Message Processing: The Science of Creating Understanding

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Chapter 1: Introduction to Message Processing

This chapter introduces "message processing" as a study of human communication processes, with a focus on how people create understanding in interaction. It explains how "message processing" contrasts with traditional approaches to studying human communication (which typically focus on outcomes that follow from communicating in particular ways, rather than how communication itself works), and why this is an important and fundamental topic in the study of communication.

For most of us, communicating is like breathing. We do it hundreds of times each day, and do so successfully with relatively little effort or thought. As children, we might have been explicitly told what a particular word means, or instructed in how to obey social norms (e.g., don't yell in a library; say "please" and "thank you"). However, we were not explicitly taught how to communicate—that is, to share ideas, thoughts, and feelings with other people through our behavior—just like we are not taught how to breathe. Yet somehow, despite this lack of explicit instruction, we are effective communicators from a very young age.

Just as we do with breathing, we generally communicate without thinking or worrying about how it works. Despite feeling simple, however, communication is actually a quite complex, and in some ways amazing, phenomenon. Think about it: when we communicate, we are taking our thoughts—which at that point exist only in our own mind, and cannot be seen, heard, touched, tasted, or smelled—and we are reaching into another person's mind to create a copy of our thoughts. In so doing, we actually change the content of that other person's thoughts—which, like our own thoughts, also cannot be seen, heard, touched, tasted or smelled. We accomplish this remarkable feat by producing and processing a combination of sounds and physical behaviors. Sometimes these are codified and conventional (e.g., using a shared language), while other times they are improvised (e.g., using gestures or pantomime when there is no shared language). But how does all of this work? What actually happens when two people communicate?

This text is designed to address these issues. Specifically, it has been developed around two related questions:

- *How does human communication work?*
- *What happens— biologically, cognitively, and socially—when we communicate?*

Across this text, we will look at everyday behaviors and experiences (e.g., speaking, listening, making inferences about what others are thinking) through a scientific lens. This will often involve taking a step back and critically examining behaviors, activities, and thought processes that are so routine that they often go unnoticed. This may be challenging, but will ultimately give you a valuable new perspective on your own experiences, and a greater appreciation for the social world in which we all live.

MESSAGE PROCESSING

Before proceeding any further, it is worthwhile to more precisely define this text's central construct, *message processing*. This is a term that has been used in different ways by different scholars and researchers (e.g., Burleson, 2010; Roskos-Ewoldsen & Roskos-Ewoldsen, 2010). As such, it is important to be clear how it will be used here, and what it is intended to mean. (What "meaning" means at all is an important topic in and of itself, and one that we will return to later).

For our purposes, *message processing* refers to the study of the physical and psychological activities in which people engage in order to create mutual understanding in social interaction.

This definition differs from other scholars' uses of the term in a few ways worth explicitly noting. First, other research in the discipline of communication that uses this term often restricts its focus to messages in mass media (e.g., television, radio, and increasingly, online media channels). The definition used here addresses *any* message, regardless of the

medium through which it is transmitted (see Chapter 3 for a more in-depth discussion of the concept of media within a message processing framework). As such, this text's definition includes media messages that other definitions address, but includes a much broader range of other messages (e.g., those shared between individuals, within small groups; face-to-face and online, etc.) as well. The reasoning behind this is that people engage with and process messages using the same mental pathways and mechanisms regardless of the media system being used. Although properties of media can constrain or enable the use of certain message features, the cognitive processes involved in communication are—to the best our current knowledge—fundamentally the same across these different media contexts. Because it is those fundamentals of human communication we are interested in, our definition of message processing is agnostic to media, and therefore more general than that of some other researchers.

A second important difference in this text's definition is that it seeks to encompass both the creation (i.e., production) and interpretation (i.e., reception and processing) of messages. Often, the word "processing" is associated solely with activities or operations carried out by recipients of messages. For example, in media research, work in the area of message processing focuses almost exclusively on how audience members attend to, think about, and ultimately comprehend mass media messages; it generally does not include studying the processes or activities through which messages were created by media professionals. Similarly, in an interpersonal domain, message processing is often equated to "message reception" or "decoding" (Burleson, 2010, p. 153), and has been overtly distinguished from message production processes (e.g., Berger, Roloff, & Roskos-Ewoldsen, 2010).

The use of the term here, in contrast, does not treat message production as an activity divorced from message reception. The reasoning behind this is that both are part and parcel of the process of human communication as a whole. Indeed, in most human social interactions, message production and reception are interrelated and intertwined on multiple levels (e.g., Pickering & Garrod, 2004). Although production and reception do, certainly, involve some differences, we contend that the traditional theoretical separation between "sender" and "receiver" in models of communication is, at best, artificial and overly simplistic; communication is fundamentally dyadic (see Chapter 2). Considering the similarities and interconnections, rather than the differences, between message production and reception is both more useful and more interesting if the goal is to understand how human communication works. As such, our study of message processing will include the mental and physical endeavors involved in message creation and interpretation. In this way, again, this definition may be seen as more inclusive than others in the discipline.

A third and final potential difference in this text's definition of message processing is that it focuses exclusively on the *creation of mutual understanding* between people. In both psychological and communication research, the term "processing" is often used to refer to any kind of mental operation or activity people engage in when they encounter some kind of stimulus (i.e., input via one or more of their five senses). There are many, diverse potential outcomes of such mental operations—for example, we might figure out what is happening in a complex visual scene; have an emotional response to our experience; or be persuaded to believe a particular perspective or take a certain course of action. While all of these outcomes—and the processes leading to them—are worthy objects of study, we are interested in one outcome in particular: how people create mutual understanding. As such, when the term "message processing" is used here, it focuses on how we create, perceive, and interpret messages relevant to creating understanding. In this, this text's use of the term could be seen as more narrow than that of other researchers.

A BRIEF HISTORICAL NOTE

It might surprise you to learn that the scientific study of message processing—that is, how people create understanding—is relatively new to the field of communication. This is largely a result of the field's history: the study of communication has its origins in the Ancient Greek's study of rhetoric and public speaking. The focus of these efforts was determining how to construct arguments that effectively *persuaded* people—so the outcome that scholars emphasized, and cared about, was influence and persuasion, not understanding. In modern times, the growth and development of communication as an academic field was largely driven by interest in how media messages and propaganda influence

people. In the latter half of the 20th century, interest in interpersonal communication grew—but the focus of most scholars' inquiries was on relational influence (e.g., how we form and cultivate relationships with communication). Across all of this, researchers' primary outcome of interest was *influence*—that is, how people were affected by communication—not understanding. In many ways, understanding has been taken for granted; scholars have assumed that people understood the messages whose effects they were studying.

As a result of this, understanding has not been an issue that communication scholars have paid much attention to (with a few exceptions). Even the term itself is not well-defined: the discipline does not have a widely accepted definition of *understanding*. Rather, it is usually treated as a *primitive term*, or a concept that so basic or fundamental that it is taken as "given" and not explicitly defined. It is only now, in the latter half of the 20th and in the early 21st century, that this topic has started to receive more attention. One reason for this may be increased interest in artificial intelligence (AI): as scientists try to get machines to think and act "intelligently"—which includes creating understanding with other entities—they have been prompted to probe how people actually do this. As interest in this question has grown, researchers in disciplines other than communication—among them anthropology, philosophy, cognitive psychology, education, and linguistics—have been actively contributing to this area, each in ways that reflect their own interests and orientation. One of the goals of this text is to develop a clear definition, and understanding(!), of the phenomenon of *understanding* for the discipline of communication.

WHY STUDY MESSAGE PROCESSING?

Now that we have a clearer picture of what message processing consists of, it is worth considering why this is a worthwhile topic to study, and how it relates to other topics and areas within and beyond the discipline of communication. In short, message processing is important to study because it is fundamental: as humans, it is fundamental to our everyday lives; as students and scholars, it is fundamental to the study of human communication.

First, the study of message processing is closely connected to our lived experiences as human beings. The activities involved in message processing are things we do every day, hundreds if not thousands of times, often without thinking about them. If message processing is something so basic that nearly anyone can do it, can it really be that interesting or important to study? Indeed, it is the very fact that these experiences are so widely shared—across the lifespan, across cultures, across time and space—that makes them so important to study. While it may sound grand, the study of message processing implicates literally every person in the world—past, present and future. As will hopefully become clear in this course, how humans communicate, and the skills required to communicate in this way, are also something essential to our species. The history of their development is intertwined with the evolution of *homo sapiens* (i.e., modern humans), and in turn the development of human civilization as we know it.

Second, as students and scholars interested in communication, message processing is a foundational topic. How can we say that we study *communication* if we do not try to understand how the process of human communication actually works? A majority of research in the field of communication – which includes most of the topics covered in widely-taught courses like persuasion, interpersonal communication, relational communication, strategic communication, and media effects—does not actually address the *process* of human communication. Rather, this work examines outcomes that follow from communication: for example, changing attitudes or beliefs, building relationships, or managing impressions. As noted above, the creation of understanding is taken for granted: researchers focused on these outcomes often assume that when people engage in social interaction, they understand what each other intends and immediately move on examining the supposed effects of the interaction. However, the creation of this shared understanding is, in fact, the foundation on which everything else sits. If researchers do not know what this foundation consists of, and how it is constructed, they risk making erroneous assumptions and/or constructing theoretical models on unstable ground. Thus, to both understand and responsibly study higher order effects of communication—such as interpersonal relations, conflict, social influence, or deception, among many others—it is important to understand its first-order effect, creating understanding.

The study of message processing also gives us the opportunity to see how communication across a range of different contexts is fundamentally similar. In the field of communication (as in many fields), there is a tendency to create boundaries that define particular sub-areas. Entire books and courses are dedicated to "nonverbal communication", separate and distinct from "verbal communication" (which, oddly, is not taught or written about widely). In reality, most human communication involves verbal and nonverbal components operating together. The separation of these two "types" of communication is an artifact of scholars' attempts to organize the topics they study, rather than a distinction that is meaningful or functional in the real world.

Much of communication research has historically been organized by context: there are courses and books in *organizational* communication, *health* communication, *political* communication, *family* communication, etc. While there are certainly features of these contexts that shape the way that people interact, these divisions can give the impression that the process of human communication is somehow inherently different across these different contexts. In reality, it is not. People create understanding and share meaning using the same basic processes and mechanisms in all these settings; they just draw on particular resources to greater or lesser degrees depending on what the situation makes available. Message processing focuses on the basic processes and mechanisms that are shared across the topics that these sub-disciplines address. As such, it transcends these contextual divides, and can help us see common threads across diverse areas of study.

Third and finally, understanding message processing also has practical value in our everyday lives. Knowing how human communication works provides insights into where are how we are at risk for creating misunderstandings, and gives us ideas about how to prevent or mitigate such problems. Similarly, this knowledge can help us determine how to best (i.e., most effectively) craft and interpret messages in different situations and contexts, which is an important life skill. Finally, getting a sense of the complexity of human communication processes can help provide perspective when things do not go as we intend, and help us appreciate just how amazing it is that we are able to get someone else to experience what we are thinking, or move an idea from our head into someone else's head, using something as simple as a stream of sounds (i.e., speech), the way we move our body (i.e., gestures, facial expressions) or a set of marks on a page (i.e., writing… like this!).

References

Berger, C. R., Roloff, M. E., & Roskos-Ewoldsen, D. R. (Eds.). (2010). *Handbook of communication science* (2nd Edition). Thousand Oaks, CA: Sage.

Burleson, B. (2010). The nature of interpersonal communication: A message centered approach. In C. R. Berger, M. E. Roloff and D. R. Roskos-Ewoldsen (Eds.) *Handbook of communication science* (2nd Edition; pp. 145-164). Thousand Oaks, CA: Sage.

Pickering, M. J., & Garrod, S. (2004). Toward a mechanistic psychology of dialogue. *Behavioral and Brain Sciences*, *27*, 169-226.

Roskos-Ewoldsen, D. R., & Roskos-Ewoldsen, B. (2010). Message processing. In C. R. Berger, M. E. Roloff and D. R. Roskos-Ewoldsen (Eds.) *Handbook of communication science* (2nd Edition; pp. 129-144). Thousand Oaks, CA: Sage.

Chapter 2: Foundational Concepts

This chapter introduces key concepts in the study of human communication. It begins by summarizing contemporary definitions of communication, highlighting common themes as well as their shortcomings for studying understanding. It then introduces a "message processing" definition of communication, which conceptualizes communication as a process of creating shared mental states between two minds. The balance of the chapter introduces and defines related concepts that will be useful to the study of message processing.

Before diving into past and present scientific models of human communication, it is important to take a step back and spend some time discussing and defining the concepts and ideas used in those models. Just as you might lay out your tools and materials before starting a project (e.g., assembling a piece of furniture, baking a cake, repairing an engine), this chapter aims to lay out foundational concepts in the study of human communication before we get into the details of how it works. Many communication textbooks treat these concepts as primitive terms (i.e., terms that do not need to be defined, because they are widely understood). However—as subsequent discussions of message processing will make clear—this is potentially problematic, as it can lead to ambiguity in what exactly is intended when a term is used. This, in turn, can lead to misunderstandings and/or a lack of precision in theorizing and thinking about important questions.

COMMUNICATION

Perhaps the most central term of all to the study of message processing is *communication*. The word "communicate" has its origins in the Latin word "communicare", which means to "share" or "make common". (This is the same word root as words like "community" or "common"). Thus, etymologically, when we *communicate*, what we are doing is *making the content of our thoughts common* between us. Although we have deliberately defined the term *message processing* without using the term "communication", the study of message processing essentially consists of examining how "making our thoughts common" occurs, and what happens during this process.

People have been studying human communication for literally thousands of years. As both (meta)theoretical thinking and research methods have evolved over time, the way people have approached this area has also undergone changes. In the following sections, will look at the ways in which contemporary (i.e., 20th and 21st century) communication scholars have traditionally defined human communication. After considering some of the shortcomings of these definitions for the study of message processing, we propose an alternative definition of communication that better suits those purposes. In addition to this new definition, we will also introduce several other key concepts that will help us study how people create understanding in social interaction.

Traditional Definitions of Communication

Consider the following definitions of communication. All of these come from relatively recent publications focused on communication theory and practice.

> "Communication is a social process in which individuals employ symbols to establish and interpret meaning in their social environment" (West & Turner, 2014, p. 5)
>
> Interpersonal communication is a "complex, situated social process in which people who have established a communicative relationship exchange messages in an effort to generate shared meanings and accomplish social goals." (Burleson, 2010, p. 151)
>
> "[Communication is] any act by which one person gives to or receives from another person information about that person's needs, desires, perceptions, knowledge, or affective states. Communication may be intentional or

unintentional, may involve conventional or unconventional signals, may take linguistic or nonlinguistic forms, and may occur through spoken or other modes" (National Joint Committee for the Communicative Needs of Persons with Severe Disabilities, 1992, p. 2)

"Communication is the relational process of creating and interpreting messages that elicit a response" (Griffin, 2011, p. 6)

"[Communication is] the process through which people use messages to generate meanings within and across contexts, cultures, channels and media" (McCornack, 2010, p. 6).

Although there are some differences in wording, these definitions have a number of elements in common. First and foremost, they all describe communication as involving some form of *meaning-making* via *messages*. Second, they all describe communication as a *process*, or something that is ongoing and unfolds over time through a series of related actions (McCornack, 2010; West & Turner, 2014). Third, all these definitions involve some kind of *social* or *relational* component: the process they describe involves people interacting *with other people*, in a manner that is consequential to that process. In sum, across these definitions, we see agreement that communication is a social process involving messages, and that it results in the generation of meaning.

However, none of these definitions tell or show us *how* people generate meaning from messages (or, notably, what "meaning" is). They just state that people do. Although most of them acknowledge that communication is a process, which implies a series of actions or events, their focus is on the outcomes or outputs of the process (i.e., meanings, responses, accomplishing social goals). None actually describes what the process involves. In other words, these definitions do not provide much insight into how communication *works*. (It should be noted that we are not picking on the authors in particular; their definitions are representative of what is found across the discipline, in terms of content.)

These traditional definitions are useful enough for the purposes of scholars interested in outcomes of communication like social and relational influence—which, as noted in Chapter 1, have been the traditional focus of research in the discipline of communication. However, they are not as useful to us, as we are less interested in those outcomes; we are more interested in how the process of communicating works. We need a message-processing definition of communication.

Message Processing Definition of Communication

For our purposes—studying how people create mutual understanding in social interaction—we need a definition of communication that addresses what the process of communication involves, and that explains how people share the content of their minds with others via messages. To meet these needs, we propose the following definition: *Communication is the process by which people observe and exhibit social stimuli in order to activate, create, or ascertain meme states in other people, with the goal of creating isomorphic meme states between themselves.* We will now look at each part of this definition.

This definition begins by describing communication as a *process*—that is, something that is ongoing and unfolds over time through a series of related actions (McCornack, 2010; West & Turner, 2014). This is consistent with traditional definitions of communication above. The next part of the definition describes the activities involved in communication: *people observe and exhibit social stimuli.* Stating that people both *observe* and *exhibit* emphasizes that process of communication involves both input (taking in; sensing or perceiving) and output (casting; displaying or presenting) by the parties involved.

Stimuli refers to any kind of sensory input (i.e., something in our environment that is accessible via hearing, sight, touch, taste, smell) that evokes a cognitive, affective, or behavioral reaction. Any environment we are in contains what can be described as a very large amount of energy, in many different forms (e.g., various frequencies of sound, light with various wavelengths). However, we cannot perceive all of it: our senses can only sample from very narrow, non-overlapping bandwidths of that energy. In any given instance, we only attend to some portions of those bandwidths, while other portions of those bandwidths are processed at very low levels of awareness, or not processed at all. *Stimuli* refers

to the portions of those bandwidths that (a) are accessible to our senses and (b) *stimulate*, or bring about, some kind of response, as opposed to just being present in an environment.

