

A multidisciplinary approach of communication

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Abstract. *Each form of communication has its specific feature which helps, in turn in creating unique designs. There are also designs which go beyond a certain format and that can be adapted to all situations, for any of the types of communication. The use of models allows the interpretation of phenomena using certain structures that link the elements and relationships that can exist between these elements. The roles that can be performed by a certain model are heuristic (to explain), organizational (to order) and forecasting (to make assumptions). Mc Quail D. and S. Windahl (Mc Quail and Windahl, 2004) state that a model is valid only to its degree of probability: it remains valid as long as it is not refuted by experience. As Yves C. shows, we must emphasize the fact that the use of a model can sometimes stop the development of a science, through the lack of feed-back or even by not considering the context that may influence the communication process modeling.*

The twentieth century was the promoter of new theoretical models of the communication process inspired by the various schools (the process school, the semiotic school, the Palo Alto school, the Oxford school, etc.) or sciences (mathematics, informatics, cybernetics, linguistics, semiotics, psychology, physics, sociology, etc.). In order to propose a universal model of communication, we highlight a few models that have influenced researchers for decades. Next, we will proceed in analyzing these general models based on an evolutionary principle, from the simplest to the most complex.

Keywords: communication; models of the communication; communication process; relationships; multifunctionality.

JEL Classification: M2; M3; O3; O4.

1.1. The linear model of Claude Elwood Shannon

The most representative communicational model is the Shannon-Weaver model that works on the principle of linearity from the transmitter and receiver (a source would prepare the message which would be left to the receiver via a transmitter along a channel). This first theory, the informational one, studies “the natural transmission of signals, the semiology of communication the structure of codes and sign systems, the pragmatics of communication, the dynamic of the relationship transmitter-receiver” (Baylon and Mignot, 2000, p. 9). During the communicational process between the two poles, the information remains invariant, translated into series of binary informational units. The quality of this external event that takes a value between 0 and 1 is called by Shannon bit, it is measurable and can be calculated:

$$Q_i = f\left(\frac{1}{p}\right)$$

Where Q represents the amount of information, while p is the probability of its appearance.

But during transmission, the information may degrade irreversibly, and can be calculated using the formula of the American engineer Hartley:

$$Q_i = \log_2\left(\frac{1}{p}\right)$$

The amount of information distributed by a pole with $\frac{1}{2}$ probability of appearance is:

$$Q_i = \log_2\left(\frac{1}{\frac{1}{2}}\right) = \log_2 2 = 1$$

In the case when in the company, the medium information has different probability of occurrence, it is calculated as follows:

$$\begin{aligned} Q_{med} &= \frac{\left[p_1 \log\left(\frac{1}{p_1}\right) + p_2 \log\left(\frac{1}{p_2}\right) + \dots + p_n \log\left(\frac{1}{p_n}\right) \right]}{(p_1 + p_2 + \dots + p_n)} = \\ &= \frac{[p_1(-\log p_1) + p_2(-\log p_2) + \dots + p_n(-\log p_n)]}{(p_1 + p_2 + \dots + p_n)} \end{aligned}$$

The sum of the probabilities of occurrence of all information is equal to 1, which means that Shannon's formula becomes:

$$Q = -\sum_{i=1}^n p_i \log p_i$$

During the 1920's, H. Nyquist and R. Hartley developed several fundamental ideas related to the transmission of information between the two poles, especially in the context of the telegraph regarded as a communication system. Over time these concepts have been developed individually, but didn't become part of a comprehensive theory. In 1940, Shannon developed the concept of channel capacity, based in part on the ideas of Nyquist and Hartley, and then formulated a complete theory. A meaningless message for a receiver does not take the form of information and the explanation approached by E.C. Shannon referred to structuring a communication system by introducing new channel concepts such as the influence of noise.

1.2. Johnson's model

Using the model proposed in 1948, W. Johnson gave up on the name used to define the actors of communication (Mr. A and Mr. B) and created within his formula, ten steps which refer to the perceptual and communicative dimension of each individual involved in the communicational process.

Not for stochastic reasons, the process of communication within the Johnson's formula is represented by a rigid approach, where even not addressed elements of other intrapersonal communication models can be found, such as: spiritual influence, the personal value systems of the actors of communication or the intangibility of the actor's personality serving to define the steps of the process. Through this dedication on the examination of the functions and possible discrepancies in each stage, Johnson provides a first approach to the existence of communication barriers.

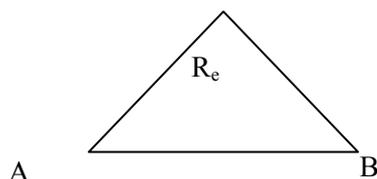
The description of the communication process by means of a formula may be represented also through a graphical representation of the model of Johnson.

