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Chapter

Introductory Chapter: The Role of Communication as a Fundamental Process for Life and Society

Anamaria Berea

1. Communication as a fundamental process for life

The area of research of communication is one of the largest and vastest one can find oneself immersed in. Without communication, none of the living systems on Earth could exist, as life itself is an emergent process of interactions between different organisms, whether these interactions ultimately lead to the creation of new organisms or to the death of one or both of the organisms engaged in the process of communication [1]. This is true both in the natural and the social worlds, where organisms are either single celled or human institutions. In the largest sense, communication can be viewed as peer to peer interactions. In the narrowest sense, communication can be viewed as specialized language. Either way, communication implies a process of information exchange and the latest developments in information and computer science can tell us a little bit more about the process of communication in living systems as well [2].

Unlike interactions, which are common in physical nonliving systems as well, communications are about intent and outcomes that are not necessarily deterministic in nature, such as chemical reactions are, for instance. In living systems, communication is intimately linked to the action, either to initiate or to receive information, or to take some action post-communication, based on the information exchanged [2].

While each field of study has researched communication within its own framework, I was not able to find a broader view of communication that would encompass this larger view of the phenomenon. Surely, biologists have an in-depth view of animal communication with the specifics of each species, marketing specialists have an in-depth view of communication between institutions and customers, psychologists have an in-depth view of communication between humans in various contexts, and social scientists have an in-depth view of communication between groups or cultures, while linguists have an in-depth view of communication we call language. Yet, there is little attempt to cross borders between disciplines and to try to understand this phenomenon at large, in its universality, and not inside different contexts and scenarios.

Perhaps because such a view is too large to be approached in one research endeavor, or perhaps because the phenomenon itself is too broad, or perhaps because attempts have been made but failed; nonetheless, as scientists, when faced with fundamental and ubiquitous phenomena, we have the duty to try to understand them in these terms and aim toward grasping their universality [3].

Nonetheless, given some ubiquitous and fundamental understandings of what communication is about, we must at least attempt to discover common and universal features that run across disciplines, or characteristics that are similar in all living systems.

As we understand from science today, we know that nonliving systems (such as atoms, chemical compounds, even human made artifacts, do not communicate with each other), unless we take a look at computers or computer-enabled physical systems which, due to human technological innovations and repeated communication throughout history, have become tools to help facilitate communication. But even in the midst of the current explosion of information society, we can undoubtedly state that communication is a feature of life and living systems.

A caveat is worth mentioning with respect to artificial intelligence (AI) and AI-based systems that have the potential to initiate communication, in the absence of predetermined goals. These features are yet to be developed and achieved, and currently, we can only speculate on how this autonomous, unpredictable AI is going to look like.

2. Communication as a complex system

The problem of determinism or nondeterminism for communication, as mentioned above, lies in its intentionality. Communication, with its intent, can have deterministic or causal features, but unlike simple physical interactions, the outcome of communication is unknown or nondeterministic [4].

Communication is also an emergent phenomenon. We cannot really decompose it into parts, as we could a car or a computer; it represents the outcome of one or several relationships between two or several organisms, with various expectations and interpretations of the information being exchanged [5]. While we may know what makes a cell communicate with another and sometimes even manipulate this in the lab, we do not know what the overall outcome of multiple cells communicating repeatedly with each other would become. Even more so, in human societies, communication is very hard to pinpoint into indivisible components and to fully be able to predict what the outcome of the communication of many people or institutions would be. Therefore, communication is also an open system, with potential for both creativity, further action, but at the same time, misinterpretation, partial retention, and inaction.

As it represents a relationship and an interaction, communication is also a fundamental aspect of any living network [6]. And as networks are essentially graphs, communication can mathematically be viewed as a nonlinear process. It is a feature of both the individuals in the network and of the network at large, whether this network is a group of cells, animals, humans, or institutions, or any combination in between. While the simplest representation of communication is a direct relationship between two peers, the effects of this relationship can have unpredictable and nondeterministic effects.

In living systems, communication is also related to memory—most organisms communicate in order to store the information received or they communicate based on their accumulated memory, for future actions. And it is also prone to partial retention and forgetting as well, depending on the processes of selection and adaptation that govern those organisms.

And none of the least, communication has adaptability—it depends highly on the organisms that exchange the information, on the means of communication and on the environment within which it takes place. Just to give a very simple example, a conversation about animal communication would be completely irrelevant in a heliophysics conference context, while, at the same time, it can be of great relevance to the heliophysicist that is trying to understand the behavior of his or her dogs at home.

These features mentioned above are only a few of the many features of communication, but they all support the idea that communication is a complex system, and that it should be studied as such [7, 8].

3. Communication as a multidisciplinary paradigm

Throughout this brief introduction, another idea has become more and more obvious—the fact that communication cannot be studied in isolation or in niches or subfields of science. For this broader view as a fundamental and complex process, we need to cross scientific barriers and study the phenomenon in the context of the multidisciplinary paradigm.

This book is only a first step and attempt at bringing several fields together to achieve this grandiose goal. Truly, for an integrated discipline of communication, the support of many scientists, within their specialties, need to cross into other disciplines and follow the difficult, but very rewarding thread of understanding universal phenomena.

Author details

Anamaria Berea[1,2]

1 Complex Adaptive Systems Laboratory, University of Central Florida, Orlando, Florida, USA

2 Ronin Institute, USA

*Address all correspondence to: anamaria.berea@ucf.edu

References

[1] Günther F, Folke C. Characteristics of nested living systems. Journal of Biological Systems. 1993;**1**(03):257-274

[2] Berea A. Emergence of Communication in Socio-Biological Networks. Computational Social Sciences; Springer Cham, 2018

[3] Lederman LM. The value of fundamental science. Scientific American. 1984;**251**(5):40-47

[4] Nicolis G, Prigogine I, Nocolis G. Exploring Complexity. New York: WH. Freeman & Company, first edition; 1989

[5] Waldrop MM. Complexity: The Emerging Science at the Edge of Order and Chaos. New York: Simon and Schuster; 1993

[6] Estrada E et al., editors. Network Science: Complexity in Nature and Technology. Berlin, Germany: Springer Science & Business Media; 2010

[7] Mitchell M. Complexity: A Guided Tour. Oxford, UK: Oxford University Press; 2009

[8] Simon HA. The Sciences of the Artificial. Cambridge, MA: MIT Press; 1996