Stimuli can take a wide range of forms: a *stimulus* (singular of "stimuli") could be a sound, a gesture, markings on a page, a facial movement or expression, or the act of taking someone's hand, among many other things. Describing the stimuli that people observe and exhibit as *social* emphasizes that these stimuli come from and are intended for other people; they are also used for purposes that relate to other people. This is also consistent with traditional definitions of communication, which describe communication as involving a *social* or *relational* component.

The following part of the definition describes what these activities (seek to) accomplish: *to activate, create, or ascertain meme states in other people.* To make sense of this, we must first define what a meme state is. We define a *meme* as a bounded unit of cultural transmission (Dawkins, 1976). Put another way, a meme is a discrete idea or concept that a person can represent in his or her mind, and can share with others via social interaction.

These definitions direct our attention to several key features of memes. First, as a bounded unit, a meme is discrete: it can be identified as a distinct conceptual entity (i.e., it is a single, specific thing and identifiable as such).

Second, as a unit of transmission, a meme can be passed from one person to another (i.e., shared or replicated), and thus is something that can be communicated. Dawkins (1976)—who coined term "meme"—thought of a meme as comparable to a gene. Genes are replicators whose likelihood of being replicated was directly tied to the value it had for the host. Dawkins thought certain ideas – memes – would be more likely to be replicated or communicated if they proved valuable to the communicators that "host" them.

Third, a meme is a unit of *cultural* transmission, shared or passed along by social interaction, especially imitation. (The word "meme" actually comes from the Greek word "mimēa", meaning "that which is imitated"; this word has a common word root with "mimic".) Essentially, memes are sharable nouns: anything that we can turn into a noun, a discrete thought, and shared with others can be a meme. Happiness, strawberries, Poipu Beach, and doing laundry are all examples of memes. We can think of a meme as a "thing", in a colloquial sense: if the answer to, "Is that [X] a thing?" is yes, then X has taken on the status of a meme. Indeed, the term "thing" itself has emerged as a *meme* to reference ideas that have crossed a critical threshold from amorphous concept to something recognized as significant within our cultural consciousness: e.g., "Whisky bacon ice cream? Is that a *thing*?"

A *meme state* refers to an organized set of memes that a person represents in their mind at a given point in time. Meme states can vary in their depth and complexity. When people think of a single object (e.g., a dog) or concept (e.g., love), they may be relatively straightforward, consisting of a single primary meme and a few other, associated memes (e.g., feelings of warmth or happiness; memories of a childhood pet, etc.). However, more often, meme states can be considerably more complicated, involving multiple memes and specified relationships between them, as well as the memes associated with those memes and relationships. For example, a mental representation of how our day went, including what we did, where we went, and how we felt about it, is more complex than a representation of just "dog" or "love".

Activating and creating meme states are the primary objective of someone constructing and "sending" a message: when someone casts or exhibits social stimuli, they are generally doing so with the intention of activating, or bringing about, a particular meme in their fellow communicator's mind. This notion is grounded in models of human memory (see below), which tell us that we can access memes stored in our memory when we are prompted to by some kind of cue, or stimulus, that is associated with that meme. When we do encounter such a stimulus, the associated meme is brought to conscious attention. This is what is meant by *activating* a meme. In some cases, we may not already have an "entry" in our memory corresponding to the meme that another communicator is trying to activate. This happens, for example, when people use words we do not know, or tell us about things (people, places, objects) that we are not familiar with. In this case, the stimuli provided may not activate a single, specific meme (or at least, the one intended by our fellow communicator). Instead, they may activate a set of other, potentially related memes that we ultimately use to construct a new meme state; this is the *creation* of a meme state.

Ascertaining meme states is the primary objective of someone "receiving" or interpreting a message: when someone observes or "receives" social stimuli, they are generally doing so with the intention of figuring out or determining what

meme(s) their interlocutor has in mind. When we ask ourselves, "What did s/he mean by saying that?", we are actually asking "what is the meme state s/he is trying to activate in me?", or more colloquially, "What does s/he want me to think?". If the stimuli our interlocutor uses is tightly coupled with the meme state they want to activate, we may have little conscious experience of ascertaining a meme state; rather, the meme state be activated easily and automatically. However, if the stimuli our interlocutor uses are only loosely associated with the meme state they want to activate in our mind, we may experience the process of ascertaining a meme state as conscious and effortful. This issue will be discussed further below (see "Meme Activation Potential").

The final part of the definition's content describes the overall aim of communication: *with the goal of creating isomorphic meme states between themselves.* The word i*somorphic* means having the same fundamental shape, form and structure. The word is Greek in origin, and has two core components: "iso" means "equal", while "morph" means "form" or "shape". Thus, *iso-morph-ic* describes something having equal, or equivalent, shape to something else. The phrase *isomorphic meme states*, then, refers to having equivalent, or matching, memes states active across two (or more) people. This is, we argue, what communication ultimately achieves—aligning minds so they are thinking about the same thing.

Indeed, recent research suggests this is precisely what happens when people successfully communicate: they become entrained at a neural level. *Entrainment* occurs when two systems become highly aligned or synchronized in their behavior (e.g., Hasson Ghazanfar, Galantucci, Garrod, & Keysers, 2012). Recent studies by Dr. Uri Hasson and his colleagues have shown that when people communicate, they become cognitively and neurologically entrained—that is, their brains exhibit highly similar activity (i.e., the same activation in the same regions). This isomorphic meme state, this cognitive and neurological entrainment constitutes *understanding*.

For our purposes, this definition offers several advantages over traditional definitions of communication. First, as noted just above, it emphasizes the process of communicating, and the creation of understanding, rather than outcomes like influence. Second, and perhaps most importantly, it provides an explanation for how people create understanding, or generate meaning from messages: they perceive stimuli provided by another communicator, and this activates meme states in their mind (i.e., stimuli serve as a cue for memory recall or activation). Finally, this definition's explanation of how communication works corresponds to the cognitive and neurological processes that have been observed when people communicate. As such, this definition goes beyond providing a loose, metaphorical conceptualization of communication (as many traditional models of communication do) and instead offers something with a physical and physiological basis.

MESSAGES

Another fundamental concept in the study of message processing is, of course, messages. For our purposes, we define *messages* as any set of stimuli that are designed and organized to activate a particular meme state in another person. A single stimulus—e.g., a sound, a gesture, markings on a page, a facial movement or expression, etc.—can constitute a message in and of itself if it is the only stimulus being used to evoke a particular response. However, more frequently, messages involve multiple stimuli that together have a particular effect. Thus, messages often consist of a number of different stimuli (i.e., more than one individual stimulus) unified by a common cause or goal. For instance, we might try to indicate that we are happy by smiling, saying "This is great", and using a sincere or genuine tone of voice. All three of these stimuli—facial expression, spoken words, and vocalic tone—together constitute a single message that seeks to evoke the idea of happiness. (Alternatively, we might try to indicate that we are displeased by smiling, saying "This is great", and using a sarcastic tone of voice. As this example indicates, changing a single element of a message's "package" can make the message activate a quite different meme state.)

Given the potential of one stimulus to alter the meaning of a message, which stimuli are (and are not) included in a message is an important issue to consider. Depending on the media system (see Chapter 3) communicators may have more or less control over how their message is presented to others, and by extension what stimuli a communicator intends to be included in a message. Some media systems offer fairly clear indications of this: in traditional print books, for example, the line between what is and is not in the book is pretty unambiguous. However, in a majority of

communicative contexts, only some of stimuli available to communicators are intended to be part of the message (i.e., *intended* stimuli), the rest are a part of the surrounding environment, but incidental to the message (i.e., *collateral* stimuli). For example, we could say "This is great", intending our words and a sarcastic tone of voice to constitute the message's stimuli. However, other communicators may not attend to or perceive the message exactly as we, the sender, intended: they might omit something we intended to include (e.g., ignoring the tone of voice and focusing only on words), or include something else (e.g., our facial expression) which the we did not intend. As such, it is important to recognize that the message one communicator exhibits may not exactly match what another communicator observes.

Despite these potential issues, messages have a crucial role in human communication: messages are what people (and other entities) use to activate ideas in other people's minds. As such, we can think of them as the basic unit of human communication. Often, messages involve formal or established codes in the way that stimuli are used are combined—for instance, a sentence spoken in English uses language, which is a conventional code—but they do not have to.

It should be noted that this text's definition of "message", which focuses on perceptible stimuli (i.e., sensory input) contrasts with some other, extant definitions of the term. Rather than using the term to describe to sensory information, some scholars (e.g., Sperber & Wilson, 1986) use the term to refer to the ideas or concepts that stimuli are intended to activate. Defined this way, a *message* is a *mental representation*, rather than something observable. This is not the way the term will be used in this text, but this different usage is worth noting, particularly if you are interested in reading other researchers' work.

THE STRUCTURE OF MEMORY AND MENTAL REPRESENTATIONS

Much has been written on the human brain, its structure, and how this relates to people's experiences of the world. This topic is largely the domain of cognitive psychology, and a review of current knowledge on this area is outside the scope of this text. However, there are some basic features of the human mind that are foundational to the study of message processing; in what follows, we will briefly summarize those key points.

[For additional information on how memory works, click here for a brief introduction].

First, as you know from your own experience, we store many memes in our minds that we are not necessarily aware of, or attending to, at any given point in time. Every day, we are walking around with a lifetime of memories, a dictionary's worth of vocabulary, the facts from more than a decade of formal education, and much more, all tucked away in our brains. However, we are not consciously thinking about all of this content all of the time. We can, however, access stored memes or meme states when we are prompted to by some kind of cue, or stimulus, that is associated with the meme state in question. When we do encounter such a stimulus—which, as noted above, can take a wide variety of different forms—the associated meme state is brought to conscious attention. In this text, we refer to this process as the *activation* of a meme state. Generally, meme states that have been recently activated are easier to activate in the present and (near) future. Some meme states have chronically high resting levels of activation, due to chronic or repeated activation of those (or related) meme states.

According to most widely accepted models of human memory and cognition, the content stored in people's brains can be visualized as a network. Meme states (e.g., facts, memories) do not exist in isolation; rather, they are connected to one another. Thus, rather than thinking of memories or knowledge as filed in a mental "drawer", it is more accurate to think of them as nodes (i.e., connection points) in a web.

These connections are created when a meme or meme state is initially learned, or "encoded" into memory, which involves physiological changes in the brain (referred to as *memory traces*). The number and nature of connections between meme [states] can and does vary. Some meme states have many connections to other meme or meme states, while others have relatively few. For example, you probably have many different meme states (i.e., ideas, concepts, memories) connected to the meme of your home town. In contrast, you probably have relatively few meme states connected to the meme of Capel, a town in Western Australia (unless that happens to be your home town!). Generally, it is easier to access meme states that have more connections, as they have more possible paths leading to them.

The nature of these mental structures have important consequences for message processing. First, the idea that we need external stimuli to activate (i.e., call up, recall) content stored in memory is foundational to recognizing what happens, functionally, when people interact and communicate with each other. Second, the presence of connections (i.e., associations) between memes has consequences for what happens when a meme is activated. Just as moving one node (i.e., connection point) would affect other nodes in a web, activating one meme can potentially affect other meme states that are connected to, or associated with, it.

MEME ACTIVATION POTENTIAL

As described above, *meme activation* occurs when a stimulus (e.g., a word, sound, image) results in a particular meme or meme state being accessed in memory and thus brought to our attention. This process sounds fairly straightforward, but can be quite complex in practice. One of the primary reasons for this is that there is not one-to-one correspondence between stimuli and meme states. Rather, the same stimulus can be associated with multiple, different meme states. Homophones (e.g., "two" and "too") are examples of this in auditory English-language stimuli; homographs (e.g., "pen" as a writing instrument or a fence around farm animals) are examples in written English-language stimuli. Nonverbal behavior is frequently polysemous (i.e., having multiple possible "meanings", or memes associated with a given stimulus) as well. For example, holding up one's index and middle finger together could be associated with, and thus activate, (a) "peace", (b) "two", or (c) that one is posing for a photograph, among other things.

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In social interaction, elements of the context often help us arrive at the meme option that is the most likely, out of all possible options. For example, if a conversation is about school work, we are likely to assume that "pen" refers to a writing instrument rather than a fence. However, if the conversation were about farm animals, the opposite would likely be the case. Similarly, if a restaurant host asks a customer how many people need to be seated and the customer holds up his index and middle finger, this gesture is likely to activate the meme "two", rather than "peace", because the customer made the gesture right after the host's "how many" question.

Often, our minds resolve such potential ambiguities rapidly and automatically. This is particularly the case when there are multiple contextual clues that all consistently support the activation of one particular meme state associated with a stimulus. In these cases, we consider the stimulus or message to have high *meme activation potential* (MAP). Stimuli with high MAP easily and readily activate a specific meme state in a person's mind. For example, reading the word "red" likely brings to mind an image of a particular color quite easily. Indeed, sometimes this experience is so rapid and straightforward that we have no conscious experience of determining what a message "meant"; we just experience its meaning.

Stimuli with low MAP, on the other hand, do not readily or easily activate one, specific meme state in someone's mind. In some cases of low MAP, the stimuli in question may fail to activate anything related to the desired meme. It will activate *something*, but that something may not be what the creator of a message intended. For example, if you do not know French, hearing or reading the word "pamplemousse" is not likely to bring much that is specific to mind – you have nothing specific associated with that word (stimulus) in your memory. It might bring to mind "French", and things you associate with "French" (e.g., baguettes, berets). However, these associations will be loosely connected, and you will likely recognize that this is probably not what that stimulus was intended to activate. In other cases of low MAP, stimuli can activate multiple, potentially competing, ideas in a target's mind. For example, if your friend

says, “I’ll see you the beach at 5”, the phrase “the beach” could bring to mind more than one location if a particular beach has not been specified earlier in the conversation.

Generally, stimuli with low MAP lead people to experience feelings of confusion. Confusion is essentially uncertainty about what meme state one communicator thinks that another communicator is seeking to activate with the stimuli provided. In these situations, *disambiguation*—that is, the process of determining which meme state a communicator intended to bring to mind – can be a conscious and effortful undertaking. If the communicative context allows for interactivity (see above), then communicators may have the opportunity to ask for clarification or help with resolving ambiguities (e.g., asking “Which beach?”). If it is not an interactive context, however, people are left to make the best inference or deduction that they can, and miscommunication is more likely to occur.

It is worth noting that the MAP of a given stimulus or message is not an intrinsic quality of that stimulus or message. Rather, it depends on a number of factors, including the attention, abilities, and cognitive environment (e.g., knowledge, memories) of the target, as well as the nature of the communicative context. The same message will not have the same MAP, or the same effects, for all audiences: a message that might have high MAP to a content area expert (e.g., the terms “between-subjects design”, “latent transition analysis”) can sound like gibberish—and thus have low MAP—to someone unfamiliar with that topic area or its terminology. This highlights an important point we will return to throughout this text: adapting and adjusting both the content and form of messages for different audiences plays a critical role in successfully creating understanding.

INTERACTION AND INTERACTIVITY

In discussions of communication (and indeed, in the definition message processing we provided in Chapter 1), there are often references to “interaction” or “social interaction”; in describing communicative situations, we often use the term “interactive” or “interactivity”. These are related concepts, and it is important to define them. To *interact* means “to act in such a way as to have an effect on another”. For communication to occur, some degree of *interaction* (i.e., instance of interacting) must be possible and present: to make thoughts and ideas common with others, people must be able to act in ways that have effects on others. The successful sharing of ideas between people is, by definition, an effect; if there were no effects, no sharing could take place. However, all communication is not equally interactive. Different situations and communicative contexts involve different levels of *interactivity*—that is, opportunities for people to engage with, and influence, each other. To better understand how communicative contexts can vary in interactivity, two additional concepts are useful: *reciprocity* and *synchrony*.

