1 The Embodiment Perspective

This chapter critiques the approaches to human communication and the conceptual language based on comparisons to digital computers that implicitly sustain assumptions of mind-body dualism. It introduces the embodiment perspective, the assumption that mind is a function of the evolved physical body, and proposes a neutral set of conceptual terms based on the actual observable physical processes that constitute communication.

In the past, communication theories[1] have generally been anchored in a story characterized by metaphors based on digital computers, codes, and signal transmission. All these are, in turn, shaped by the mind-body dualism that has haunted European and American thought at least since Plato, and based on the assumptions that thought is fundamentally rational, language is primarily a tool of logical thought, and communication is primarily a process of exchanging data, transmitting the output of one person's thought to serve as input to another person's thought. According to this story, ideas are consciously formed in the mind, using a "language of the brain," *mentalese*,[2] and encoded by the brain into language, which is then further encoded into sounds (or shapes for written language), then encoded into a message by activating appropriate muscle groups. This message, as if it were a physical object, is "*sent*"[3] to one or more "*receivers*," listeners or readers who perform the opposite sequence of decoding, ending with a replica of a speaker or writer's thought. After "*decoding*" the message, a receiver may process the message using "mentalese" and formulate a reply, which is then encoded back into natural language to be "*sent*," continuing the interaction.

[1] I use *theory* as it is defined in social science, not humanities, to denote a system of principled causal relations among concepts, subject to test, modification, and potential disconfirmation through evidence gained from systematic observation.
[2] Bergen (2012); Fodor (1975).
[3] I indicate metaphors (where their metaphoricity is important) by italicizing them and placing them within quotation marks.

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Over the past several decades, as new research tools have been developed, this classical account has been challenged on almost every front. Maturana and Varela[4] proposed the concept of *autopoiesis* as a systems-theory-based explanation of both life and mind as *autonomous*, *self-organizing*, and *self-generating*. Varela, Thompson, and Rosch[5] developed this into an account of "the *enactive* mind," in which the entire body is engaged in cognition. Damasio[6] showed that emotions are not separate from reason, as Plato insisted, but integral to reasoning and decision-making.[7] More recently, Damasio[8] developed the related concept of *homeostasis*, incorporating recent research on chemical and neural signaling.[9] Lawrence Barsalou[10] and other cognitive researchers[11] have demonstrated that mental activity, including using and understanding language, involves *perceptual simulations*, partial activation of perceptual and motor neural systems that would be fully activated by perceptions and muscular actions associated with the words, concepts, and grammatical structure. Other researchers in cognitive linguistics, testing and extending insights gained from Conceptual Metaphor Theory,[12] have shown that perceptual simulations associated with the literal meanings of words are partially activated even when the words are used metaphorically.

Research on consciousness has shown that most routine decisions are made, and actions initiated, before an individual is aware of having made the decision, and hence they cannot result from conscious thought.[13] Along similar lines, conversation researchers have found that it takes a second or longer to understand an utterance and more than a half second to formulate and initiate an utterance. However, the pause between speaking turns is usually considerably less than a half second, and the next speaker often begins speaking before the previous speaker has finished. This indicates that listeners are able to anticipate accurately when the speaker will finish, and that they have begun to prepare their own utterance well in advance of beginning a speaking turn, contradicting traditional assumptions about the role of consciousness in originating and interpreting messages. The assumption that language exists primarily to serve rational thought by exchange of truth-conditional propositions[14] has been challenged by research suggesting that language (and the

[4] Maturana and Varela (1980).
[5] Varela, Thompson, and Rosch (1991); see also Di Paolo, Rohde, and De Jaegher (2010).
[6] Damasio (1999). [7] See also Seligman et al. (2016). [8] Damasio (2018).
[9] See Chapter 2 for a more complete discussion.
[10] Barsalou (1999, 2008); Seligman et al. (2016).
[11] See Bergen (2012) for a comprehensive review. [12] Lakoff and Johnson (1980, 1999).
[13] For a review and discussion, see Baumeister and Masicampo (2010).
[14] For example, Bickerton (2009).

brain systems that support language) evolved primarily in response not to ecological pressures but to the pressures of living in a complex social structure,[15] and that maintaining social relationships through "grooming" and exchanging news about other people's relationships ("gossip") is still the primary function of language.