Thus, Johnson, through his contribution to the study of psychological and cultural dimensions anticipates the emergence of a new paradigm, namely the organic one.

1.3. The Newcomb model

By transforming the equilibrium theory in the theory of symmetry, the communication between actors is influenced by the level of attraction of one of them simultaneously maintaining an orientation to each other and to the objects in the surrounding environment.

The Newcomb model, as can be seen in Figure 1, is based on the work of Heider where the degree of attraction is not represented, Heider thinking that when two people have attitudes of acceptance or rejection for each other or to an external referent, the components forming this relationship will be in equilibrium (both parties accept the external referent - the attitude of A-B for R_e) or unbalanced (one party accepts and the other is in disagreement with the external referent) even if this induced condition stimulates the communication.

Figure 1. *Newcomb's model*

Source: McQuail, D., Windahl, S. (2004), "Communication Models for the study of mass communication" SNSPA, p. 31.

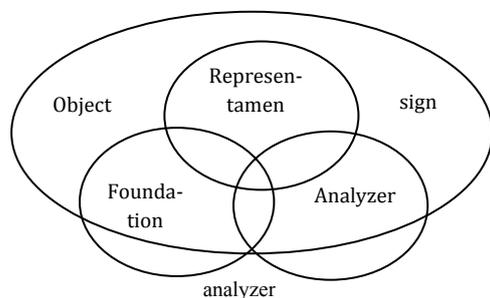
When there is a balance between the three poles A - B - R_e each participant will resist to change and if the case of imbalance different attempts will be undertaken in order to restore a "cognitive" balance.

Subsequently, in 1959 Newcomb brought, some additions to the original version, noticing the emergence of the process of communication only in certain situations (McQuail and Windahl, 2004): when there is a strong attraction between people, when the subject is important for at least one of the participant and when R_e has a common importance for both parties, testing and evaluating himself this theory.

Anticipated by the balance theory, the communication processes explained by Newcomb in his model, show that people are turning to certain sources of information in accordance to their positions, seeking information to support and certify the actual behavior. We must not believe that the trend towards consensus depicts the only cause and the only effect of communication, a multitude of solutions to these uncertainties accompanying cognitive dissonance.

1.4. The Peirce Model

Reaching across semiotics, which is analyzed as a "quasi necessary or formal doctrine of signs" (Peirce, 1990), C.S. Peirce, building on the categories of typology offered by Aristotle and Kant, believes that each process is composed of three trichotomies: the sign, the object of the analysis and the analyzer Figure 2.

Figure 2. *Items of meaning for Peirce*

Source: adapted from Peirce, C. (1990), "Meaning and Action", an anthology by Delia Marga, Humanitas, Bucharest, p. 269.

These three entities are analyzed using three others that they replace: the foundation, the representative and the interpreter, highlighting three entities “representamenul”, the object and the interpreter.

1.5. Saussure's model

Not intending to bring to the forefront a model of communication, Saussure F., through his research came out with a “structural” model which highlights the links between elements in order to understand them (Dobrescu et al., 2007, p. 317). The message becomes the most important, not the communication process or the individuals that participate in the process.

Even if he didn't define the conceptual limits of structuralism as did Popper's unitary theory, the Swiss author Saussure, focused on analyzing all firms by imposing an intrinsic link with the systematic nature of an object. Separating from the linguistic practice of studying the origin of language, he tries to offer a structural description of these firms.

In Saussure's research, the duality of language is defined as a distinct “kingdom”, composed of a physical quantity and a mental one (or an objective and a subjective one). Studying in depth the concept made Saussure try to establish a distinction between language, linguistics and speaking: “Avoiding sterile word definitions, within the total phenomenon represented by speech we first singled out two parts: language and speaking. Language is speech less speaking” (Saussure, 1972).

For Saussure represents, language is a social institution which is not subjected or described by the rules of firms in the external reality. Due to theoretical construction, language is seen as an intelligible form of language facts, subordinating to language, forming a theoretical model language is perceived as an object (corpus).

Saussure, through his two dichotomies (physical sign/mental sign and language/speech) launches a challenge regarding the study of linguistics as a whole divisible not at a functional level but only at an analytical one by binding its components to their functions. The need to study the organics of the, made Saussure state that language can not be limited to sound, or other constituent units but it can't get rid of these by a classification in any category of human facts. Thus, it cannot be a function of the speaking subject but only a structure that any participant in the communicational process can attain in time.