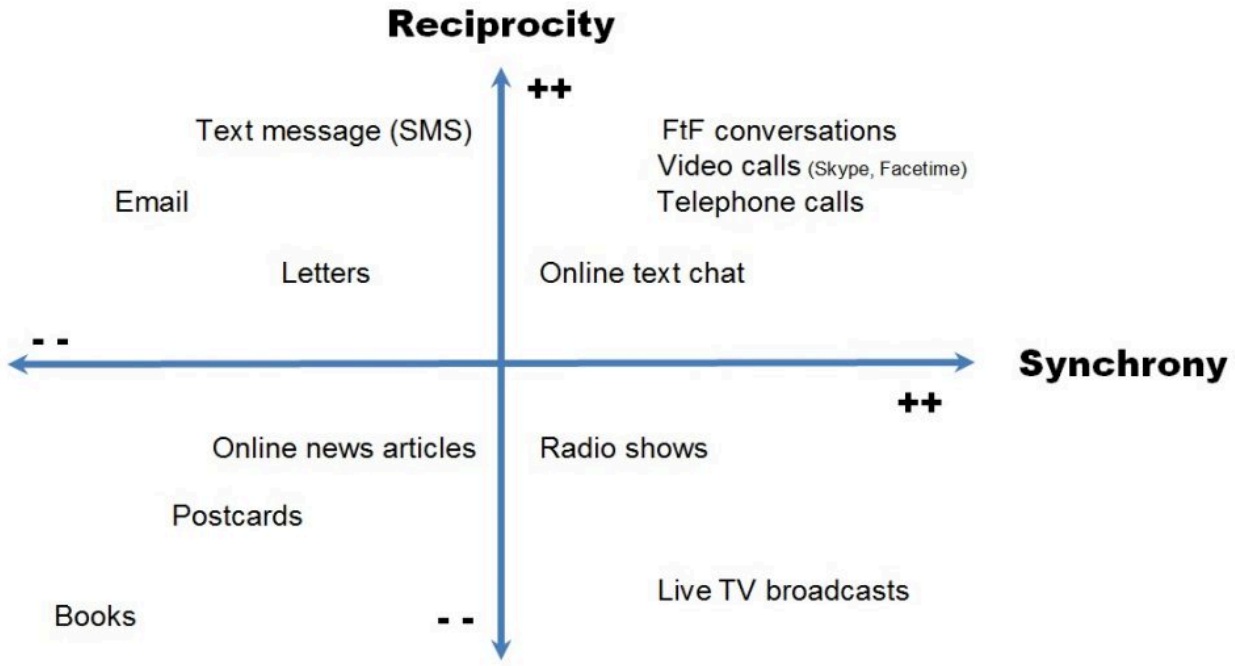
Reciprocity. *Reciprocity* is defined as providing exchanges in kind; giving something and receiving something similar back in return. For our purposes, reciprocity is relevant to the flow of stimuli in interaction. In some contexts, stimuli readily flow in two directions; in these situations, communicative reciprocity is high. Face-to-face conversations and telephone conversations are examples of interactive situations with high reciprocity; each person can readily and easily provide and receive social stimuli. In contrast, watching a movie or reading an online article are examples of interactive situations where reciprocity is low. In these situations, stimuli primarily flow in one direction, from the author or creator of the content (e.g., journalist, producer) to the audience members. Although audience members are affected by the content of the show or article, they have very limited opportunities to exert similar (i.e., in kind) effects on the content’s author(s). This constitutes an interactive situation with low reciprocity. Generally, the more a context allows for reciprocal (i.e., bilateral) exchange of stimuli, the more interactive it is considered to be.

Synchrony. *Synchrony* is defined as occurring at the same time and/or operating following the same time scale. Thus, when two things are aligned in time (i.e., they are simultaneous or closely follow each other in a coordinated way), they are considered *synchronous* or *in sync* with each other. Conversely, when two things are separated in time or uncoordinated in their timing, they are considered *asynchronous* or *out of sync* with each other. Typically, face-to-face and telephone conversations are examples of synchronous interactive situations; people speak and respond to each other in real time (or with minimal delays) in highly coordinated ways. In contrast, conversations over email can be relatively

asynchronous; we can send an email and not get a reply for a day, a week, or even a month (and these delays are not always predictable). Both synchronous and asynchronous communicative contexts can be interactive; communicative contexts that have low levels of synchrony or temporal coordination between communicators can and do still meet the definitional requirements for interactivity. For example, every day people can and do successfully use email to act in ways that affect one another. Similarly, we can be quite affected, cognitively and affectively, by the content of books written by authors decades or even centuries ago. In this sense, long-gone authors are still interacting with readers (audiences) of the stimuli they have produced. Thus, synchrony is not a defining feature of interactivity. However, we discuss it here because the extent to which an exchange is or is not synchronous can have consequences for the form that social interactions take, as well as the way we think about and study interactions.

Both synchrony and reciprocity have important implications for how messages (see below) are constructed and interpreted as people communicate. Specifically, they affect both opportunities to (a) provide feedback on messages, and (b) modify messages once they have been created. In highly reciprocal situations, people can readily and easily provide feedback to each other. This means that communicators have opportunities to seek clarification (e.g., ask for additional detail or elaboration; ask for something to be repeated) if a message is not initially clear to them. In a face-to-face conversation, which is highly reciprocal, we can ask our conversational partner to repeat something we did not hear well ("Sorry, say again?") or ask for additional information if they use a word, term, or name we are not familiar with ("Who is Dr. Young?"). Because face to face conversations are also highly synchronous, we can get answers to these queries quite quickly, in real time ("I said, 'pass the salt'"; "She's a professor in the chemistry department").

Seeking and providing clarifications are examples of how the formulation of a message, and/or the content of a conversation, can be *modified* and *revised* in reciprocal and synchronous contexts. In such situations, the initial version of a message does not have to be the final version. However, when there are few opportunities for reciprocal exchange about message content, a message is unlikely to be changed or revised once it has been constructed. As a result, messaging in highly reciprocal and synchronous contexts tends to be more *dynamic*, while messaging in minimally reciprocal and asynchronous situations tends to be more *static*. In situations involving static messaging, communicators' choices in constructing an initial message are particularly important, because they have limited opportunities to revise or change it later. In situations involving dynamic messaging, message design choices are also important, but there is more inherent flexibility, as communicators can modify messages more easily if needed.



MONOLOGIC AND DIALOGIC APPROACHES TO STUDYING COMMUNICATION

To date, a majority of research studies looking at human communication have been designed to examine the thoughts and behaviors of one person at a time. If researchers were interested in message construction, they would focus on the thoughts and actions of the message "source" (i.e., creator or originator). If researchers were interested in message effects (including comprehension), they would focus on the thoughts and actions of the message "target" (i.e., audience or recipient). In such studies, the researchers' *unit of analysis*—that is, the entity being studied—is the individual. Because it focuses on what a single person is doing or thinking, we call this way of studying communication a *monologic* approach. (This term shares a common word root with "monologue", a speech or long talking turn by a single person.) Scholarly work using this approach has certainly contributed to our understanding of message processing. However, it has also been criticized for its minimal focus on interaction.

An alternative way to study communication is a *dialogic* approach, which examines what happens to two (or more) people together as they interact. (This term shares a common word root with "dialogue", a conversation between two or more people.) A dialogic perspective directs attention to the ways in which people's actions and cognitions affect each other as they interact. In this work, the researchers' unit of analysis is the dyad (or group, in the case of interactions involving more than two people). By studying what happens to both or all individuals engaged in message processing together, researchers can get a more comprehensive picture of how interactants influence each other in the process of creating understanding (Gasiorek & Aune, 2017). Researchers who take a more dialogic perspective contend that successful communication (i.e., that which leads to shared understanding) results in *entrainment*—that is, convergence or alignment—of interactants' neurological and psychological states (Garrod & Pickering, 2004), as discussed above. These researchers have argued that the dyad is the smallest unit we can possibly use to effectively study message processing, or the creation of understanding in social interaction (e.g., Hari & Kujala, 2009; Hasson, et al., 2012; Pickering & Garrod, 2004).

COMPREHENSION VERSUS UNDERSTANDING

As discussed in Chapter 1, the term *understanding* is often treated as a primitive concept (i.e., as constructs that are so basic or widely recognized that they are not formally defined). This is also the case with *comprehension*, a term that is often used interchangeably with *understanding*. In this text, we will treat these as distinct but related constructs. We propose that both involve congruity between (a) the meme states one communicator seeks to activate and (b) the memes actually activated in another communicator's mind. However, we will use the term *comprehension* to refer to the outcomes of monologic processes, and *understanding* to refer to the outcomes of dialogic processes.

More specifically, a person *comprehends* a message when that message's stimuli activate the meme states intended by the creator of the message, and that person constructs a corresponding memory representation (Gasiorek & Aune, 2017). Consistent with a monologic approach to studying communication, this definition of comprehension focuses on the processes that occur in a single mind. Here, the individual is the unit of analysis. Generally, discussion of comprehension is best (although not exclusively) suited to the study of static messaging contexts, where there are minimal opportunities for synchronous interactivity, and communicators are removed in time and space from each other.

Alternatively, two people *understand* each other (or *create understanding*) when the stimuli they provide each other result in the activation of functionally similar (i.e., isomorphic) meme states in both their minds. Consistent with a dialogic approach to studying communication, this definition of understanding focuses on the mental processes of two (or more) people at a time, and how they correspond to one another. Here, the dyad is the unit of analysis. Generally, discussion of understanding is best suited to the study of dynamic messaging contexts, where there are frequent opportunities for synchronous interactivity, particularly changing and revising message content in response to feedback from fellow communicators.

IMPLICATIONS OF A MESSAGE PROCESSING APPROACH

A message processing definition of communication, and the corresponding concepts introduced in this chapter, have some important implications for how we think about communication. First, this definition suggests that the basic objective of the process of communication is to affect memes in other people's minds. While this is not inconsistent with traditional definitions of communication, it does represent a conceptual shift. Rather than thinking about trying to "transmit" or "convey" a message, which places the emphasis on the message—a unit that is packed up and sent off for someone to "receive"—this definition emphasizes people, and their mental processes. It suggests that if we want to understand how communication works, we need to focus on people, and what is going on in their minds, in a substantive and meaningful way.

Second, by moving away from language and analogies that suggest that meaning is somehow "sent" from one point to another, this definition also allows us to see that meaning is, in fact, created when stimuli (serving as cues) activate memes associated with them. This helps us see how the same message could "mean" different things to different people: the set of stimuli that constitute that message could activate different memes in different minds (depending on what is associated with it; see below).

Third, this definition positions creating understanding—conceptualized as arriving at isomorphic meme states across two or more people—as the primary function of communication. In other words, it claims that this is the first and most fundamental thing that communication accomplishes. Social or relational influence is considered a secondary function, and one that follows from whatever understanding is created. This contrasts with traditional definitions of communication, which implicitly emphasize the outcomes of communication over the creation of understanding.

References

Burleson, B. (2010). The nature of interpersonal communication: A message centered approach. In C. R. Berger, M. E.

Roloff and D. R. Roskos-Ewoldsen (Eds.) *Handbook of communication science* (2nd edition; pp. 145-164). Thousand Oaks, CA: Sage.

Dawkins, R. (1976). *The Selfish Gene.* Oxford: Oxford University Press.

Garrod, S., & Pickering, M. J. (2004). Why is conversation so easy? *Trends in Cognitive Sciences*, 8(1), 8–11.

Gasiorek, J., & Aune, K. A. (2017). Text features related to message comprehension. In R. Parrott (Ed.), *Oxford Encyclopedia of Health and Risk Message Design and Processing*. New York: Oxford University Press. doi: 10.1093/acrefore/9780190228613.013.303

Griffin, E. (2011). A *first look at communication theory* (8th edition). New York: McGraw Hill.

Hari, R., & Kujala, M. V. (2009). Brain basis of human social interaction: From concepts to brain imaging. *Physiological Review*, 89, 453–479.

Hasson, U., Ghazanfar, A. A., Galantucci, B., Garrod, S., & Keysers, C. (2012). Brain-to-brain coupling: A mechanism for creating and sharing a social world. *Trends in Cognitive Sciences*, 16(2), 114–121.

McCornack, S. (2010). *Reflect and relate: An introduction to interpersonal communication* (2nd edition). Boston: Bedford/St. Martin's.

National Joint Committee for the Communicative Needs of Persons With Severe Disabilities. (1992). *Guidelines for meeting the communication needs of persons with severe disabilities*. ASHA, 34 (March, Supp. 7), 1-8.

Pickering, M. J., & Garrod, S. (2004). Toward a mechanistic psychology of dialogue. *Behavioral and Brain Sciences*, 27, 169–226.

Sperber, D., & Wilson, D. (1986). *Relevance: Communication and cognition.* Oxford: Blackwell.

West, R., & Turner, L. H. (2014). *Introducing communication theory: Analysis and application* (5th edition). New York: McGraw Hill Education.

Chapter 3: Media

In this chapter, we discuss media, another foundational concept for message processing. First, to more clearly define the role of media in the process of human communication, we offer a definition of the term "medium", and discuss the functions media serve. We then look at affordances of the different media systems, highlighting how media differ and are similar to one another, and the implications of media system use and choice for message processing.

In this chapter, we continue our discussion of foundational concepts for message processing, focusing on media. The aim of this, and our discussion of fundamental concepts more generally, is twofold. First, we are laying the conceptual groundwork for our study of message processing. In so doing, we also aim to help you see elements of the world around you from a new perspective. Second, and related, systematically examining these concepts gives us insight into how both objects and contexts that might seem unrelated actually share common properties and roles with respect to human communication. A piece of paper, a computer hard drive, and the wall of a building might initially seem to have little in common, but they can all fulfill the same function as an interface medium for written communication. By the end of this chapter, you should have a better idea of key similarities and differences across different forms of media, and how they are relevant to message processing.

DEFINING "MEDIA"

In theory, research, and everyday discussions of communication, we often see and hear the term "media" used in variety of different ways and forms. Popular communication and cultural studies refer to "the media" when talking about the entire broadcasting industry. Likewise, journalism – whether print, radio, or televised – is often referred to as "the media" or more recently "mainstream media." An extremely common term in research and popular culture is "computer-mediated communication." In the arts community, a primary question you might ask a new artist friend is "What medium [singular of "media"] do you work in?" When communication researchers compare different forms of communication, they sometimes claim that nonverbal communication is more "immediate" that verbal communication because the latter is more "cognitively mediated." In statistics, we might point out that the apparent relationship between two variables is actually "mediated" by a third variable.

Clearly media is a useful and versatile term for us, and important to the study of communication. However, using this term so widely to refer to so many different things makes it difficult to tell what "media" actually is, and the role in plays in communication. For example, most researchers and scholars refer to communicative behavior that employs information or communication technologies as mediated communication. Does that indicate communication without such technologies, i.e., face-to-face (FtF) communication, is unmediated communication? (The answer, we will argue, is no.) To address issues such as these, we need a definition of "media".

For the purposes of studying message processing, we offer the following as a definition of medium (plural, media):

> A medium is any material or portion of the electromagnetic spectrum that can be systematically altered by a communicator with sufficient stability to (a) preserve stimuli for purposes of distributing and storing messages, or (b) cast stimuli into the proximal environment of another communicator for purposes of interfacing with messages.

This definition is, on a fundamental level, consistent with the Latin origins of the word, which designate something "in the middle" or between two (or more) things. Here, a medium is the physical substance "in the middle" between two or more communicators, through which they communicate.

With that said, it is important to recognize that medium in and of itself does not necessarily have communicative value. For instance, a blank white sheet of paper has the capacity to serve as a medium. In its blank state, it has qualities to which

we can assign values: we could measure its size, the weight of the paper, its opacity or reflectivity – but its communicative value is still only potential. A medium has to be altered in some systematic fashion to create a media system. Thus, the moment we make a mark on that blank paper with pencil (which is another medium), we create a media system. We also could raise bumps on that blank paper – as with the Braille communicative system – and create an effective media system with just the single medium. In each of these situations we have the basic components for a media system: a constant background and a variable foreground. It is the systematic altering of a constant with a variable that allows a medium or media to have communicative value.

All media systems function as variable foregrounds on constant backgrounds. When we speak we disrupt the relatively constant air pressure with variability caused by our voices. The vinyl 33 rpm records of the mid-20th century were a media system consisting of a constant surface made variable by spirals of grooves in the disk's surface. Likewise, our more current CDs and DVD consist of constant plastic surfaces with very fine pits systematically burned into those surfaces. We can use a stick to make grooves and divots in a uniform dirt or sand surface to draw maps or write words. A painting is a blank canvas with a systematic application of paints to depict images. Even a skywriting plane creates a media system by leaving a systematic exhaust trail spelling out words against the constant background of the sky. Fiber optic and copper cables function as media systems via the systematic pulsing of light or electricity through the constant state of the cables. Radio and television transmitters create media systems by systematic pulsing of specific bandwidths of electromagnetic radiation against the relative constancy of background radiation.

Thus, systematically altering a medium is the means by which communicators can access and create (i.e., observe or exhibit) stimuli intended for other communicators. From this follows an important point: communication always requires a medium. As discussed in our message processing definition of communication (see Chapter 2), communicators must employ stimuli to activate, create, or ascertain other communicators' meme states, because people do not have direct access to other people's minds. The only access we have to others' minds is through their brains, and the only access we have to their brain is through their senses. Systematic alterations of media are the means through which we can access others' senses. If we do not have a medium, we have no way to access others' senses. Thus, we need a medium to communicate.

FUNCTIONS OF MEDIA

Beyond the observation that communication requires a medium, what role do media play in message processing? To address this question, we might ask another: What do people refer to when they use the term "media"? A partial answer is that people use the term "media" or "mediate" in reference to messages. Frequently, it is used to address how a message gets presented to us or how a message moves from one communicator to another. More specifically, as our definition above suggests, media serve two primary functions: they allow people to interface with messages, and to distribute or transport messages across time and space.

Media as Sensory Interface

If you do not have access to another's senses, then you cannot communicate with that person. A medium provides access to their senses. When we gesture, we use light (more specifically, photons) as a medium. The ambient light reflects off our body, and stimulates rods and cones in another person's eyes. When we write a letter to a friend, we employ ink and paper as media; this ultimately relies on light to reach our recipient's senses as well. Prisoners in separate cells who tap the bars or the wall to communicate with fellow prisoners also use the air as medium.

A commonality across all of the examples above is that we are using a medium or media system to interact with another's senses. This use of media suggests that a primary function of media is sensory access to messages, or what we refer to as interfacing with messages. When we wish to activate memes in another communicator's mind, we structure stimuli in some fashion (i.e., construct a message; see Chapter 2) and present it to that other's senses. It is through the

process of systematically altering a medium—which has a physical form—that we create messages in a form that another communicator can access via his or her senses.