The primacy of formal logic is also challenged by research on how ordinary people reason about causality. For example, Deanna Kuhn[16] tested the ability of successful practitioners in several professions to engage in reasoning about causal relations according to the standard model of scientific logic (in which alternative hypotheses are tested against each other) and discovered that only advanced doctoral students in philosophy could perform these logical tasks correctly. Most of the other subjects preferred to synthesize ideas from the alternative theories into a comprehensive account rather than test them against one another. Kuhn argued that this indicates a need for better logic training in professional schools, but reexamination of Kuhn's evidence suggests the opposite conclusion, that people, even well-educated people, do not find formal scientific logic useful in their everyday lives, and that it is actually very difficult to learn to use formal logic.[17] If formal logic is that difficult to learn and use, and if experienced and well-educated reasoners resist using it, it is probably not part of the brain's natural functioning.[18]

Extensive research by Kahneman and Tversky[19] established that people routinely fall back on simple heuristics in their reasoning, even about important issues like financial investments and public policy preferences. Greene[20] shows that even highly influential moral philosophers tend to be guided by moral heuristics and adapt their highly trained logical reasoning skills to support the conclusions drawn from their moral beliefs, rather than examining or revising these moral beliefs. More generally, researchers have recently shown that people routinely engage in "motivated reasoning": They selectively focus on evidence that supports their prior beliefs and discredit or reinterpret evidence that contradicts their prior beliefs. Again, even highly educated people are susceptible[21] to this kind of bias in reasoning – and it is quite difficult to avoid.[22]

[15] See, for example, Dessalles (2014); Dunbar (1996, 2003, 2014).
[16] Kuhn (1991).
[17] Ritchie (2003c).
[18] Seligman et al. (2016). On the other hand, it appears that the brain does something that can be described by natural language statistics, but that doesn't mean that it actually does the same computations that a statistician would use (Chapter 3).
[19] Kahneman and Tversky (1982).
[20] Greene (2014).
[21] The fact that biased processing and motivated reasoning are so widespread – effectively universal – suggests that "susceptible" may not be the right word: In computer science jargon, perhaps it is "a feature, not a bug."
[22] It should be obvious from recent science news that social and physical scientists are not immune from the effects of motivated reasoning and confirmation bias.

Most of these ideas have found their way in a piecemeal fashion into recent communication theory and research, but many of the rationalist and computational assumptions linger on in research methodology[23] as well as theoretical writing, often embodied in unchallenged metaphorical language. Toward the end of this chapter, I will briefly examine the assumptions implicit in some of this metaphorical language and propose alternative terminology that is less likely to reinforce inaccurate and obsolete beliefs; a more detailed discussion can be found in Chapter 6.

The central, motivating purpose of this book is to rethink the foundations of communication theory, how we think and talk about human communication, in a way that acknowledges and incorporates this accumulating evidence and recognizes communicating subjects as evolved biological organisms. I will organize the discussion around several interrelated conceptual frameworks and core concepts, which will serve as a foundation for challenging and examining previously taken-for-granted assumptions.

First, the evolved biological body is the focal center of it all. Both thinking and communicating are biologically evolved social processes, engaging the entire body. They engage biologically evolved neural processes that primarily serve to maintain the reproductive fitness of biological organisms within a complex and ever-changing environment, in particular the social environment.[24] The capabilities that produce sophisticated philosophical arguments, profound religious insights, and stunning works of art are all happy but incidental extensions of fitness-related processes.[25]

Second, consistent with systems theory thinking, the ongoing dynamic responses and adjustments that Damasio summarizes as "homeostasis" constitute a process at multiple levels, from the individual cell through tissues and organs to individual persons and on to groups, cultures, and societies. Within an individual body, each organ's output is input to other organs, and all organs strive to maintain homeostasis by responding to the other organs; the net result is the much more complex homeostasis of the body as a whole. Similarly, each individual in a social group takes and responds to input from others; the net process of these interactions is the homeostasis of the group. This is why Damasio uses the term *homeostasis* rather than *balance*: A dynamic system is never in balance; it is always in the process of perceiving and adjusting to both internal and external units, each a complex system in its own right, that are also constantly perceiving and responding to each other and to themselves.

[23] For example, Thorson, Wicks, and Leshner (2012). [24] Barrett (2020).
[25] Writing in the summer of 2020, I can't help adding that the ability to produce horrific weapons, environment-destroying pollutants, and so forth, is also an (un)happy but incidental extension of the same processes – consistent with meme theory (Chapter 3).

Signaling systems, including the body's neural and chemical signals as well as language and other social signals, also evolved in support of individual and social group homeostasis. Unlike computers and transmission systems, neither the brain nor language is *designed*. The parts, including the perceptual and signal production systems, coevolved with each other – and with other constraints. Evolution is messy and rarely leads to *optimal* results: *Adequate* is far more common.[26] Motivated reasoning, susceptibility to perceptual illusion, and the development and spread of useless and even pernicious memes as well as useless or pernicious physiological characteristics and other apparently suboptimal features must be understood in this context. We communicate with the body we have, not the body that a priori reasoning or clever engineering principles would lead us to believe we must, surely, have.

