions	**Case**: A's feeling- and concept-inspired emotion
therefore		
Case: A's feeling- and concept-inspired emotion	**Rule**: A's classification of current emotion	**Result**: A's response

Empathy is not always successful, though. It can be expected, due to the manner in which synapses are formed in the cortex, that people respond with varying degrees of empathy depending on the situation, the individual's state of mind, and the individual's enduring traits. People are usually more inclined to empathize with someone perceived to be similar to themselves (Kohn, 1990) because they are perceived to share similar somatic markers (Damasio, 1994). Every person is not equally empathic, and at the same time most people can choose at any instant to override the inclination to be empathic with another individual (Kohn, 1990). Reasons for being less empathic overall as well as reasons for overriding one particular situation can arise from some of the following obstacles.

First, if A is uncomfortable with his own emotionality or if A perceives B to touch upon an area of conflict, A will have a more difficult time having empathy with B.

If A is more interested in analyzing B than in perceiving and resonating to B's feelings empathy will be hindered. This barrier could explain how social workers, psychologists, and physicians sometimes lose their ability to be empathic. Another deterrent of empathy is when A's needs seem more pressing than B's. Empathy requires truthfully tuning into the message B is sending from B's unique perspective, thus any preoccupation A has will interfere with this reception process. Finally, if A is emotionally drained by the demands B is placing on him, A will have a difficult time forming an emotion based on the perception of B's perspective (Kohn, 1990). Again, this occurs in many scenarios from health care to education to family situations.

The understanding and rule forming aspect of empathy is based on innate and acquired knowledge. If A has acquired knowledge by the incorrect association of stimulus and response in interaction with its environment, A's ability to have empathy will be skewed (Kohn, 1990). This inaccurate association could elicit a response that is based on an inadequate aspect of the situation that misses the emotional meaning altogether. Additionally, B could fail to send appropriate signals of his emotional state due to incorrect associations made through past experience (Lasher, 1992). A can only learn if accurate empathy has transpired and if B can give appropriate feedback to A's response.

The malfunction or complete absence of empathy is often sited as a factor in sociopathy and delinquency (Kohn, 1990). The situation of socially deviant individuals might be explained by these associations that were learned incorrectly, or perhaps by abnormalities in the limbic system and neocortex that do not provide for the correct formation of appropriate dispositional representations. As knowledge of the physiology of the brain increases, so will the insight on the source of these behavioral and communicative abnormalities.

Relativity

Defining the situation also requires the use of what McHugh (1968) has referred to as *relativity.* This is the area known as taking the role of the other. It is composed of six qualitites: typicality, likelihood, causal texture, technical efficiency, moral requiredness, and substantive congruity.

Typicality and Likelihood

"When a member interacts with another, he infers whether or not the other's behavior is representative of some group or category membership" (McHugh, 1968, p.44). As we have mentioned this might include a *reference group*, such as a fraternity, a football team, students at university X, legislators, physicians, benefactors, or church-goers. It might also include *significant others* such as parents, grandparents, mentors. We assess the situation to determine whether a particular other in functioning in a socially-appropriate manner as a representative of a group. We assess the *likelihood* of behavior as well as its typicality. If we see a grown man crying at a funeral, we do not perceive of this as out of the ordinary. In fact, we would probably predict that *some* people would be crying at a funeral. Because of the nature of the situation, we might also predict that *some* people might cry at a wedding, although the list of actors is somewhat less than it would be at a funeral.

Causal Texture and Technical Efficiency

Here we continue to make predictions about the behavior of another, but we are also allowing for additional variables to enter our formula. "Is Pat likely to undress *if she drinks too much*?" Here we are discussing what mitigating factors might change the behavior of another and how the mitigating circumstance might change that person's behavior. Technical efficiency is an analysis of what is the most and the least appropriate behavior within a circumstance, and what are all of the levels in between?

Moral Requiredness and Substantive Congruity

What are the factors that are of concern in terms of the situation as it pertains to moral and ethical behavior? While it might be more acceptable for Pat to get undressed, if she is drunk and if she is at a fraternity party, neither the getting drunk nor the removal of clothing would be acceptable at a wedding reception that took place in an annex to the church building. Substantive congruity is concerned with the other aspects of relativity. "Actors can assess any single behavior in terms of all, a few, or just one of the [qualities] of relativity. Further, the outcome of the assessment needn't be positive or negative across all components, but could be positive for one and negative for another, as when crying is atypical but likely. Different [qualities] can also, conflict, for example, the moral commandment that one shouldn't kill, even if it would be technically efficient in getting rid of a nagging [spouse]" (McHugh, p. 45). Now that the mind has transformed some data about the communicative situation, there must be a decision to decide whether to act and talk. At the most basic level, that decision, given all of the available data, is based on the survival instinct.

Engagement

Empathy is the capacity to perceive, understand, and respond to the unique experience of another. This process exists specifically in humans, and discernibly among other mammals, with the interactions of primitive and modern regions of the brain. Physiologically, the limbic system and neocortex serve as association and classification regions between the five sensory input regions that form an emotion based on the perception of the unique perspective of another and the three main motor output sectors that produce motor responses based on a rule that classifies the emotion (Damasio, 1994). The brain is an organ containing innate and acquired knowledge about the body, the world, and the interaction of the two.

This knowledge is influenced in part by the individual’s genetic information but is tailored to the individual through experiences with the environment. Empathy follows the logic patterns of hypothesis, induction, and deduction, which can be traced by the physiology of the brain during each step of the empathic process. Empathy has evolved with organisms to assist in survival by encouraging and facilitating cooperation through understanding and will continue to evolve as species, especially humans, continue to enhance the knowledge and associations they gain via new and innovative ways to converge their journeys with one another and their environment.