Messages often arrive to us in a format that we cannot directly use. A land line telephone call arrives as electric pulses across a copper wire or a fiber. Cellular phone calls reach our cell phones as radio waves, the same way they reach our wireless receivers in our computers. These various electric and optical pulses carry enormous amounts of data – in other words, messages – but we do not have access to these messages until they translated into sonic waves accessible by our ears or light waves accessible to our eyes. These messages must be converted from analog and digital data streams to those subsets of energy from which our (first order) senses can sample.

In thinking about this process, it is important to remember that what is experienced as "direct" interaction with the world is always and only experienced through our senses. Our senses sample from the world external to us and that sampling – through touch, vision, hearing, smell, and taste – only corresponds to what we those senses are able to perceive. Vast portions of the world external to our bodies (e.g., x-rays, infrared light, ultrasonic frequencies) are unavailable to our conscious experiences due to the limitations of our sensory apparatus.

We can think about our senses – the senses we came into the world with – as first order sensory technology. With the help of second-order sensory technology, we can restore damaged first order sensory technology to its initial or "normal" state: glasses, contact lenses, and hearing aids are all examples of this. For hundreds of years, people have also been developing third order sensory technology, or technologies that augment or amplify our senses beyond their normal capabilities. Examples of these include microscopes, binoculars, and telescopes; or glasses/goggles that sample from electromagnetic spectra not visible to our unaided eyes, allowing us to see in the dark or see infrared radiation. Optical aids such as Google glasses, which allow us to see all sorts of digital information overlaid on our field of vision, are also examples of this. For our purposes, we consider anything accessing and/or accessible to our senses—regardless of the technology used to have this experience—a medium or media system functioning as a sensory interface.

Media as Distributors of Messages

When we communicate, our goal is generally to move messages from one place to another. It might be one person's mouth to another's ears. It might be from a television station to your home television. It can be from your cell phone to another's cell phone. It can be from the author of a book to her thousands of readers. In the process of moving from Point A to Point B, a message might undergo one or more transformations in form or format (a point we will return to in discussing codes; see Chapter 4) to make the trip across space and/or time. When you speak to your friend, it is not words that reach his or her ears, but rather compressions and rarefications of air, which will hit and vibrate his or her eardrum. This, in turn, will create neural impulses that are carried to his or her brain, which will ultimately translate those signals into words. When you make a cell phone call, the words you speak into my phone undergo multiple transformations into different types of digital signals before emanating as a facsimile of your voice from the speaker on your friend's phone. In all of these instances media – air, electricity, radio waves, microwaves – are used to move or distribute the message from one communicator to another.

Thus, in addition to allowing access to stimuli in a single time and place (i.e., an interface function), media systems also allow us to move the message from Point A to Point B, or from Time 1 to Time 2. We refer to this function as distribution of messages—that is, transmitting messages across space and time. The latter function (i.e., relating to time) can also be thought about as message preservation or storage.

Conduit media

How we use media systems to distribute messages is not a singular process; different media do this in different ways. Some media – air, electricity, light – serve as conduit for message distribution. A conduit is akin to a channel or a pipe, through which a substance travels. When a medium operates as a conduit, the medium does not move but the message

moves within the medium, like water moves through plumbing. In "land line" phones our voices are converted to electric signals that traverse copper cables before arriving at another phone. Cable television makes use of copper cable and fiber optic networks to distribute electric signals and pulsed light waves to homes and businesses around the country. And when we speak with each other we make use of the air and light in the room to serve the very same function that copper cables serve with phone calls. In all these cases the medium employed – air, light, copper cable, fiber optic cable – is serving as conduit to distribute the message.

Carrier media

We can also distribute a message by putting it on some kind of durable substance – for example, paper, plastic, magnetized metal oxides, silicon, wood, even stone – and then move that substance from Point A to Point B. In this case, the substance is our medium, and it is operating as a carrier—that is, something that physically carries a message. Mail in your mailbox, physical books, vinyl records, and digital game cartridges or discs are all examples of carrier media. In all of these cases the message has been recorded on a physical medium and that medium has made a trek – via planes, boats, trucks – to its destination. This, too, is a form of message distribution (and one which is potentially costly, as we will discuss later).

MEDIA AFFORDANCES

Seeing what all media systems have in common—that is, they consist of a variable foreground on a constant background, and are used to distribute and/or interface with messages—the next question one could ask is: how do media systems vary? More specifically, can we describe media systems using a set of criteria that would allow us to compare and contrast different media systems? Doing so would be useful for at least two reasons. First, it would allow us to determine the assets and liabilities of each media system, which could help us see why some media systems are best suited for some communicative jobs relative to others. Second, this would help us see the continuity across media systems that might otherwise appear to be quite different. In this section, we discuss these criteria in the form of media system affordances.

The term affordances refers to capacities of a technology that make that technology useful to its users. For example, some of the affordances we could consider for technologies designed to move people across space (e.g., cars, skateboards, bicycles, automobiles, Segways, buses, airplanes, etc.) could include speed, passenger capacity, safety, manner of propulsion, energy efficiency, and expense. We can describe anything in that category, from a skateboard to a space capsule, in terms of these capacities, or affordances.

What affordances apply to different media systems? In what follows, we will seek to answer this question in terms of the two functions of media discussed above. First, we will consider those that relate to message distribution (i.e., moving messages from Point A to Point B); second, we will consider those that relate to interfacing with messages (i.e., allowing communicators to access to messages).

Affordances Related to Message Distribution

There are multiple affordances that we can use to examine differences in how media systems distribute messages. Among these are the following:

Carrying Capacity

Carrying capacity (often referred to as bandwidth for conduit media systems) refers to the message load that a media system can handle per unit of time. Since the Internet emerged as a public phenomenon in the 1990s, we have seen continual growth in its capacity to carry more data in less time. As the Internet grew from a copper cable-based system

to one including higher capacity glass fiber optic cables, more and more data could be moved in less and less time. In the 1990s a single web page of text might take minutes to load on a screen; today we stream high definition movies in seconds. Just as we can describe the carrying capacity of cables, we can also describe the carrying capacity of other conduit media such as air, microwave radiation, and AM and FM radio waves. We can even assign a value to the carrying capacity of the bones in our head (as used in e.g., bone conductive headphones). All can be compared and contrasted in terms of how much stimuli they can hold and move per unit of time.

Similarly, we can describe the carrying capacity of carrier media systems, such as paper, CDs, DVDs, flash drives, or stone tablets. Intuition tells us that paper can carries significantly less stimuli than a DVD or a flash drive (and a stone tablet, even less!) relative to the other media in the list. However, comparing all these media in terms of this affordance shows us that the function of paper is fundamentally no different than the function of CDs and flash drives: they all have the capacity to record a message and move that message from Point A to Point B.

Message Durability

In order to carry a message, a media system must provide some degree of stability over time for that message. Copper and fiber optic cables allow some message stability but, as with many conduit media, message stability and message integrity are lost over large distances. In the same way that our unassisted voice can only carry so far through the air, the electric or light pulses traveling through cables will often degrade as they traverse longer distances. In general, conduit media systems only allow limited message durability. Without some form of augmentation, messages traveling through conduit media degrade. In everyday life, systems are engineered to compensate for this issue with the help of technology. We can augment our voice with microphones and (audio) speakers to amplify and distribute our voice over larger distances. Copper and fiber optic cables use periodically spaced repeaters and amplifiers to help messages reach intended audiences.

Carrier media systems generally have better message durability than conduit media systems. Messages recorded on stone tablets, paper, magnetic strips, plastic discs, silicon transistors are considerably more durable than messages traversing conduit media. If we want our messages to last weeks, months, years, centuries then we strategically select from among various carrier media systems to meet those durability needs. However, durability tends to come at other costs.

Message Distribution Speed

Media systems can also be compared and contrasted in terms of how quickly they allow us to distribute a message. On this criterion, conduit media have a clear advantage over carrier media systems. Speaking through air, we can distribute a message at approximately 340 meters per second (about 767 mph—i.e., the speed of sound). Using our land line phones or our cell phones, we can speak with somebody across the country with no discernable delay. Digital signals across cable/fiber optic networks are measured in megabits per second and can range from 1 Mbit/sec to over 100 Mbit/sec. Wireless technology (and software systems that support it) have progressed to the point that we can stream high definition movies to our TVs and watch them as they are streaming.

In carrier media systems, in contrast, messages are integrated with a media system; this means the media systems must be physically transported for the message to be distributed. More or less all forms of physical transportation and delivery – e.g., foot, road, rail, air transport, ships – are orders of magnitude slower than delivery via conduit media systems; often, they are also more expensive. Further, each instance of a message distributed via a carrier media system must be recorded on a corresponding physical media system. That means a physical book destined to reach a thousand people requires a thousand individual, printed copies of that book to be distributed. A digital version of that same book can be distributed across a conduit media system to reach those same thousand people much more rapidly.

Source Control Over Message Casting

For both conduit and carrier media systems, we can also consider how much control a message source as over how they distribute a message. When you speak to an individual person, anybody in the vicinity of your voice can listen. Your voice is broadcast, albeit not a great distance. The television system in the second half of the 20th century was also a broadcast system: television programs were blasted out in all directions – broadcast – for anybody with a receiver (i.e., antenna, attached to their TV) to watch. Because television producers could not control who could watch their shows, they could not charge their audience for watching their shows. It became necessary to fund their programming by attracting sponsors who would pay for the programming in exchange for promoting their products to viewers—and this is the origin of commercials on television.

Telephony uses a different message distribution model. Even the earliest phones were designed to target (only approximately in the early days) an individual receiver: calls went from one phone to another only; they were not broadcast for just anyone to pick up. Likewise, a letter sent through the US Postal service, an email message, and a text message all target specific individuals with little effort or expense on the part of a message source.

As these examples demonstrate, media systems can vary in how narrowly or broadly they can "cast" their message(s). Some systems, like speech, radio, and broadcast television, send messages out into space where anybody with appropriate reception technology (e.g., ears, antennae, dish antennae) can collect those messages. Likewise, media systems vary significantly in the ease and expense with which they can distribute their messages.

The internet forever changed how easily and inexpensively we could distribute message to individual targets. Among other outcomes, this resulted in the greatest increase in spam—i.e., unsolicited messages—that we have ever experienced. Prior to the internet, spamming somebody was fairly difficult and expensive. Each household might have had a separate, targetable address, but acquiring that information and using that information was cumbersome, and a sender had to pay for each letter or postcard they sent (because postal mail is a carrier media system). If you wished to reach a few million people (e.g., with a fabricated story from a foreign bank officer who wished to send a million dollars for safekeeping), you had to print a million separate letters to be placed into a million envelopes, labeled with accurate addresses that you somehow acquired, and then pay for postage. With the Internet, reaching a million people is much easier and cheaper: you can easily acquire a million email addresses, and you only need write and send your scam email a single time– with the push of a button – at almost no cost to you. It has been estimated that as much as 80% of email flying around the ether is some sort of spam, thankfully intercepted largely by our spam blockers.

Affordances Related to Message Interface

There are also multiple affordances that we can use to examine differences in how media systems give us access to messages. These affordances include:

Available Modalities

Any given interface media system is designed to allow access to stimuli by one or more senses, or sensory modalities. We can compare and contrast different media systems in terms of which, and how many, modalities they use. Television, cinematic theaters, computer interfaces all make use of both visual and auditory stimuli. Material books, magazines, letters, as well as email and instant messaging typically limit their messaging to visual modalities. Recorded music presentations are usually offered as auditory stimuli only, but a live (or visually recorded) musical presentation includes a visual component as well. Watching a movie in a theater that has an enhanced sound system can actually add a tactile modality to the presentation as well, as the lower pitched or louder sounds – base notes, explosions – can be experienced through the tactile stimuli of vibrations in your seat.

Immediacy

Immediacy is a term commonly used in communicative theories to refer to how physiologically engaging a message can be. We can think of this in reference to the degree of central nervous system arousal a message creates. Consider, for instance, the experience of watching a movie such as the most recent in the Star Wars franchise, Rogue One. We can watch Rogue One in its entirety on our smartphones with high resolution images and sound. Yet, given the choice, most viewers would opt to see Rogue One in a theater rather than on their phone. Why is this? Both experiences employ the same modalities, visual and auditory. The difference is one of immediacy. The theater sound offers a greater bandwidth of frequencies, greater highs and lows, and greater separation of sounds as well. Speakers are distributed around the theater, allowing different sounds to reach movie goers from all directions. The visual experience, too, is unlike anything provided on even our largest cell phone screens. The image is higher resolution and the colors are brighter. The screen is too large to take in without moving our heads. Vistas can seem overwhelming in a way they never will be on a cell phone screen. In short, watching a movie in a theater is more physiologically engaging; smartphones afford a much less immediate viewing experience than do movie theaters.

Message Accessibility

The ease with which a person can both access and revisit message content varies across different interface systems. Consider a spoken conversation, where the media system is compressions in the air: messages are rather easy to access—all we have to do is be present in a space where someone is speaking (and indeed, sometimes we hear the conversations of people around us, even when we don't intend to). However, spoken messages ephemeral—that is, once they are spoken, they are gone. If we don't hear a word or a phrase, we cannot rewind and replay it. Now, consider a printed book as an interface system: messages are slightly harder to access (one has to open the book and then exert some effort to read—a task most people find more difficult than speaking). However, messages in a book are available to revisit: if you miss a word or phrase, you can go back and re-read a sentence or paragraph quite easily. Unless the book (i.e., media system) itself gets damaged, you can return to exactly the same passage—and access exactly the same message—weeks, months, or years later. These two dimensions of accessibility, effort required and potential to revisit content, are largely independent of each other (i.e., a media system can be high on both, low on both, or a combination of high and low).

Message Availability

How much stimuli is available at any given point in time, and how quickly communicators can access that stimuli, both contribute to the message availability afforded by a media system. As examples of how message availability can vary, consider traditional newspapers contrasted with online news sites. A traditional, physical newspaper offers a large amount of stimuli at a given point in time: we can unfold and see two large pages of content in front of us at once. We could even spread multiple pages in front of us across a table, should we choose. The digital version of that paper is always limited by the computer monitor (or tablet/phone screen) that serves as its interface device. A cell phone cannot offer more than a paragraph or two from a single article. A large enough computer screen can present perhaps a portion of a couple articles, perhaps more—but not nearly as much as two or more large pieces of newsprint. However, when it comes to how quickly people can access stimuli, a digital interface might offer some advantages: because most online sites are searchable, a reader might be able to find a story or topic of interest more quickly than he or she would be able to flipping through a physical newspaper.

Control over Message Presentation

Another affordance in interface media systems is communicators' control over the message they receive. Specifically, with different media systems, communicators can exert different degrees of control over the message presentation or format. Reading a print book, we have very little control over how messages are presented to us: the page size, font size, font style, and amount of text on a page are all fixed, and cannot be altered. Traditional, face-to-face conversations (where air is the media system), are similar: we have minimal control over the presentation and format of messages produced by others. (We can ask a fellow communicators to change the volume of their voice or to repeat something, but this involves the communicators changing the presentation of their message, which is different from our ability to exert control over an existing message, via the media system).

Watching a show on television, we have a bit more control over how the messages we see and hear are presented: we can turn the volume up and down, add closed-captioning, and adjust the colors and resolution of the images on our TVs. With devices such as DVRs, we can record a TV show to be watched on our own schedule. Even a live broadcast can be paused while we answer the phone, and resumed when our call is finished. Digital books as interface systems offer us even more control over presentation of their message content: We can change the type of font used as well as the size of the font (in case we misplace our glasses). We can change the amount and type of backlighting they provide, so we can read in the dark. We can interact with the words such that we can tap an unrecognized word and a definition will be at our fingertips. We can enter a word or phrase into a search window and explore each use of that term. Options for leaving bookmarks and "marginal" comments are far greater than with paper books. Digital books provide essentially the same message as do paper books, but they greatly expand a reader's control over how the message is presented and formatted.

SUMMARY AND CONCLUSION

In this chapter, we have asserted that all communication requires a media system, because media systems provide access the brains and minds of other people. We identified two primary functions of media: message distribution and the message interface. In other words, media are instrumental to moving messages and to presenting messages to communicators. Distributing messages is accomplished with two types of media systems. The first, conduit media, are systems through which messages move from place to place. These include air, light, copper and fiber optic cables, and various frequencies of the electromagnetic spectrum. The second, carrier media, are systems on which messages are recorded. To distribute these messages, we have to transport the media system as well, and thus have to rely on traditional means of material transport.

Interfacing with messages is accomplished through the use of materials and technologies that make messages accessible to our senses. Sometimes, distributing messages requires that messages be transformed to accommodate efficient transport of the messages. Upon arrival at their destination, these messages have to be transformed back into a state that is accessible to our senses—for this, we need a media system that functions as an interface.

We also reviewed a variety of affordances that could be used to compare and media systems. In doing so, we have provided a manner in which to think about both similarities and differences across these media systems. This calls attention to the similarities and shared functionality between things that might otherwise seem unrelated: air, copper cable, and microwaves; stone tablets, magnetic tapes, and flash drives—all have something fundamental in common, as media systems. Thinking about media in terms of affordances also provides a means by which we can talk about relative advantages and disadvantages of different systems. These affordances help us see and recognize the type and amount of stimuli—and thus, the size, type, and format of messages—that communicators can use in different media systems. As such, these affordances provide tools for strategically selecting media systems—for example, choosing between air and copper cables as means for distributing messages, or words on a page versus words on an LCD screen versus words drawn in the sand—as means to present and distribute messages to others.