Third, humans have evolved as social animals, and human signaling, particularly language, evolved and developed in response to the pressures of living in large complex social groups, and probably also in response to the mutual dependence of individuals on their primary groups and of the dependence of the group itself on the complex homeostatic relationships among humans. As fundamentally social creatures, humans are also deeply dependent on culture, the transmission of learned practices (social as well as ecological) across generations. A unique and crucial contribution of a flexible and powerful language is to facilitate relatively rapid cultural and social change in response to a fluctuating environment[27] through both imitation and intentional instruction, a process sometimes theorized as *cultural evolution*.[28]

A fourth consideration in the structure of this book is the importance of language itself in all these processes, in the homeostasis-maintaining processes of individuals, social groups, and cultures. As such, understanding how language evolves and adapts and is used in conversation is important to understanding the complex nature of human communication. That includes "indirect" communication forms such as language play, metaphor, humor, and storytelling, each of which will get its own chapter.

A fifth consideration follows from the importance of language itself. In particular, metaphorical terms often carry unacknowledged assumptions and constraints on theory development and understanding, and sometimes on

[26] It is intellectually and emotionally satisfying (and spiritually useful) to marvel at the subtle and complex intricacies of evolved biological systems, which are truly amazing and beautiful. However, we must not allow our justifiable awe to blind us to their fundamentally unplanned, *un*-designed, and ad hoc features. See Chapter 2 for a more complete discussion.

[27] Writing in 2019 and 2020, I cannot help commenting on the irony that these very cultural transmission and adaptation tools that have enabled us to adapt to almost every environment on Earth have apparently also enabled us to despoil and possibly destroy the environment of the entire planet.

[28] For example, see Heyes et al. (2020); Dennett (2017).

evidence-gathering and analysis. Accordingly, beginning in this chapter, and then throughout most of the book, I will explicate and critique terminology that has come to be taken for granted but that implies unjustified and misleading assumptions about both cognition and communication. Communication theorists have adopted and reified seductive "*machine*," "*computer*," and "*telecommunication*" metaphors, which obstruct our ability to see how people actually communicate (and how people use metaphors[29]).

Reified metaphors and other fallacies have sprung in part from the understandable desire of social scientists to achieve something like the kind of rigor achieved in the physical sciences, especially in physics and engineering disciplines based on physics. Because computers, like brains, process data, and (in the early days of artificial intelligence (AI) research) we were able to describe precisely how computers process data, the computer became a popular, if highly misleading, model for the brain. Along the same lines, because our research methods, including computer modeling as well as many of our statistical methods, require us to classify both perceptual stimuli and behavioral responses into discrete categories, and because the "*code*" metaphor assumes digitization, we concluded that these digitized categories represented something real about human cognition and communication. However, as my mentor, Steve Chaffee, used to admonish, "never give a methodological answer to a theoretical question." The fact that a manageable research design requires that we digitize behavior does not mean behavior is digital, and the fact that certain aspects of human perception and response can be simplified and modeled on a digital computer does not imply that human cognition is either simple or digital.

The foundational perspective of the book is that human communication is *embodied* in a *biological* sense, as well as in a *social* and *cultural* sense. The *biologically embodied* perspective includes the role of communication in the body's processes of maintaining *homeostasis*[30] as well as the engagement in language use and comprehension of neural systems primarily associated with perception and muscular action.[31] The biologically embodied perspective also requires continual attention to the processes of evolution, especially biological evolution but also cultural evolution.

The *social* perspective includes the recognition that social relationships and social structure are themselves fundamentally biological and coevolved with the physiological features that support them. The social perspective also involves recognizing that the function of communication as a medium for developing and maintaining the social relationships is essential to our *biological* survival, what Dunbar[32] refers to as the "grooming" and "gossip"

[29] Chapter 11. [30] See Chapter 2. [31] See Chapters 3 and 7.
[32] Dunbar (1996, 2003); see Chapter 5.

functions of language use. The *cultural* dimension of communication includes recognizing that culture is also fundamentally biological, an outgrowth and expression of biologically evolved processes. Culture also includes the contextual background of ideas, behaviors, and norms (including what Dawkins[33] and Dennett[34] call *memes*[35]) that are transmitted by communication and form much of the content of communication. Finally, at a *conceptual* level, communication is characterized by fundamental ambiguity[36] and the ubiquitous use of heuristics[37] rather than formal logic.