Once the mind has transformed information about the communicative situation, there must be a decision on whether to talk or act. At the most basic level, that decision, given all of the available data, is based on the survival instinct. Among most animals, this concept is referred to as fight or flight, but this is usually in a conflict situation. Among humans, the psychologists call this approach-avoidance. Given all the available information, the person decides whether to approach the other and interact or whether to

avoid interaction altogether. This process initializes further participation on the part of the two interactants. Davidson (1995) refers to this choice as approach-withdrawal. The choice "involves a delicate interplay between procesing within the medial regions of the prefrontal cortex in the right and left cerebral hemispheres" (Gazzaniga, et al., 2002, p. 440). According to Davidson, the left hemisphere is biased to promote approach behaviors, while the right hemisphere promotes withdrawal.

We have defined the concept of empathy from a number of different perspectives. In the process, we have indicated that there are interaction effects among the genetic structure, the neurology of the brain, and human social behavior. A four-step process is illustrated in which selection of stimuli involves exposure, attention, perception, and recall. The information from a variety of sources is used by the interactants to determine whether they wish to carry though with the interactive process. This theoretical approach is different from those previously developed in that it sees empathy as a genetic, neurological, and social phenomenon. This theoretical perspective should be strongly heuristic, especially in light of new developments in brain scanning and genetics.

Communication researchers should continue this investigation as the concept of empathy is instrumental in establishing identification from a rhetorical perspective. Empathy is also integral to further understanding of symbolic interaction, especially the workings of the “Me” and the generalized other. By using neurological tests, it may be possible at some time in the future to determine exactly where the mind meets the brain.

Notes

[1]Philosopher Norman Malcolm (1963) has written about the philosophical questions that need to be resolved about the nature of knowing other minds. He has stated that because we know that others have bodies like our own, they must have similar thoughts. Nevertheless, he notes, that we can sometimes, or often, be wrong in connecting our own feelings with those of an other. Another possible position to take is in regard to our understanding of language, as opposed to understanding the other per se. One of the most interesting questions that he poses is "How did I know to say the words, 'My head aches,' the very first time I felt the pain?

[2]While there is considerable evidence of Ridley's hypothesis (Fisher, Vargha-Knadem, Watkins, Monaco, & Pembrey, 1997; Fisher, Vargha-Khadem, Watkins, Monaco, & Pembrey, 1998). There is also evidence that there are other places that hold genetic bases of language. Fisher, et al. (1997; 1998) found the gene, 7q31, to involve the absence of speech in a seven-year-old boy; as well they found frontal lobe abnormalities. Greinwald, Wayne, Chen, Scott, Zbar, Kraft, Prasad, Ramesh, Coucke, Srisailapathy, Lovett, Van Camp, and Smith (1998) found non-recessive hearing loss in the same gene. Others found some indices of speech and language impairment (SLI) in 16q and 19q (SLI Consortium, 2002). Ridley

(1999) has himself indicated that Williams syndrome has been found in chromosome 11. Bartlett, Flax, Logue, Vieland, Bassett, Tallal, and Brzustowitz (2002) found language impairment in 13q21. As well, Tomblin and Pandich (1999) have written on the general subject of language impairment in children. Thus, as we are making progress in finding the genetic structure of communication, the project is far from complete. Genetic studies are often searching for "abnormalities," which in the long-run provide for more information about the genetic structure of "normalities." See also: Seigel (1996) as well as Gould, Reeves, Graziano, & Gross (1999).

[3]Jones (1975) has summarized this approach, at least for Husserl and Heidegger. See especially pp. 265-270. One could argue that, in a sense, empathy and bracketing are opposites. Empathy calls for association and bracketing calls for dissociation. Nevertheless, the bracketing of certain information, necessarily brings other information to the forefront.

[4]Damasio has undertaken substantial research on the construct of the somatic marker, although the idea was originally created by Nauta (1971).

[5]The slime mold, *Dictyostelium*, is an excellent example of a single-celled animal integrating the principles of empathy. These unicellular organisms are unable to move to find food on their own. When food sources get low, they secrete a chemical signal of cyclic adenosine monophosphate (cAMP) which works as a pheromone (Ciaramicoli & Ketcham, 2000). Nearby cells receive this signal and respond by gathering together to form a large colony that can move en masse to find food. Additionally, *Dictylstelium* can only reproduce after they have come together to form a colony, or multicellular pseudoplasmodium. After gathering food, the colony comes to rest and spores are formed (Wilson, 1975). Only by receiving and understanding the signal sent from the perspective of another cell can the cell respond. It should be noted that cAMP is an intracellular messenger in all organisms. It stimulates certain forms of genetic expressions and in vertebrates it mediates hormones that arrive at the cell membrane and the target enzymes inside the membrane (Wilson, 1975). This advances the model pattern to the next evolutionary level of the development of the human fetus.

[6] Gazzaniga, et al. (2002) have objected to the use of the "limbic system" as a major player in the study of the emotions. The arguments against the limbic system as the primary purveyor of the emotions has also been criticized substantially by LeDoux (2002, p. 211): "[T]here are still no generally accepted criterai for stipulating which areas of the brain belong to the limbic system. Some scientists have suggested that the limbic system be abandoned."

[7]Such representations have also been noted in the work of Maguire, Gadian, Johnsrude, Good, Ashburner, Frackowiak, and Frith (2000). These researchers found that the hippocampi of London taxi drivers were statistically significantly larger than a control. The authors believe that the size of the hippocampus increases as the taxi drivers learn more and more directions. It is as if the brain creates a "map" of the city of London within the brain.

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