Chapter 4: Communicative Codes

In this chapter, we conclude our discussion of foundational concepts by examining communicative codes. We first discuss what makes a communicative code, and how they develop. We then examine the various dimensions along which communicative codes can vary, which can be used to assess the utility of different communicative codes for different communicative tasks.

Like "media", "code" is a word we use in everyday conversation to refer to a number of related, but somewhat different, things. As children, for example, we use *codes* to write secret messages to our friends. Software programmers write *code* for a living, and we know that every computer program we use, and every webpage we access, is written in some kind of *code*. (In most web browsers, clicking "view page source" lets you see the code behind the website you are viewing). The term "*code*" also plays an important of traditional models of communication, which describe communicators as en*coding* and de*coding* messages. Clearly, *code* is a useful and versatile term for us, and relevant to the study of communication. In what follows, we will look at what makes a code, how they develop, and the role communicative codes play in message processing.

DEFINING CODES

Broadly defined, a code is a system in which one thing (e.g., a word, number, symbol) stands for something else (e.g., another word, symbol, or number; an idea or meme). Although we will talk about codes in more general terms, in this text, we are most interested in the role codes play in message processing. To distinguish between codes in the general sense and codes that have a first-order role in the creation of understanding between people, we will call the latter as *communicative codes*.

For the purposes of studying message processing, we define *communicative codes* as *systems that pair structurally related stimuli and meme states, such that structurally related stimuli consistently and systematically evoke similar meme states across various media.*

This definition specifically calls attention to what we consider the essentials of *codification*—in other words, the properties that make something operate as a code. The first is that structurally related stimuli consistently and systematically evoke similar meme states in different situations. Put another way, codes have *syntax*—that is, there is a degree of structure evident, and employed, in a code. When something is highly codified, the same stimuli always evoke the same meme state, in a structured, organized, and predictable way.

The second essential of *codification* is the structural commonality of stimuli (which evoke the meme state), regardless of media system being employed. When something is highly codified, stimuli can take different physical forms (i.e., be instantiated in different ways) across different media systems, as long as they retain their key structural properties. As long as these key properties are retained, different versions of stimuli should be recognized as the "same", and will reliably activate the same meme states, for a given code.

As an example, let's consider the "smiley face" (which one could consider part of a kinesic code). A smiley face can evoke the same meme state whether it appears as pixels on a screen, graphite or ink on paper, pieces of fruit, an arrangement of paperclips, or exhaust plumes arranged against a blue sky.

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All of those depictions differ in terms of the media systems employed; they also differ in terms of size and scale, from less than an inch to perhaps 100 feet. However, they retain a structural continuity: all consist of a closed circle containing two horizontally-aligned dots in the upper half of the circle, and a broad, U-shaped curve in the bottom half of the circle. Additionally, this arrangement is structurally comparable to a smiling, human face. There are a many different ways to depict the smiley face using different media systems. However, across all of these, the basic structure of the stimuli remains the same. That people recognize this enough for different stimuli to evoke the same meme state ("happy face", positive affect) indicates a high degree of *codification* is present.

Examples of Communicative Codes

Traditionally, communication scholars have divided the codes used for human communication into two categories: *verbal* codes and *nonverbal* codes. This distinction has become reified and calcified to the point that we treat this classification system as if it is "real"—that is, as if it is a reflection of our communicative reality. We believe that thinking about communicative codes as either verbal and nonverbal, we risk limiting how we see and think about communication. First, the verbal/nonverbal distinction implicitly promotes a conceptualization of communication as based on "language and other, lesser ways of communicating." In particular, we risk overlooking communicative codes that do not fit into this neat, two category system. But as we have argued above, modern musical notation system certainly qualifies as a communicative code, as do mathematical notation systems.

Our message processing approach requires only that we look at behaviors and ask if there is a system that activates the same meme states, through the use of structurally related stimuli, in a consistent manner. If there is, we call that a communicative code.

Some of the communicative codes that humans employ include:

- **Language** – Language could be further reduced to *written (visual)* versions and *spoken (auditory)* versions as both display enough systematic differences that it would be productive to examine and understand why those differences exist.

- **Modern Musical Notation System** – This refers to how music is written, including information about the order and length of notes, time signature, key, and more.

- **Mathematical Notion Systems** – This refers to how math is written, including numbers, symbols for mathematical operations, and notation used in proofs (e.g., "QED").

- **Aesthetic Codes** – Various arts – e.g., painting, sculpting, acting, dancing, film production, music composition, music performance – can be considered communicative codes in that they employ behavior and artifacts in rule-governed ways that systematically evoke particular meme states in others.

- **Kinesic Code** – This refers to how we use our physical bodies to activate meme states in others. This code does not necessarily require an actual physical body as a medium. When we look at a comic strip the media system employed is paper and ink. The kinesic code, however, is visible in the faces the comic strip characters make and the way their bodies are position.

- **Proxemic Code** – This refers to how we used physical space to activate memes in other. As with the kinesic code, the proxemic code can be evident in a variety of different media systems – animations, movies, photographs – and is not limited to use only between actual human beings.

- **Vocalic Code** – This refers to all the qualities of our voices that accompany the content, or the words, spoken. This can include pitch, rate, variation in pitch, accent, volume, articulation, etc. It, too, can be evident in a variety of different media systems. In fact, we would argue that what is referred to as "punctuation" in print can be understood as graphic indicators of vocalic code. Commas, semi-colons, periods, ellipses, question marks, exclamation marks are all indicators of vocalic behavior. For example, person who posts something online in ALL CAPS is often told to "stop shouting."

- **Haptic Code** – This code includes all the ways we activate meme states via touching another person.

- **Chronemic Code** – This refers to how we can activate meme states via the use of time. Arriving late, arriving early, imposing on something unannounced, multi-tasking while someone is talking with you – these are all examples of how we use time to activate meme states.

- **Physical Appearance** – We present our physical selves a variety of ways to others. Some of these meme states get activated by qualities of our appearance less directly under our control (e.g., height, skin color, hair color), some more directly under our control (e.g., weight, size, shape).

- **Artifacts and Environment** – This code includes what George Carlin refers to as "our stuff," and how it activates particular meme states for those interacting with us. How we dress, what glasses we wear, our purses, backpacks, jewelry, and all the ways we manipulate and decorate our immediate environment (e.g., bedroom, office) can all be part of this code.
- **Olfactory Code** – This code, which addresses how smell systematically activates memes, has only recently become recognized and studied by researchers, despite a "personal odor manipulation" industry (e.g., perfumes, colognes, after shaves, deodorants, breath fresheners, mouth washes, scented shampoos, "odor eaters" for shoes) that generates tens of billions of dollars annually.

DOES COMMUNICATION REQUIRE A CODE?

In the previous chapter, we argued that communication cannot be accomplished without the use of a media system. We cannot directly access other people's brains, so we have to access their brains indirectly, via their senses. To do this, we present fellow communicators with stimuli, which we create by systematically altering a media system. For communication to "work"—that is, for the stimuli we present to activate or create the meme state we intend—does that stimuli have to be *codified*? In other words, do we need *codes* to communicate?

Much of human communication takes places through a shared language. Shared language qualifies as a communicative code: languages are systems that pair structurally related stimuli (e.g., words) with meme states (e.g., definitions of those words), and do so in structured and organized ways. It is also the case that much of our communication employs nonverbal behavior as well. Any number of textbooks that address nonverbal communication identify and describe various nonverbal codes—that is, the "meaning" or meme states, that people systematically associate with different forms of nonverbal behavior. Many traditional definitions of communication make reference to some sort of "shared code" or "shared signal system". Given this focus on language and nonverbal codes in scholars' discussions of communication, it intuitively seems that communication would be dependent on some sort of shared communicative code(s).

We contend that a shared code is *not* an essential component of a communicative event—in other words, it is possible to communicate without a code. However, codes do *facilitate* communication, and can be an emergent phenomenon following repeated communicative events. Put another way, we do not have to have a code to communicate, but codes make communication easier—so much so that even if we start communicating without a code, we likely will develop one along the way, if we communicate for long enough.

As a way to illustrate this point, consider the game *Charades*. For the few readers unfamiliar with this game, this is the general procedure: Two teams compete against each other. One person on one team is given a prompt that is not shared with her teammates. This prompt could be many different things: a song title, a movie, a popular phrase, or any number of general concepts ("dance party", "bookworm"). The player given the prompt must communicate this prompt to her teammates without the use of any words, language, or sound. The player can only use gestures. Her teammates shout out their inferences about what she is trying to convey until they either get it right or a set amount of time is up.

If we were to find a handful of people who have never played the game before and entice them to play, it is highly likely they will be naïve to any gestures or behaviors that other more experienced players may use when playing. They must literally "make it up as they go along." Yet, despite this inexperience, they will probably be successful in several of their attempts to infer the right prompts.

By most definitions of communication, and certainly the definition we have employed in this book, *Charades* clearly involves communication. And yet our hypothetical team of *Charades* novices are managing to successfully communicate in the absence of any specific, previously established, shared codes. We concede by the end of several rounds of play, our novices will likely have developed a very basic, embryonic *Charades* code (where, for example, the same gestures are systematically used to activate "sounds like", or "book", or "movie"). However, their initial successes show us that it is possible to communicate without a shared code.

DEVELOPMENT OF COMMUNICATIVE CODES

The example game of Charades shows us one possible way that a communicative code can arise—that is, that codification can occur. Once communicators successfully create understanding using a particular set of stimuli (i.e., message), they often return to the same stimuli when they want to activate the same meme state again. In a game of Charades, putting my hand behind my ear could be used to activate the meme state, "sounds like". If this gesture effectively activates this meme state for my teammates, I will use it again the next time it is useful to me; my teammates are also likely to use it when it is useful to them. A behavior will be reproduced if it is effective at activating a desired meme state, and reproduced widely if it is widely effective.

Through this process, this gesture (putting my hand behind my ear) becomes a *cultural artifact*. A cultural artifact is a product created within a human culture to serve a purpose, and that is replicated as a function of its effectiveness. We can look at the range of communicative behaviors we employ, and argue that all these behaviors are cultural artifacts that work effectively as communicative behaviors through a process of *cultural consensus* and *habituation*. If we and others find and agree that a given behavior is effective at activating a desired meme state (cultural consensus), we and others will continue to use that behavior in that way, for that purpose (habituation).

However, codification does not always arise in the same manner. The game of Charades shows how a set of conventions

can emerge from human interaction, and ultimately lead to the development of (basic) code. As a different example, however, let's return to the smiley face. A smiley face essentially reduces a smiling human face to the most fundamental structural elements that will still activate the concept of a human's smiling face, and the positive affect associated with it. This is a bit different than a "sounds like" gesture: the smiley face is designed to emulate that smiling human face, which would also activate similar memes ("happy face", positive affect). Do we want to argue that the actual human smiling face is just a cultural artifact as well?

The smiling face is, indeed, a bit different. The association between a smiling face and the meme state of positive affect is a global phenomenon– people around the world, from different cultures, smile in a highly similar fashion when experiencing positive affect. When a common behavior is associated with a common response around the planet (and in some cases across species as well), it is generally safe to assume that such a behavior/response relationship has a more fundamental origin than culture. In these cases, we generally presume that such behavior/response combinations are part of our genetic heritage, encoded in our DNA. Smiling when happy, growling and gritting/baring our teeth when hostile, expanding ourselves when taking on a challenge and literally shrinking ourselves when backing away from a challenge – these are all behaviors that a variety of mammals exhibit in similar ways.

FUNCTIONS OF CODES

We can examine codes in terms of the functions they serve in the process of human communication, just as we did with media systems. The two primary functions of codes we will discuss align with the two primary functions of media systems: codes help us *distribute* messages, and codes help us *interface* with messages. Let's examine distribution first.

Distribution

Generally, message sources and targets are separated by some kind of gap in space and/or time. To communicate, one communicator – for example, a person speaking, a book author, a radio or television station – must send or *cast* a message across that gap to other communicators. In most face-to-face settings, a message can effectively be cast into the proximal environment of the target using the media systems (e.g., air, light) at hand. In this case, the form in which one communicator *encodes* a message can be accessed by other communicators' senses.

However, in many situations, communicators do not have direct access to other communicators' senses. This is the case, for instance, when a book author wants to reach a reader a thousand miles away, or when a radio station broadcasts music to an audience distributed across hundreds of square miles, or an internet content producer wants to send his blog to his twenty-seven dedicated followers around the world. In such cases, communicators need additional conduit or carrier media systems (e.g., electricity in copper wires, plastic disks, paper) to move the message greater distances across space and time. Under these circumstances, a message often has to be converted, or translated, to a form of stimuli that can move efficiently through (or being carried by) these additional media systems. Codes are often used to make this conversion or translation between stimuli. Thus, an important function of codes is facilitating and enabling message distribution.

For example, early telephones captured energy created by our voice and converted it into *structurally comparable* variance in electrical frequencies that traveled across copper wires. Those electrical frequencies would create variance in a diaphragm at the other end of the call, creating variance in air pressure that reasonably reflected the original speaker-caused variance in air pressure. This is how a receiver would "hear" the speaker's voice. We call this an *analog code* because the variance in the electrical frequencies traveling through the wires is a direct analog of the voice that produced the code.

Similarly, early vinyl disks – phonographs (literally "written sound") – were used to record sounds produced by singers or musical instruments. Just as the telephone converted voices into electrical frequencies that corresponded with the voices, singers' voices were used to cut grooves into the vinyl records. The variance in the grooves reflected the variance

in the voices that created them, thus the grooves could be "read back" to provide a reasonable facsimile of the voices that made them. These phonographs could then be reproduced in large numbers and shipped all over to allow the recorded messages to be transmitted to thousands of targets. This is also an example of analog code use, as the grooves in the vinyl reflect an analog encoding of the original sound.

Printed language, as a code, can also be used to help efficiently distribute messages. In this case, communicators' meme states can be depicted and recorded via visually accessible codes, with stimuli consisting of letters, glyphs, or similar marks. Encoding messages into printed language allows messages to be recorded on a variety of carrier and conduit media and distributed to thousands of targets, or audience members.

Morse code provides a somewhat different example of a code used to distribute messages. It is different because it does not count on creating analog versions of the message being transmitted; instead, it converts the message into a symbols, in the form of dashes and dots. Samuel Morse, one of the inventors of the telegraph, developed his code for the transmission of text (such as English language) across electrified copper wires. Morse simply cycled the electric power on or off in short or longer pulses ("dots" and "dashes") associated with each letter of the alphabet. The receiver at the other end would see and hear those pulses as they caused two contacts to magnetically open and close. The receiver would translate the pulses back into letters. Morse code proved to be an extremely versatile transmission code in that it can be used across a variety of media systems, virtually any system that allows for differentiating between shorter and longer pulses of any stimuli.

Digital codes are a final example of codes used for message distribution. A large percentage of message distribution today is accomplished through the use of digital coding. Analog waves have largely been replaced with digital pulses – binary digits or *bits* (Shannon & Weaver, 1947)– that serve as the basis of an entirely different, more versatile and efficient coding system. Combinations of bits are used to activate particular pixels on a screen in a specific way. They can activate a particular sonic frequency. They can correspond with a particular letter. At this point, virtually all messages can be converted to a stream of bits and moved across a variety of conduit and carrier media to intended targets. Material books, magazines, newspapers still employ printed language and images, but their digital counterparts use bits.

Interface

Now that we have discussed how codes can help move messages, we will turn our attention to how codes can help people interface with messages. As mentioned above, in every communicative situation, a message must traverse the gap between two or more communicators. Once that gap has been successfully traversed, the message must be in a form that can be accessed and processed by a person for it to be part of a communicative process.

A message that arrives in a form that a communicator cannot access (or detect) is useless from a communicative standpoint. This is the reason we cannot watch television shows by peering into the copper cable coming out from our wall at home. It is not because the message – the latest episode of our favorite show – is not present in the copper cable; it is there. The problem is the message is in a form not accessible to our senses and not meaningful to our understanding of the world—the stimuli that are present in the copper cable are not empirically available to us.

To watch our favorite show, we need to plug the cable into the back of our screens. When we do this, our TVs (or monitors) the *decode* the digital signal, and *encode* the message it carries into the activation of specific pixels on the screen and sonic output produced by the speakers. The light from these pixels and the sounds from the speakers will be presented at frequencies from which our senses can sample. The pixels will collectively illuminate to form a pattern that activates meme states (e.g., "dragon") in our minds, and that response will be reinforced by a sonic wave coming from our speakers (that activates e.g., a dragon's roar). The message was present in the cable all the time; however it was coded for *distribution* purposes, not for *interface*. For us to be able to access that message, it needs to be encoded in way that is designed to interface with (i.e., be accessible to) our primary senses.

PROPERTIES OF CODES

Just as we looked at how media systems vary in their affordances, we can also examine how communicative codes vary in terms of key properties. This allows us to compare and contrast the utility of different communicative codes for the communicative task at hand. While these properties can relate to either function of codes discussed above, communication scientists generally care more about how people interface with messages than how we move them around. (Determining how to use code to move messages from Point A to Point B has historically been the province of engineers and computer scientists.) Thus, in our discussion of properties of codes, we will focus primarily on qualities that have consequences for interface.

Syntactic Rigidity

Communicative codes can vary considerably in how fixed, or rigid, their syntax is. (Recall from earlier that *syntax* refers to the degree and nature of structure present in a code). The modern music notation system is widely used around the world and clearly qualifies as a communicative code, according to our definition. In this system, a set of symbols (e.g., clefs, types of notes) systematically and consistently evoke the same meme states (e.g., play a particular note, for a particular amount of time, in a particular order) across users. The syntax that governs modern music notation is fairly rigid: the same visual symbols (e.g., whole note) always correspond to the same, specific meme states and corresponding behaviors (e.g., play a note for a full beat in the time signature). As a result, the "messages" encoded using modern music notation – a book of piano music, for instance – are interpreted in a highly similar fashion across multiple communicators (i.e., anyone reading the music and playing the piano).