Saussure manages to make a distinction between diachrony (the study of language through time while operating on the subject as a dynamic element of change) and synchrony (studying in a particular operating point on the subject as a static element), in what concerns the study as an organic whole. The Swiss author Saussure, in what concerns the study of the functionality of language, leans more on its synchrony as it offers a certain regularity and thus can more easily provide regarding the study of Saussurean linguistics. Adopting this concept, the study emphasizes especially on the relationship between form and content as the analysis of a dynamic succession of stage would force us to provide guidance to an analysis on the “categories of ideas” in development. Following such an approach, Saussure concludes that language as a system

of signs, may be a particular case of such other systems. In terms of research in communication Saussure succeeds in making an important distinction between the written/spoken word and the mental concept or between the physical and mental sign.

Thus, the visible part of the sign is represented by the signifier, while the mental concept belongs to the signified, both belonging to the same community or linguistic cultures. The activity of encoding/decoding belongs to the communication act, according to the relationship between the sign (signifier and signified) and reality. Thus, the meaning is an active process of re-creation, interpretation, negotiation of a certain message.

Studying the relations between the parties, Saussure considers that there is a link between the signifier and the signified, but that this relation is arbitrary, Figure 3.

Figure 3. *The elements of meaning in Saussure's model*



Source: Fiske, J. (2003), *Introduction to Mass Communication*, New York: Polirom collection Collegium series Media, p. 67.

This arbitrary feature of the elements associated with the sign gives rise to the arbitrariness of the sign itself, through a lack of a direct link between the signifier and the external reality.

Saussure proposes another dichotomy, the fourth, between the form and the content that has as its starting point the previous one. Establishing a report for each term signifier/signified, creates a mediation of language, without clearly delineating between thought and utterance, each of these terms becoming an articulus attached to an idea or it becomes the sign of an idea.

Solving the perception signifier/signified can be achieved through interdependent units in form and content but inseparable physically. The originality of this Saussurian aspect was developed using the multifunctional model of communication by Gerbner G.

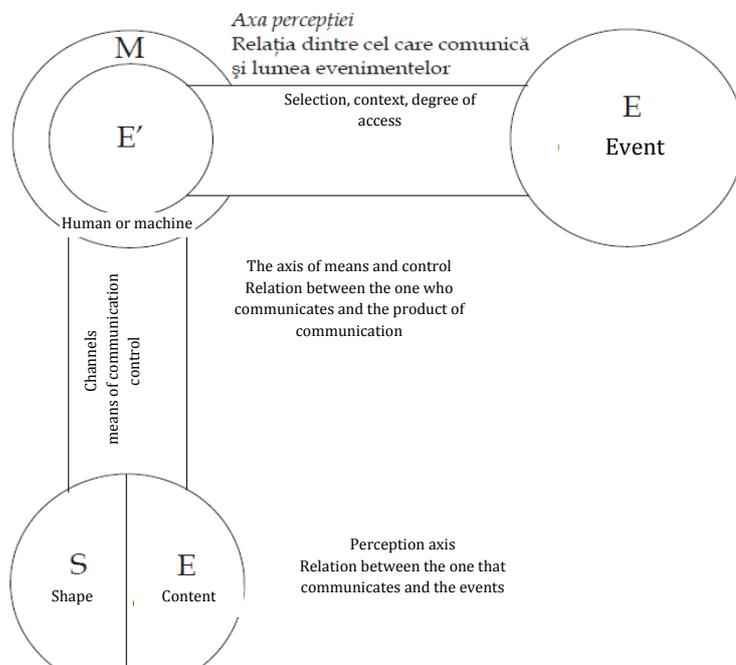
1.6. Gerbner's multifunctional model

Deepening the neuropsychological studies of W. Johnson, G. Gerbner, moves to a more detailed study of the message by sketching a model that has a greater applicability. This model can take different forms depending on the specific of the communication situation it describes, as the elements of which it is composed can be used like bricks in a building, allowing the model to describe communication processes, simple or complicated as production (messages) and perception processes (messages and events which are communicated).

Appealing to the anticipated multifunctionality and by anchoring in the context not only through the lasswellian efficiency, but also by selection, by the ongoing transformation of Johnson's message, Gerbner's model covers a wider range of applicability, taking different forms depending on the situation of communication.

The new descriptive gerbnerian model puts in antithesis two distinct things: how to issue the message and the perception of events. To this descriptive format of the multifunctional model of Gerbner was added, in comparison to the models of Lasswell and Johnson, a diagram that highlights these two dimensions of communication the perceptual one and the one depicting the means and the control, Figure 4.