Communication as a discipline has arisen as an amalgam of theories and concepts from several other, more traditional, disciplines, including Rhetoric, English, Linguistics, Psychology, Sociology, and Anthropology; in many ways, Communication is still largely interdisciplinary in theory and method as well as in practice. This eclectic interdisciplinarity is both a strength and a liability. It is a strength because it affords the opportunity to cross boundaries that often prevent workers in one discipline from recognizing and benefiting from discoveries that are so well-known in another discipline that they are taken for granted.[38] It is a liability because central concepts, often originally based on obscure theories, are defined and explained in eclectic and sometimes mutually contradictory ways, in many cases based on obsolete or a priori reasoning or infelicitous metaphors. In order to achieve the core objectives of this book, it will be necessary to clear away some of the metaphorical underbrush that clutters theoretical writings about communication, and propose a conceptual language that is free of archaic "*machine*" and "*digital computer*" metaphors and more consistent with an embodied, biological perspective.

Communication Is Biological. Life requires constant action and change, interacting with an unpredictable and constantly changing environment. All organisms *perceive* and *react* to features of the external environment that are necessary to their survival – for example, by moving toward and ingesting nutrients, moving away from and avoiding poisons and predators. Most organisms also perceive and react to *signals* from other organisms. Multicelled organisms, including humans, have quite complex interactions with the external environment; the tissues and cells of multicelled organisms also have complex interactions with each other. Communication, within our bodies and with other humans, as well as with other organisms, is essential to our lives. Communication is one of the most important functions of living organisms,

[33] Dawkins (1976). [34] Dennett (2017). [35] See Chapter 3 for a more detailed discussion.
[36] Sperber and Wilson (1986). [37] Kahneman and Tversky (1982).
[38] An example I recently encountered is Petty and Cacioppo's (1981) Elaboration Likelihood Model, which neatly solves some long-standing problems in metaphor theory – but is largely unknown to linguists, philosophers, and even many psychologists who study metaphor.

and the complex ways we communicate are generally regarded as defining features of what it means to be human. Language is commonly mentioned in this regard, but other modes of communication are no less important to our distinctive humanity.

On the other hand, it is also important to avoid the fallacy of assuming a crisp dividing line between the communication behaviors of humans and those of other organisms. Research in the past few decades has produced convincing evidence that our human modes of communication are continuous with those of other species, especially other primates but also other mammals – and even birds. Although human language vastly exceeds the signaling behavior of any other species[39] in its richness and complexity, anyone who would fully understand human communication cannot afford to neglect the study of the communication behavior of other primates as well as many other species of mammals, birds, and even less complex organisms.

Because of the conceptual sophistication and complexity of human language, and because language is the medium in which both science and philosophy are conducted, most of the discussion of human communication has focused intensively on language. Other modes of signaling are often misleadingly labeled as, for example, "body *language*."[40] The indisputable role of language in both abstract thought and discourse about abstract ideas has also led to an intensive focus on the use of language to express ideas. Ironically, until recently, the role of the brain and central nervous system in language use has been largely neglected.

When I began my own academic study of communication, in the 1980s, the brain was dismissed as a "*black box*,"[41] a mysterious and complicated organ that, because we had no way to "*peer into* it," was out of bounds for theorizing, much less researching, communication. As a result, theorists fell back on a metaphor popularized by the midcentury progress in computational science:[42] The brain is a "*computer*" and communication is a process of "*encoding*" ideas into signals that are "*sent to* a *receiver*" where they are "*decoded*" into the same ideas. This theoretical language went hand in hand with the rapid development of research in "AI," which was often described as the *only* available avenue for empirical research into how communication "*messages*" are created, "*transmitted*," and understood. The prevailing doctrine was that, if you could not express

[39] Perhaps excepting the cetaceans; at this writing, we know that the signals of whales, for example, are very complex; we do not know whether they accomplish communication in any sense comparable to human communication.
[40] "Body *signals*" is a more accurate, hence preferred, term.
[41] **Notation**: Where metaphors are relevant to the discussion, I will mark metaphorical words and phrases by placing metaphorical elements in italics and the entire phrase within quotation marks (e.g. "body *language*" and "*black box*").
[42] Ritchie (1991).

your theory in a functioning computer algorithm, you did not have a valid theory.[43] This approach tacitly implies that body, brain, mind, and language are in some sense *designed* and *engineered*, which in turn implies an *engineer*, a creator or creative process with *agency* and *intentionality*.