Similarly, and for the same reasons, modern mathematical notation systems are very rigid as well. A mathematical equation has no room for ambiguity; it cannot be unclear or vague. Multiple communicators must be able to interpret that equation exactly the same way. Not surprisingly, two functions that early computers were programmed to do were various mathematical activities and – when the necessary accessory hardware was created – play music. Why could computers do math and music so early? Because math and music also have simple syntaxes that are rigid in nature.

On the other hand, many of the communicative codes we use every day have less rigid syntax. The less rigid syntax is, the more we can think of it as probabilistic: that is, the likelihood that somebody will behave in accordance with the syntax is more variable. People's use of kinesic behaviors, for instance – facial expressions or gestures – only sometimes evoke (and are intended to evoke) specific meme states in consistent and systematic ways. Our current commercial AI systems – Apple's Siri™, Amazon's Echo™, Microsoft's Cortana™ – all have some difficulties in linguistic interactions with users but are showing promise. However, it will be a long time before our AI systems can show average adult human skills at responding appropriately to kinesic, vocalic, or proxemics communicative behavior. These codes are simply characterized by much less rigidity, than musical or mathematical notation systems, or even spoken and written language. Generally, it is more difficult to reliably interpret messages when the codes they use have less rigid syntax.

Syntactic Complexity

Communicative codes also vary in the complexity of their syntax. Some codes have a relatively straightforward structure, defined by straightforward rules. Morse code, for example (see below), consists of a series of combinations of dots and dashes, with a different combination representing each letter of the English alphabet. Syntactically, this code is fairly simple, and you could learn its syntax fairly quickly. The same cannot be said of the syntax that governs mathematical communication. The syntax of mathematical communication is certainly rigid, but for the average person it is also quite complex. Many an adult when faced with solving a mathematical equation suddenly remembers "Please Excuse My Dear Aunt Sally" or PEMDAS, that helps them remember orders of operations. Grammar—the syntax of language—is also quite complex. We might be fairly adept at speaking English but most of us cannot articulate any more than the most basic rules

of English grammar. Closely related, reading and comprehending sentences with multiple embedded clauses ("the man whose cat ran off in a fright last week is still upset"; "she's a friend of my sister's neighbor's son, who lives in Utah")—which is one form that complex grammatical syntax takes—can be difficult even for advanced readers.

Commonality of Use

We can also compare and contrast codes based on how widespread their use is. For example, we can assume that some aspects of kinesic and vocalic codes might be common the world over. This is because portions of these codes are part of our mammalian heritage. We can smile, frown, grit our teeth and growl and people across the planet will interpret these behaviors in a highly similar fashion. Similarly, two mathematicians from different countries who speak different languages might not be able to converse about the weather very easily, but they can communicate about anything that can be expressed in mathematical formula and equations. This is because the ways we communicate via mathematical "code" are extremely widespread, global even. Mathematical code is not part of our genetic inheritance; it is an invented (i.e., conventional) code. Like the modern musical notation system, mathematical code has become standardized across much of the world, allowing people of different cultures and backgrounds, speaking different languages, to communicate about those content areas amenable to those codes.

Limits to Topicality

This property, which refers to the range of possible ideas or meme states that can be addressed by a code, is particularly important to consider when assessing how a code can be used. As discussed earlier, the primary function of communication is the activation of meme states in another communicator. Not all codes do this equally well for all possible meme states. Mathematical codes are excellent for clearly communicating mathematical ideas, but poor for discussing the weather, politics, or how your day at school went. Of all the codes humans commonly use, language has the greatest capacity for topicality. Certainly, there are ideas we have "trouble putting into words." But in the end, words – language – is still our most versatile and effective communicative code when faced with the need to efficiently activate the greatest range of meme states with the best possibility of success.

SUMMARY AND CONCLUSION

In this chapter, we offered a message processing-focused definition of *communicative codes*, and provided some examples of communicative codes that are frequently used to activate meme states and help communicators effectively create understanding. We made the argument that unlike media systems, we do not have to have a code to successfully communicate. However, communicative codes do facilitate communication; as a result, they often emerge across repeated communicative interactions if we do not start with a shared code. We then articulated a set of key properties—syntactic rigidity, syntactic complexity, commonality of use, and limits to topicality—that can be used to assess codes as well as compare and contrast them with each other. Identifying a set of properties common to all communicative codes helps us recognize the functional commonalities across various codes, and dispel the conceptual limitations that accompany a traditional "verbal/nonverbal" dichotomy in thinking about communicative codes.

References

Shannon, C. E., & Weaver, W. (1949). *The mathematical theory of communication*. Urbana: University of Illinois Press.

Chapter 5: Traditional Models of Human Communication

This chapter reviews traditional theoretical models of human communication, from both the discipline of communication and other areas of study. It focuses on the "code model", a generalized model outlining the traditional conceptualization of how human communication works. After describing this model, it identifies several shortcomings with this model, most notably the range of everyday situations and experiences that it cannot adequately address.

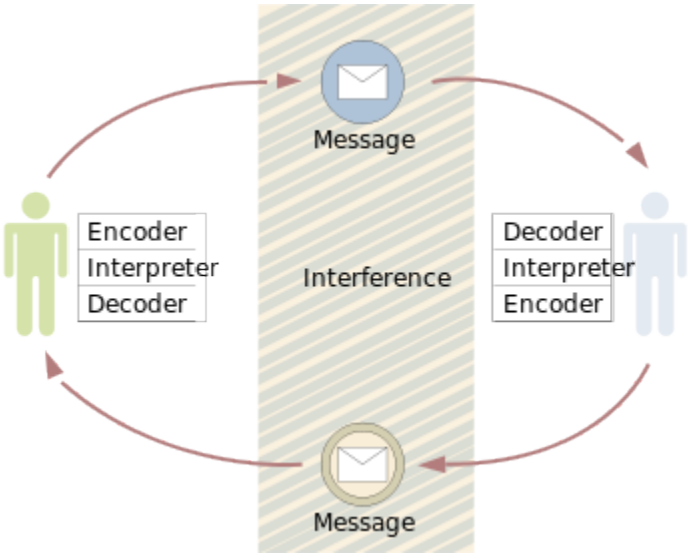
To explore, visualize, and study how processes work, scholars will often create models. Models are essentially (simplified) representations of an object, process or system that depict relevant functional or structural qualities (Pavitt, 2010, 2016). How the process of (human) communication works has been a longstanding topic of scholarly and philosophical interest, and has been approached (from various angles) by scholars from a number of different disciplines, including philosophy, linguistics, psychology, education, and communication. Members of each discipline have developed models focusing on different features or aspects of the communicative process, sometimes in specific contexts. As such, many different conceptual models of human communication, and of sub-processes involved in it, have been put forward.

MODELS IN THE DISCIPLINE COMMUNICATION

Within the field of communication, three general categories of models have been put forward to describe the process of human communication: linear, interactive, and transactional models (e.g., McCornack, 2010). If you have taken an introductory course in communication, you have likely encountered one or more of these models.

Linear models (e.g., "source-message-receiver" models) of human communication present communication as a series of activities moving information from a source to a receiver. One prominent example of this is Shannon and Weaver's (1949) model. In this and other linear models, a source packages (i.e., *encodes*) information content into a message that can be transmitted (which these models often refer to as a *signal*). The source then sends that message through a channel to a receiver. As the message travels through the channel, *noise*—conceptualized as environmental factors that interfere with message transmission—can distort the message, or prevent it from reaching its destination. Assuming the message is able to reach its destination in some kind of recognizable form, a receiver detects and accepts the message (including any changes to it made by noise during transmission). The receiver then unpackages (i.e., *decodes*) the sender's message back into information content. This completes the process of information being transmitted via messages (or signals) from source to receiver. As you may have guessed, this model draws heavily on telecommunications and signal processing as analogues for human communication.. This results in a number of shortcomings, the most obvious of which that much human communication does not occur as a single, unidimensional transmission. Rather, as discussed in Chapter 2, it is interactive.

Interactive models of human communication present human communication as a bi-directional (and potentially cyclical) process between sources and receivers. One prominent example of this is Schramm's (1954) model of communication. In this and other interactive models, the basic processes and components outlined in a linear communication model are still present. However, two new elements are present: first, receivers can provide *feedback* to sources (which may ultimately begin a new cycle of through the model, where source and receiver switch roles). Second, both source and receiver have *fields of experience* (e.g., beliefs, attitudes, values, knowledge) that they bring to the interaction. These can influence the way that people send and interpret messages, and thus how easily people understand each other. While interactive models do a better job incorporating influence from a receiver than do linear models, many have argued that they still do not adequately recognize the role of the "receiver" in the creation of meaning.



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Transactional models of human communication were developed to address these concerns. One prominent example of this is Watzlawick, Beavin and Jackson's (1967) model. In transactional models (e.g., Miller & Steinberg, 1975), communication is presented as inherently collaborative. Rather than designating a "source" and "receiver", these models designate both (or all) interactants as responsible for the co-creation of meaning. In this, communicators are conceptualized as interdependent, and as capable of influencing each other on an ongoing basis throughout the interaction. This offers a fundamentally different conceptualization of communication than linear and interactive models, and one that is more consistent with a message processing approach to studying communication (see Chapter 2). However, in line with the values and priorities of traditional communication research, the focus of transactional models (particularly that of Watzlawick et al., 1967) is generally on the social and relational consequences of communication. Although they acknowledge that both or all communicators affect each other and construct meaning together, they do not say much about the means by which this occurs. Rather than being detailed, functional representations of the process of human communication, these models are more heuristic and abstract in nature. As such, transactional models they do not actually provide very much insight into how people create mutual understanding in interaction—that they do so is essentially taken as a given, rather than explicated.

In this text, our goal is to study how people create mutual understanding in interaction. To a degree, these models provide insight into how this can occur. Collectively, they identify key components of communication as a process: *people* (either designated as sources/receivers or as communicators), *mental environments* (cf. "fields of experience") of those entities, *messages*, some form of message *transmission*, and the sharing of information or *creation of meaning* as an outcome. However, like traditional definitions of communication reviewed in Chapter 2, these models do not really provide insight into *how* people create meaning or mutual understanding. While they do lay out a series of events that (theoretically) comprise communication, scholars' use of these models has tended to focus on outcomes rather than the functional details, of communicative processes. As noted at the outset, this is likely a result of the communication discipline's historical focus on influence, rather than understanding, as its primary outcome of interest.

In other disciplines such as linguistics, psychology, and education, there has been a more focused and concerted effort to try to model processes of message comprehension and/or understanding. Scholars in linguistics have generally approached this issue with an emphasis on comprehension of language (i.e., verbal stimuli, as opposed to nonverbal stimuli), with different sub-disciplines focusing on the structure and processing different components of human language

(e.g., syntax, lexicon). (An important exception to this is research in pragmatics, which focuses on how people interact and make meaning in context. Prominent scholars in pragmatics have argued for the need to approach this topic differently than other sub-disciplines of linguistics have, and we will return to this point later). Scholars in psychology have generally approached this issue with an emphasis on the cognitive processes involved in comprehension such as attention; perception; and memory encoding, storage, and recall. Scholars in education have generally approached this issue with an interest in reading and thus text comprehension—often motivated by a need to diagnose and address reading difficulties—as well as developmental aspects of this process (as it relates to the creation of age-appropriate materials).

THE CODE MODEL

Although the models developed by these scholars differ in their details, many share a common set of implicit assumptions about how communication functions. (These assumptions are shared by the linear and interactive models of communication described above). Generalized, this conceptualization of the process of human communication is referred to as the *code model* (Sperber & Wilson, 1986; Scott-Phillips, 2015).

The basic logic of this model is that mental representations cannot actually travel across time and space, because they are conceptual abstractions (i.e., as thoughts, ideas, meme states), and do not have a physical form. However, if they are converted into something that has a physical form, then this *signal* (i.e., set of physical stimuli which stand for the mental representation of interest) can travel in space and time. If an entity can convert the physical signal back into a conceptual abstraction at its destination, then this allows thoughts or ideas to "travel". To be able to reliably convert or translate mental representations into signals, and signals into mental representations, *codes*—that is, systems that reliably pair stimuli (signals) with meme states (mental representations)—are required.

According to the code model, communication occurs via *encoding* and *decoding* of messages, which function as signals. In this process, a source (or sender) converts a meme state (i.e., thought, idea), into a message (i.e., set of stimuli; signal), using a code. This is *encoding*. This message, or signal, is then transmitted through some kind of medium from Point A to Point B, across space and/or time. During the transmission process, the signal can be distorted, disrupted, or otherwise affected, meaning that the set of stimuli that "arrive" at a destination may not be identical to what was "sent" from a source. Assuming some kind of signal arrives, a target (or receiver) converts the message back into a meme state, using the same code that the sender initially used. This is *decoding*. If this process is successful, then the target will end up with the same meme state, or mental representation (as a conceptual abstraction) that the source had at the start of the process. In other words, one person's mental representation will have effectively "traveled" from one point to another.

Several important assumptions are implicit in the code model.

- First, as its name suggests, this model treats codes as essential to communication. In the code model, codes are the means by which meme states (as abstractions) can be converted into and out of messages.
- Second, and following from this, this model relies on the application of systematic associations as the primary mechanism by which communication occurs (i.e., using "entries" in a code book: connecting pairs of meme states and stimuli).
- This leads us to a third assumption: the key skill or ability required to communicate is representing and applying associations. Any entity that can reliably associate stimuli (i.e., messages or signals) with corresponding meme states (i.e., mental representations) following a set of clearly defined rules (i.e., a code, which pairs them together) should be able to communicate effectively.
- Accordingly, the "meaning" of a message—that is the information content it represents—is relatively stable and fixed: the message's form and meaning should be clearly and reliably linked (via a code), and as such can be seen as a property of the message (as a set of stimuli, operating as a signal).

A final, implicit assumption of the code model is that senders and receivers perform their respective operations—encoding and decoding—independent of each other. Because codes are established systems consisting of reliable pairings of stimuli and meme states, there is no real need for them to work together, as long as they both know the code being used. As a consequence of this, there is no theoretical problem with researchers focusing on one person, or role (i.e., sender or receiver), at a time when studying communication processes. Thus, this model allows, and to an extent encourages, treating the individual as the primary unit of analysis in research (for a further discussion of this issue, see Chapter 2).

RESEARCH WITH THE CODE MODEL

The code model was—and in many academic areas, continues to be—a dominant conceptual approach to studying communication. As a result, its assertions and assumptions have shaped a large body of research across different disciplines. In particular, the code model's emphasis on *encoding* and *decoding* have led researchers to focus on the mechanics of these processes, and the mechanisms involved in them. Researchers interested encoding have studied topics like speech production processes; much of this work is in psychological sciences and to some extent, communication sciences and disorders. Research and theorizing on message construction and audience design are areas of study that address encoding at a more abstract level, although researchers in these areas do not necessarily position their work as being about encoding per se. Researchers interested in decoding have generally studied comprehension processes, in a range of different domains. Models of text comprehension (e.g., Kintsch & Van Dijk, 1978), discourse comprehension (e.g., Graesser, Millis, & Zwaan, 1997) and reading comprehension (e.g., Lorch & van den Broek, 1997) are just a few examples of this kind of domain-specific work. All of this research, both theoretical and empirical, is built on the foundation of the code model, and can be seen as a direct result of conceptualizing communication as a process of encoding, transmitting, and decoding messages.

CRITIQUING THE CODE MODEL

Like any theoretical model, the code model has both strengths and weaknesses. First, let us consider its strengths. As its widespread use in scholarship and research would suggest, it clearly does have something to offer those interested in explaining how communication works. First and perhaps foremost, the code model does appear to describe observable phenomena involved in communication in a sensible and useful way. In this, the model seems to have *face validity*: that is, it "looks" right when we consider it together with our everyday experiences (particularly those involving verbal communication). As such, the model is intuitively appealing. As just discussed, it has also formed the foundation of the large body of scholarly work, which means it has been useful resource for many people studying communicative phenomena.

Additionally, the code model has received some degree of empirical support. Many of the domain-specific models mentioned above, which focus on processes of encoding and decoding, have been tested, refined, and supported across numerous research studies. These models can also be quite useful in helping people recognize where problems with communication or comprehension arise. For instance, models of reading comprehension provide a set of mental "steps" and corresponding skills involved in the decoding of written texts. These steps can be used to help diagnose where reading difficulties are occurring as they direct researchers' (or educators') attention to key variables in the process of reading comprehension (e.g., word comprehension vs. combining words into sentences vs. relating the content of sentences to one another). Likewise, these models can also serve as a basis for developing educational programs and interventions to address deficits and/or improve skills needed for successful reading (and decoding more generally).

However, scholars have also pointed out a number of issues, or weaknesses, that the code model has. Most importantly, its critics argue that the code model cannot fully explain much of everyday communication, particularly face-to-face interpersonal interactions. Although the model easily describes and explains how a person would interpret a literal

statement (e.g., "It is cold in here" to mean, "The temperature is low in this location"), it does not do as well explaining how people successfully create understanding and share meaning using non-literal or indirect statements (e.g., "It's cold in here" to mean, "Please close the window"). If the primary means by which people share meaning is through a code—that is, a system that pairs stimuli and memes—it is difficult to explain how people manage to successfully decode non-literal or indirect messages, as their intended meaning does not directly correspond to what is "coded" into the words that speakers use.

Many scholars have sought to address this issue within the paradigm of the code model. For example, some have suggested that we comprehend metaphors, which are one type of non-literal statement, by first processing the literal meaning and then searching for an alternative when the literal meaning does not fit the context (e.g., Clark & Lucy, 1975). However, others, and their empirical findings, have challenged this model of metaphor comprehension (e.g., Gildea & Glucksberg, 1982). These researchers suggest that people can and do access the meaning of a metaphor directly, often with the help of the context, which makes certain concepts or ideas more or less salient (that is, easily accessible in our minds). This kind of processing explanation still could, conceivably, be seen as consistent with the code model: one could argue for particular code "entries" being accessed differentially in different contexts, or for different "rules" or associations being systematically applied to distinguish literal and non-literal usage. However, the fact that it takes these extra twists and turns to create a viable explanation shows that these situations do not really fit cleanly or comfortably within a code model's framework.

Similar problems arise when we attempt to explain situations where people successfully communicate using ambiguous stimuli—that is, stimuli that do not necessarily have a clearly delineated memes or meme states associated with them. Nonverbal stimuli (e.g., shared glances, sighs, gestures) frequently fall in this category: the same expression or action can have a wide variety of different meanings—so many that the stimulus itself does not necessarily have a clear "definition", or entry in a code book. This kind of communication in fact happens quite frequently in our daily lives, but the code model struggles to explain how people manage to understand each other in these circumstances.

Another situation that the code model struggles to explain is how people interact when they do not share a common code. Consider, for example, a situation in which two people who do not speak the same language try to communicate. (If you have ever travelled to a country or region where you did not speak the local language, you may have had this experience yourself). Although they do not initially have a code to rely on—which, according to the code model, is required for communication—they are often able to create mutual understanding well enough for their purposes. How do people manage this? In some cases, interactants may be able to switch from their "default" code (e.g., native language) to another code that is shared with their interlocutor (e.g., second or foreign language; use of a kinesic code like conventional gestures). For example, someone who speaks Japanese (but not Tagalog) and someone who speaks Tagalog (but not Japanese) might be able to have a conversation in English if they both know English (as a second language). Through this adjustment, they are able to create a situation in which a common or shared code becomes available. However, this kind of adjustment is not always an option. When it is not, people often use ambiguous nonverbal stimuli (e.g., gestures, facial expressions, pointing at objects) to try to express and share their thoughts with others. This then returns us to the scenario we considered in the previous paragraph—communicating using ambiguous stimuli—which is sometimes possible, but usually not easy, to explain in terms of the code model.

A final, related criticism of the code model is that it cannot adequately explain situations where people use instantaneous conventions, or improvise, to communicate. Instantaneous conventions are communicative practices (established by usage) that are generated "on the spot" in an interaction (Misyak, Noguchi & Chater, 2016). Because they are not formalized or set before an interaction, the associations between memes and stimuli in such conventions are generally flexible: the same stimulus can be used to indicate one or more different memes, both within and between conversations. For example, waving one's hand in a particular way might be used to indicate, "that's enough, stop" in one instance; later in the conversation, the same motion might be used to indicate, "go ahead, add some more". In a study by Misyak and colleagues (2016), the researchers set up a game in which players had to work together to open boxes containing rewards, and avoid opening boxes that contained punishments. One player knew what was in each box but

could not open them; the other player had a digital tool to open boxes, but did not know what was in each box. Depending on the resources available for communication and the configuration of rewards and penalties in the boxes in different rounds, the players were observed using the *same signal* (e.g., placing a digital token on a box) to indicate (a) "open this box" and (b) "do not open this box".

This kind of communicative behavior is very difficult to explain with the code model, which relies on stable associations between memes and stimuli to explain how meaning is shared via messages. Indeed, a code in which the same sign (e.g., a hand wave) could indicate two opposite meanings (e.g., *both* "yes" and "no") is not very helpful or useful for communicating, if that code is the only means we have to create mutual understanding with another person. That people use instantaneous conventions (as well as use more established conventions in novel and flexible ways) to share meaning, and that they do so successfully, suggests that there must be more to human communication than the code model tells us.

When we look across the strengths and weaknesses of the code model, we can see some patterns emerge. First, as its name would suggest, the code model "works" best when there is an established, shared code used by all communicators, and this code has relatively rigid syntax. Second, this model is also best for direct and/or literal statements, because they can be encoded and decoded with minimal ambiguity. These qualities generally characterize what cognitive and computer scientists call "well-posed problems": tasks or situations that have a clear "right" answer that one can arrive at by systematically applying sets of rules. However, the code model does not work as well for situations where there is not a shared, established code; stimuli are ambiguous; signals are being improvised; or syntax is less rigid and increasingly probabilistic. These qualities generally characterize what are called "ill-posed problems"—that is, problems that do not have a clear "right" answer that one can determine or calculate using sets of pre-defined rules. In short, the code model appears to work reasonably well for well-posed (communicative) problems, but not for ill-posed problems.

Thinking about it this way, we can see that the code model is not necessarily wrong or inaccurate, but it is incomplete as a model of human communication: it is only able to tell us how things work in a subset of situations. For better or for worse, much of human communication is an ill-posed problem, rather than a well-posed one. Thus, the processes outlined in the code model need to be either augmented, or reconsidered, to be able to get the "whole" story—that is, to be able to describe and explain the wide range of situations and experiences that constitute human communication.

References

Clark, H. H., & Lucy, P. (1975). Understanding what is meant from what is said: A study in conversationally conveyed requests. *Journal of Verbal Learning and Verbal Behavior*, *21*, 85–98.

Gildea, P., & Glucksberg, S. (1982). On understanding metaphor: The role of context. *Journal of Verbal Learning and Verbal Behavior*, *22*, 577–590.

Glucksberg, S., & Keysar, B. (1990). Understanding metaphorical comparisons: Beyond similarity. *Psychological Review*, 97, 3–18.

Graesser, A. C., Millis, K. K., & Zwaan, R. A. (1997). Discourse comprehension. *Annual Review of Psychology*, *48*, 163–189.

Kintsch, W., & Van Dijk, T. A. (1978). Toward a model of text comprehension and production. *Psychological Review*, 85(5), 363.

Lorch, R. F., Jr., & van den Broek, P. (1997). Understanding reading comprehension: Current and future contributions of cognitive science. *Contemporary Educational Psychology*, *22*(2), 213–246.

McCornack, S. (2010). *Reflect and relate: An introduction to interpersonal communication* (2nd edition). Boston: Bedford/St. Martin's.

Miller, G. R., & Steinberg, M. (1975). *Between people: A new analysis of interpersonal communication*. Chicago: Science Research Associates.

Misyak, J., Noguchi, T., & Chater, N. (2016). Instantaneous conventions: The emergence of flexible communicative signals. *Psychological Science*, *27*(12), 1550-1561.

Pavitt, C. (2010). Alternative approaches to theorizing in communication science. In C. R. Berger, R. E. Roloff, & D. R. Roskos-Ewoldsen (Eds.), *The handbook of communication science* (pp. 37–54). Thousand Oaks, CA: Sage.

Pavitt, C. (2016). *A survey of scientific communication theory*. New York: Peter Lang.

Schramm (1954). *Process and effects of mass communication*. Urbana: University of Illinois Press.

Scott-Phillips, T. (2015). *Speaking our minds*. New York: Palgrave Macmillan.

Shannon, C. E., & Weaver, W. (1949). *The mathematical theory of communication*. Urbana: University of Illinois Press.

Sperber, D., & Wilson, D. (1986). *Relevance: Communication and cognition.* Oxford: Blackwell.

Watzlawick, P., & Beavin, J. H. (1967). B., & Jackson, D. D. (1967). *Pragmatics of human communication: A study of interactional patterns, pathologies, and paradoxes*. New York: Norton.

Chapter 6: The Inferential Model of Human Communication

This chapter describes an alternative approach to describing the process of human communication, the "inferential model". This model addresses many of the issues and shortcomings raised with a traditional models of communication, and offers a newer, and more widely applicable theoretical explanation of human communication processes. This chapter concludes with a summary of how inferential and code models differ in their explanation of human communication.

In the previous chapter, we reviewed traditional models of communication, with a focus on the *code model*. To date, this way of thinking has been the dominant approach to studying communication across many disciplines, including the discipline of communication. Although this conceptual approach enjoys widespread acceptance and does have some strengths, it also has a number of shortcomings. As a model of human communication processes, the code model has difficulty accounting for many situations that people experience every day, including those where there is not a shared, established code; stimuli are ambiguous; or signals are being improvised. In this chapter, we will try to address these issues by outlining an alternative way to conceptualize human communication, the *inferential model* (Scott-Phillips, 2015; Sperber & Wilson, 1986).

THE INFERENTIAL MODEL

The inferential model proposes that communication consists of communicators making *inferences* (hence the name) about what the other is thinking or intending based on evidence provided in context. Inferences are essentially deductions or informed estimates. Because we cannot directly read the content of other people's thoughts, we have to do our best to figure out what they are thinking—that is, the meme states they are intending to communicate—based on their behavior—that is, based on the social stimuli they exhibit. For this process to be successful, communicators have to display and recognize two distinct types of intentions: *informative intentions* and *communicative intentions*.

Informative intentions refer to intentions related to the content of one's meme state—that is, *what* one is trying to communicate (Scott-Phillips, 2015). When communicators are constructing or sending a message, their informative intention is that their "audience recognize[s] *what* [they] are trying to communicate" (p. 26). When communicators are interpreting or receiving a message, the informative intention they must infer or recognize is what their interlocutor wanted to communicate or share with them. For example, if Sally wants to tell Anne that, "*the toy is in the box*", Sally's informative intention is that Anne recognizes, or infers, that the particular toy she is referring to is located in a particular box. This informative intention (i.e., that Anne recognize that a particular toy is in a particular box) is what Anne needs to infer for communication of this meme state to be successful. This is generally the set of inferences about intentions that comes to mind first when we think about communicating via inference-making.

Communicative intentions, the second type of intentions, refer to intentions to communicate in the first place. We do many things every day that result in casting many different types of stimuli, but much of it is not intended for anyone, or to communicate anything—it is just incidental, or a by-product of doing other things. For example, when walk down the street, your legs and arms move (as you propel yourself forward) and your gaze moves around (taking in your surroundings), but this nonverbal behavior is not necessarily intended to activate any specific meme states in anyone. However, if you see your friend as you walk down the street, lock eyes with him or her, and start moving in a visibly purposeful way toward them, you could *intend* your nonverbal behavior to *communicate* to your friend: "I see you; I am coming over to say hello to you." In the first example, there is no communicative intention associated with your body movement and gaze; in the second, there is a communicative intention associated with your body movement and

gaze. When communicators are constructing or sending a message, their communicative intention is that their "audience recognize[s] *that* [they] are trying to communicate" (p. 26). When communicators are interpreting or receiving a message, the communicative intention they must infer or recognize is that their interlocutor wants to communicate with them.

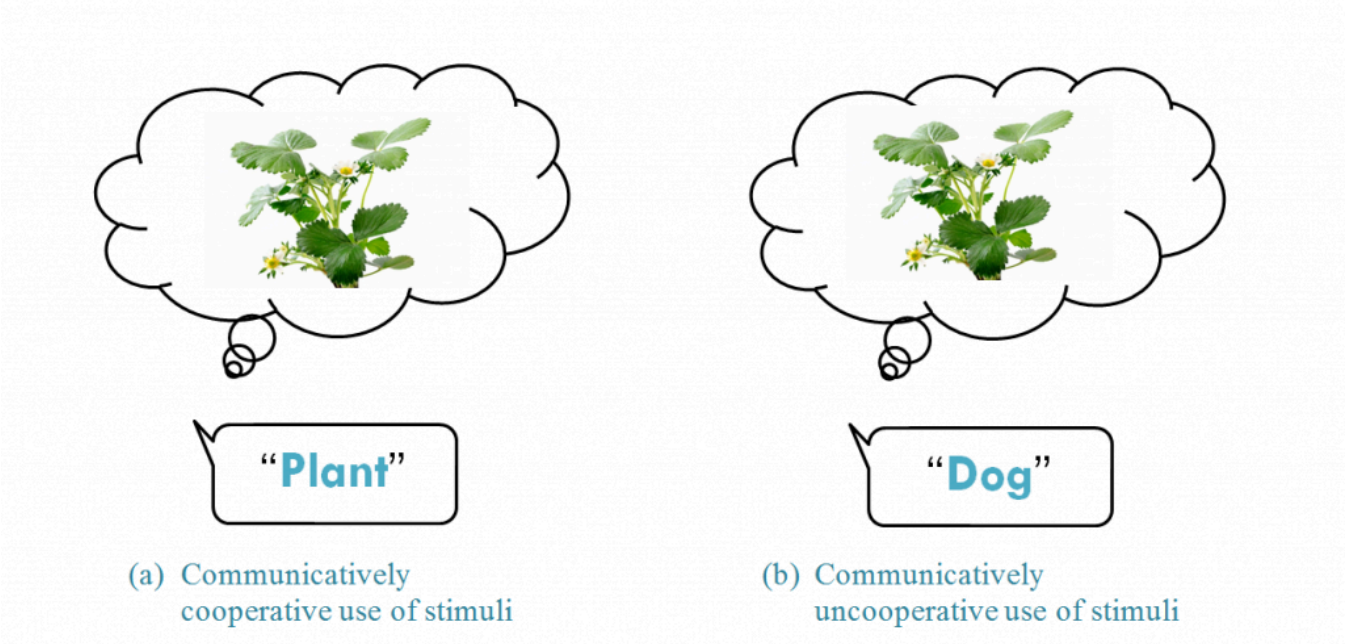
Thus, communication depends on two distinct intentions being present and recognized: first, a communicator must intend to communicate (communicative intention), and others must recognize this. Then the communicator must intend for specific meme states to be activated in others' minds (informative intention). Once other communicators have recognized the communicative intention—and as a result, oriented their attention to the stimuli being provided as relevant to this process—then they must infer the communicator's informative intention, or what meme state the communicator is seeking to activate.

But how do we manage to infer people's intentions correctly and appropriately, in context? Given the wide range of things that a single stimulus (for example, waving a hand) could signal or index, how do we possibly arrive at the correct conclusion? (Or at a minimum, the correct conclusion often enough for this to seem like a good idea, as a means of communicating?) Part of the answer is that we accomplish it through cooperation. Communication is an inherently cooperative activity, and successful communication requires collaborative effort, joint attention, and recursive mindreading (a term we will return to) by all involved.

Cooperation and Communication

Cooperation is a term you are almost certainly familiar with; when you read this word, it likely activates memes like "working together", "mutual effort", or "teamwork". These are common definitions of this word, and these can describe what people engage in when they communicate. However, we want to be more precise in our usage of this term. Scott-Phillips (2015) identifies three different types of cooperation involved in human interaction: *communicative cooperation*, *informative cooperation*, and *material cooperation*.

The first of these, *communicative cooperation*, consists of using stimuli in a way that enables or facilitates communication. This includes (but is not limited to) exhibiting and observing stimuli in interpretable or conventional ways, or using established codes. For example, speaking at an audible volume, using words that fellow communicators know in a conventional way, and providing a sufficient amount of stimuli (to allow others to infer your intended meaning) are all instances of communicative cooperation. Conversely, speaking so quietly that you cannot be heard, using words others do not know, using words in unconventional ways (e.g., saying "dog" to index or signal a plant), or providing insufficient stimuli for successful inference-making (e.g., saying, "see you there" without ever indicating where "there" is) are all acts that could be seen as communicatively uncooperative. We often take communicative cooperation for granted—that is, we assume that others are using stimuli in a conventional manner, and acting in ways that facilitate the creation of understanding (e.g., that they are not saying "dog" to mean "plant"). However, when miscommunication or communicative "failures" occur, it can often be traced back to problems (whether intentional or unintentional) with communicative cooperation.



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The second type of cooperation, *informative cooperation*, consists of activating meme states, or providing evidence for inferences, in a honest and truthful manner. This is, essentially, acting in good faith as a communicator: offering stimuli that reflect a meme state truthfully and accurately, and that do not deliberately mislead other communicators. This type of cooperation focuses on the content that is communicated, and its truth value. Saying, "I'm upset" when you are feeling upset is an example of informatively cooperative behavior (i.e., you are making a truthful statement about your emotional state). Saying "I'm fine" when you are feeling upset is an example of behavior that is not informatively cooperative (i.e., you are making a deceptive or untruthful statement about your emotional state). Generally, what constitutes "truth" is grounded in a given communicator's perspective: if they are expressing something they believe to be true (even if, objectively, it is incorrect), we would consider their behavior informatively cooperative. Thus, if you say, "The store opens at 10:00" believing the store does indeed open at 10:00, you are acting in an informatively cooperative manner even if the store actually opens at 11:00. (You are just mistaken about the truth value of your beliefs about the store's hours).

The third type of cooperation, *material cooperation*, consists of acting in ways that pursue or promote prosocial goals. When someone engages in material cooperation, they are doing things that are considered helpful, positive, or supportive for others. This is probably the type of cooperation that most closely matches your everyday use of the term "cooperation". Answering a question, complying with a request, offering assistance, or complimenting someone are all materially cooperative behaviors (i.e., they help others, or are actions with prosocial goals and outcomes). Ignoring a question, failing to comply with a rest, denying assistance, or insulting someone are all materially uncooperative behaviors (i.e., they do not help others, or are actions with antisocial goals and outcomes).