Metaphors of Communication. This approach to research and theorizing about human communication, which Damasio[44] calls the "Boolean logic" approach, is consistent with the "*computer*" metaphor of mind, popularized in the 1950s and still advocated by some theorists. However, it is inconsistent with a growing body of research that challenges the implicit separation of mind from body as well as the implicit separation of thinking from communicating. It also implies a degree of precision in the everyday use of language that is not supported by analysis of actual conversations. Michael Reddy,[45] an early critic of the computer/algorithm approach, called it the CONTAINER/CONDUIT metaphor. Reddy pointed out that we speak and write of messages "*containing*" information, that are "*put into a message*" by a "*source*" and "*sent to*" a "*receiver*," who "*extracts*" the "*information out of*" the message. Reddy's primary criticism of this metaphorical language was that it constrains how we understand language, and encourages a view in which misunderstanding is the result of inept "*encoding*" or "*decoding*," either "*putting* ideas *into the wrong containers*" or "*getting the wrong ideas out of the containers*." All this implies that "*messages are objects*" that must be "*sent*" and "*received*." Reddy proposed an alternate view, in which interlocutors do not have access to each other's "*codes*." A person creates a message by trying to anticipate how other interlocutors will understand certain utterances or gestures; other interlocutors interpret the message by drawing inferences about what the source must have intended – all without any access to what others intend or mean by the signals they produce.

Reddy's critique has been the center of continued controversy. Krzeszowski[46] defends the use of the CONDUIT metaphor on the basis that it is difficult or impossible to discuss communication without using metaphors, and the overwhelming preponderance of discourse about communication uses one or all of them. He acknowledges that "the early, crude version of the CONDUIT metaphor . . . is based on the false assumption that meanings are stable and permanent and do not change, very much like concrete things in the containers" and that "there is no such thing as stability of meaning."[47]

[43] For example, Feldman (2006), but for an early contrary view, see also Winograd and Flores (1986). See also Goatly (2007).
[44] Damasio (1999, 2018). [45] Reddy (1993). See Chapter 6. [46] Krzeszowski (2020).
[47] Krzeszowski suggests an alternative phases of matter metaphor (i.e. "*solid*," "*liquid*," "*gas*," and "*plasma*") to describe this instability of meaning. However, this scheme would introduce its own confusion – and it is unlikely that many Communication students understand the underlying physics.

Krzeszowski complains that arguing "about meanings of particular linguistic expressions [comes] at the expense of concentrating on what really matters." However, Krippendorff argues that the continued use of these metaphors effectively obscures "what really matters." Krippendorff[48] argues that the language we used to develop and describe our theories shapes how these theories are understood and applied, "and has a good chance of affecting how the stakeholders of our scholarship subsequently communicate." The use of object/container metaphors makes it difficult "to reflect on the implications of our own discourse." Because they objectify the message, these metaphors obscure the fact that people frequently disagree about both the intention and the meaning of communication acts. Use of these metaphors "celebrates animistic conceptions of texts speaking to us, ... and renders incomprehensible the dynamic world of communication of which we are a part."

Krippendorff suggests we use human-centered language that acknowledges imagination and creativity of ordinary discourse, such as "interpreting, articulating, inferring, narrating, conversing, collaborating, negotiating, and interacting." I endorse use of human-centered words, and in this and subsequent chapters, I will suggest a more austere foundational terminology based on an examination of the actual physical events that constitute communication: A person alters the physical environment to create a pattern that another person can perceive, infer that it is intended as a signal, and interpret. The core terms are not *send* a *message* but *create* or *enact* a *signal* to *express* an idea, not "*receive*" a "*message*" (passively) but *perceive* and *interpret* a *signal* (actively). Signaling behavior (including perceiving and interpreting or responding) is grounded in biology, and all the rest, including all the human-centered terms Krippendorff proposes, builds on this fundamentally biological basis, vastly elaborated through social interaction and cultural transmission.

In sum, even as a metaphor, "*send* a message" makes sense if, and only if, you agree that messages are *objects*, that words and gestures have precise meanings, and that they are understood in the same way by everyone who has an adequate knowledge of the language. I agree with Krippendorff that use of these terms in scientific discourse (and in teaching) can only serve to sustain and propagate the epistemological errors from which they derive – just as use of terms derived from the Ptolemaic model of the solar system (e.g. *sunrise* and *sunset*) sustain and propagate a geocentric model, and use of terms derived from a creationist account of evolution (e.g. *design*, natural *selection*) sustain and propagate a creationist model. So, I accept Krippendorff's challenge:

[48] Krippendorff (2017, p. 98).