These three types of cooperation can occur in different combinations. For instance, it is possible to be communicatively cooperative but informatively and materially uncooperative: telling someone a lie (in a way they can clearly understand), in order to hurt their feelings, is an example of this. Similarly, it is possible to be communicatively and materially cooperative, but informatively uncooperative: telling a lie (in a way they can clearly understand) to save face or protect someone's feelings is an example of this. It is even possible to be informatively and materially cooperative, but

communicatively uncooperative: this can happen, for example, when a technician or specialist offers accurate and truthful advice for fixing a problem, but does so using jargon or terminology we do not know.

To successfully communicate, the only form of cooperation strictly required is communicative cooperation. Without this, it would be close to impossible make accurate inferences about others' meme states based on the stimuli they provide. To communicate truthful or accurate representations of meme states themselves (or of the state of the world, more generally), however, informative cooperation is also needed. Without informative cooperation, we can successfully communicate, but it is likely to involve deception: in other words, the mutual understanding that is created may involve content that at least one person in the interaction does not believe is true.

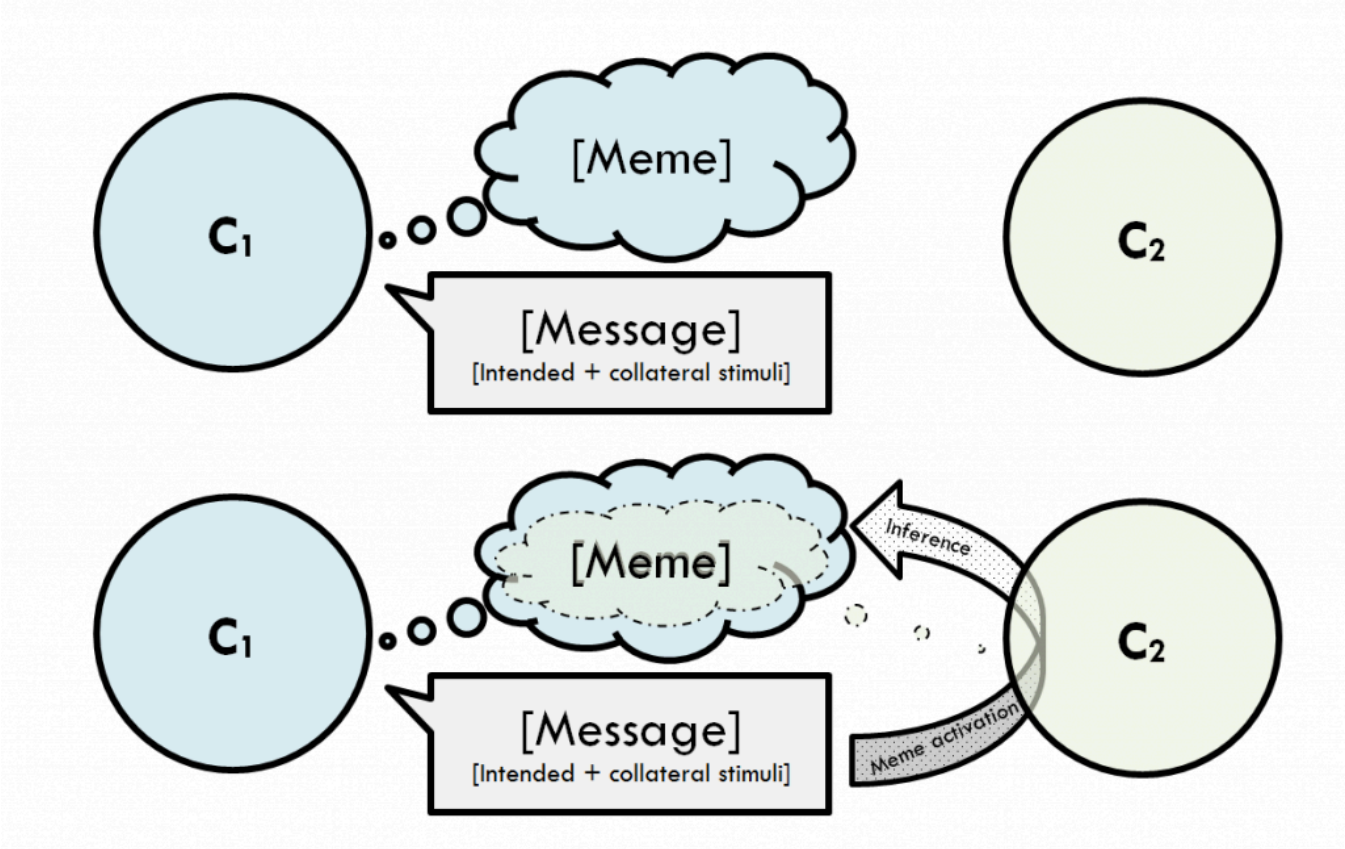
THEORY OF MIND AND MINDREADING

To engage in the kind of inference-making described by the inferential model, communicators need a special set of skills and abilities. First and most fundamentally, inferring what others are thinking requires what scholars call *theory of mind* (TOM). TOM refers to the recognition or knowledge that other entities have minds, thoughts, and mental experiences of the world—and that these mental states correspond to (i.e., guide, and are reflected in) their behavior. Implicit in the concept of TOM is also the recognition that others' thoughts and mental experiences may not be the same as our own—that is, that others can perceive, think, and feel different things than we perceive, think, and feel. Understanding that others have minds, and that others experience the world in terms of their mental states, is fundamental to human social interaction.

TOM shapes our perspective on the world: we instinctively perceive and interpret behavior in terms of mental states and intentions, rather than objective actions. People tend to attribute *agency* (or lack thereof) to other entities in our environment: that is, we see them as actors or agents that produce particular effects. Closely related, we operate with a basic sense of "goal" psychology, such that we tend to interpret others entities' actions in terms of trying to achieve some kind of objective. Thus, we see a person waving their hand not as "a waving hand attached to a body" [effect or outcome], but as "a person [agent] greeting us [intention]" or "a person [agent] trying to get our attention [intention]". Although this most likely evolved as a skill to navigate (increasingly) complex human social environments, TOM permeates our experience of the world to such an extent that we often attribute mental states and intentions to non-human objects as well. If you have ever said something like, "My computer *is mad* at me" or "That plant *is really liking* its new spot the garden", you have engaged in this kind of TOM overgeneralization. Rationally, you know that your computer does not (yet) have emotional experiences that affect its performance, or than a plant is not consciously appreciating its new placement in a flowerbox. However, the language that most readily comes to us, and the interpretation of the situation that is most accessible, is often framed in terms of agents, intentions, and mental states.

This has consequences for communication: when we engage in social interaction, we generally perceive and think about other entities in terms of intentions and mental states. Thus, we do not "see" or interpret social stimuli objectively as actions (e.g., a hand waving, a mouth forming a set of sounds). Rather, we experience them as pieces of evidence, indications, or reflections, of what is going on in people's minds. Scholars who study this topic refer to the process of inferring what others are thinking as *mindreading* or *mentalizing*. Although it is something that many of us do every day (often without even trying), it is in fact a relatively complex, and advanced, social cognitive ability.

According to the inferential model, communication essentially consists of successful mindreading based on social stimuli. Stimuli activate and/or create meme states for us (as in our message processing definition of communication). These meme states, in turn, constitute our inferences about others' mental states (when MAP is high), or serve as a starting point for conscious or effortful inference-making about those mental states (when MAP is lower).



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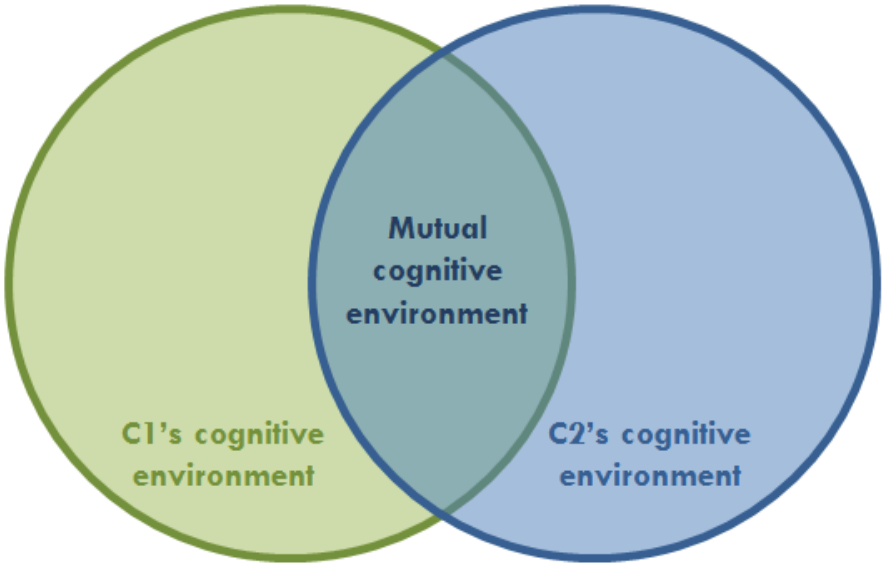
MUTUAL COGNITIVE ENVIRONMENTS AND RECURSIVE MINDREADING

As you read this, you might be wondering how it is that we manage to successfully communicate—that is, create understanding—through inferences, given the wide range of things that a single stimulus could potentially signal. Part of the answer we have given so far is communicative cooperation—that is, communicators use stimuli in interpretable or conventional ways, or use established codes. But, one could push further, how do we know what stimuli will be "interpretable" to another entity? How do we know how other entities intend for us to interpret the stimuli they provide?

Explaining *how* we engage in communicative cooperation requires returning to the human mind, and its social cognitive capacities. To successfully make the kind of inferences required for communication, we need to attend to, and be aware of, what fellow communicators know and believe. In other words, we need to be aware of what is in their *cognitive environment*, defined as "the set of facts [memes] that person is capable of representing mentally, and accepting as true or probably true" (Sperber & Wilson, 1986, p. 39). The content of a person's cognitive environment may be objectively incorrect or false (e.g., someone might believe a store opens at 10:00, when it actually opens at 11:00), but as long as the person in questions perceives and believes that content to be true, it is considered a part of that person's cognitive environment. Every person (including you) has a cognitive environment, and its content shaped by that person's life experiences.

While no two people's cognitive environments will be completely identical, there will be areas of overlap for any given pair (or group) of people. We can think about these as a Venn diagram: for any two people who come together, there will be a part of their cognitive environments that is unique to each person, and a part that is shared, or common,

between them. For example, two sports teammates who come from different backgrounds might have unique memes (i.e., knowledge, memories, and beliefs) about their respective hometowns, politics, or religion. However, as teammates, they have a shared set of memes (i.e., knowledge, memories, beliefs) related to their sport; this is the overlap in their cognitive environment. The "shared set of facts [memes] that two or more people are both capable of representing mentally, and accepting as true or probably true" (Sperber & Wilson, 1986) defines the *mutual cognitive environment* of those individuals.



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To communicate effectively, we need to identify or determine what is in the mutual cognitive environment we share with other communicators, and—critically—*what those other communicators (also) think is in our mutual cognitive environment*. This recursive knowledge (i.e., "I know that you know that I know") of our mutual cognitive environment shapes and constrains the stimuli we choose when constructing messages to activate particular meme states, as well as the possible inferences that we make based on the stimuli our interlocutors provide. As a general rule, we presume we are operating within the mutual cognitive environment of which all communicators involved are aware.

When constructing messages, we choose stimuli that we and fellow communicators are both familiar with (and know we are familiar with), and are linked to memes that are available and accessible to us both (and that we believe are available and accessible to us both). For example, we typically use words that (we believe) others know (and avoid words they do not), and we use those words to signal memes or concepts that (we believe) they know in conversation. If we believe we are introducing a concept or idea (i.e., meme) that our fellow communicators are not familiar with (i.e., is not in our mutual cognitive environment), we generally introduce and explain it using concepts that we believe others do know (e.g., "It's like X", "It's similar to Y", "It has ABC qualities").

When interpreting messages, we assume that fellow communicators are using stimuli we are both familiar with (and know we are familiar with), and are linked to memes that are available and accessible to us both (and that we believe are available and accessible to us both). In other words, we presume that people communicate about things they believe we

both capable of thinking about, and that they do so in a way that is interpretable to us. Although this might sound obvious, it considerably constrains the possible inferences one could make based on a given stimulus (even an ambiguous one), which is a major issue this conceptualization of communication has to contend with.

So, how do we determine what we jointly believe is in our mutual cognitive environment? This first requires (a) being aware that others have minds (TOM); (b) being able to represent, read, or infer what the content of others' minds might be (mindreading or mentalizing). However, it also requires an additional set of steps: we need to be able to (c) compare and contrast the content of others' cognitive environments with our own, (d) represent how our fellow communicators would make this assessment, and (e) represent how they would assess our assessment. The last of these steps is *recursive mindreading*: inferring what other people infer that we are inferring. When something is *recursive*, it is characterized by embeddedness and repetition; it involves "the repeated application of a rule, definition, or procedure to successive results". Thus, recursive mindreading involves *reading* the content of others' *mindreading*.

The concept of recursive mindreading (and indeed, recursivity more generally) sounds difficult and complicated, but is actually something we deal with all the time, and deal with pretty easily in real life contexts. For example, consider: Do you know what your friends believe you like to do? When talking to a fellow student in your class, do you know (or at least, have a pretty good estimate) of how much they think you know about the course's material? Do you know what your parents think they know about your personal life? You can probably answer yes for one, if not all, of these situations. All of these require a degree of recursive mindreading: you have to know what other people think that you think.

IMPLICATIONS OF THE INFERENTIAL MODEL

The inferential model was introduced as an alternative to the code model, to address some of the latter's shortcomings. In this, it succeeds: the inferential model is able to address and explain situations that code model could not: when inferences are the mechanism by which communication occurs, it is possible to communicate successful when there is not a shared, established code, stimuli are ambiguous, or signals are being improvised. Beyond addressing these concerns, however, the inferential model offers a fundamentally different conceptualization, and explanation, of how communication works than does the code model. This has several implications, for both studying communication and the act of communicating itself.

First and perhaps foremost, the inferential model prompts us to think about "meaning" in a different way. In this conceptual framework , "meaning" lies in recognizing or inferring a source's intentions to communicate, or make common, a particular meme state. The messages (i.e., stimuli) provided function as evidence or signals of those intentions, but they are only that—evidence, or a basis for, an inference. This is an important feature of the inferential model, and one that clearly distinguishes it from the code model. Because meaning depends on inferences about mental states, the use and interpretation of stimuli can be much more flexible. In this model, we are no longer constrained by strictly defined stimulus-meme pairings, or "if/then" rules to decipher messages. Rather, "making sense" or "making meaning" out of a message becomes of a process of inference-making based on the stimuli provided in that message.

Second, and related, the inferential model gives codes a different role in the communicative process. Rather than being essential to communication, the inferential model positions codes as helpful, but not necessary, to communication. In inferential model communication, it is the recognition of intentions, not the application of codes (i.e., systematic associations between stimuli and memes) that is the driving mechanism of human communication. As such, through inferential processes, it is possible to communicate without a (shared) code. This does not suggest or imply that codes are not important—only that they are not strictly necessary for creating understanding. Indeed, codes are widely used in human communication, and dramatically increase the efficiency of communication. Because they offer established and reliable associations between memes and stimuli, they drastically reduce the uncertainty associated with inference-making, allowing communicators to make inferences more quickly and be more sure of the inferences they are making.

Third, the inferential model suggests that a different set of skills or abilities are required for communication than does the code model. To use a code, one must be able to represent and apply associations—in the case of communicative

codes, associations between stimuli and memes. To make social inferences successfully, however, requires advanced social cognitive abilities: theory of mind, mindreading, and recursive mindreading. This paints a quite different picture of communication: following the inferential model, communication is deeply and fundamentally social, as well as cognitive, in nature. This suggests that these elements require attention in any study of human communication processes, something the code model does not necessarily imply.

Fourth, and related, a focus on inference-making—and particularly, inference making that is supported and enabled by recursive mindreading—characterizes communication as an intrinsically cooperative endeavor. As discussed above, successful inference-making is made possible by the joint attention and joint effort between communicators; this needs both parties. Following from this, the inferential model encourages a shift in focus for the study communication: rather than examining what each individual (i.e., a sender and a receiver) undertakes in a distinct role in communication, the inferential model encourages us to consider the dyad—that is a system of two (or more) communicators—as our unit of analysis. This is consistent with the dialogic, as opposed to monologic, approach to studying communication introduced in Chapter 2.

	Code Model	**Inferential Model**
Mechanism	Application of systematic associations	Recognition of intentions; inference
Skills required	Associations	Theory of mind; recursive mindreading
Meaning	Property of the stimulus (signal)	Property of mutual cognitive environment
Process	Match stimuli with meme	Make informed hypotheses based on evidence in context
Codes	Necessary	Helpful
Focus	Individual (one mind)	Coordinated dyad (two minds)

Fifth and finally, by positioning inference-making as the core process defining communication, this model suggests that all communication is intrinsically uncertain, inexact, and to a degree, indeterminate. We are essentially playing an ongoing social guessing game, doing the best we can to make informed deductions based on the evidence at hand. However, since we do not have direct access to others' minds, we can never be completely sure that our meme state matches that of our fellow communicators—an observation that should perhaps give us all some pause, and patience, as we interact with others.

References

Scott-Phillips, T. (2015). *Speaking our minds*. New York: Palgrave Macmillan.

Sperber, D., & Wilson, D. (1986). *Relevance: Communication and cognition.* Oxford: Blackwell.