Figure 4. Multifunctional model developed by Gerbner: *M perceives E as E'*



Source: McQuail, D., Windahl, S. (2004), "Communication Models for the study of mass communication" SNSPA, p. 28.

Highlighting the communication process through this chart: E means event and the subject, M, perceives the event as E' until it is transferred in the form of a message SE (where S represents linguistic means and E represents the information to be transmitted). When the pattern relates to human communication, M may be a person, and in other types of communication M can be a particular kind of machine (for example, a radiator in a heating system). Gerbner proposes a two axes analysis of the relationship between E, M and E' which is one of perception. One is "transactional" (communication), where E' is considered mainly as a function "of assumptions, views, previous experience of M, as well as other factors. How will E' be for M depends thus on factors within M or linked to it. On the other axis, called by Gerbner psychophysical (perceptual or reception), E (the event itself) represents the most important factor, creating "fair and appropriate

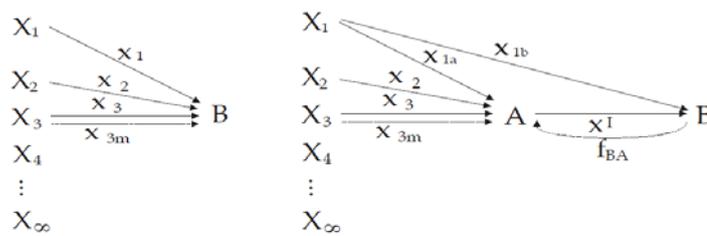
perception on favorable terms". What M perceives depends on selection, on the context in which M meets E and the extent to which M has access to this E and other Es.

1.7. The Westley-MacLean model

The need to differentiate between human and mass communication where in the latter, the feedback is minimal or delayed, and the receiver informs a variety of sources that can be chosen and to whom it may have certain attitudes, gave rise to a new model adapted from the Newcomb's ABX.

The Westley-MacLean model keeps Newcomb's notes but adds to the ABX1 diagram the objects (subjects) X_2 - X_n . Thus, the receiver B receives direct information from the object X_1 , and to the triangle ABX1 other possible ABXm triangles are added, Figure 5.

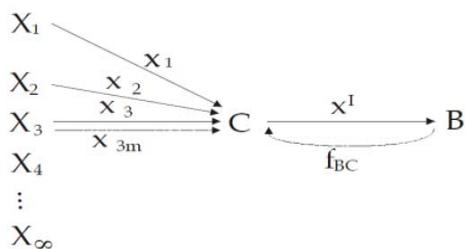
Figure 5. *The initial model of Westley-MacLean*



Source: adapted from Westley B. Malcolm, S. MacLean Jr. (1955), "Conceptual Model for Communication Research", Audio-Visual Communication Review, Winter (<http://zimmer.csufresno.edu/~johnca/spch100/notes.htm>, accessed on 12/08/2012).

This model suffered some changes by introducing a new element, channel C, which has the role of encoder and acts on B's behalf, expanding its social environment at the same time, adding an editorial - communicational function in order to meet receptor's needs of social the messages A, Figure 6.

Figure 6. *Adding the editorial-communicational function*

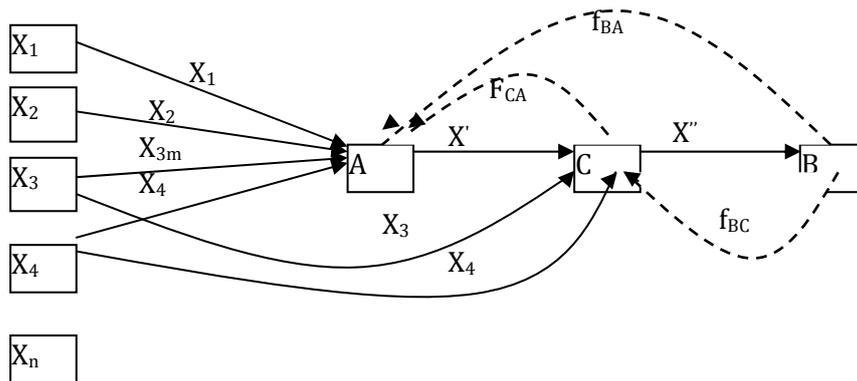


Source: adapted from Westley B. Malcolm, S. MacLean Jr. (1955), "Conceptual Model for Communication Research", Audio-Visual Communication Review, Winter (<http://zimmer.csufresno.edu/~johnca/spch100/notes.htm>, accessed on 12/08/2012).

The social source that does not resume to simple emitters relates to topics of interest represented by the multitude of objects X_m . Westley and MacLean, in this new context, appeal to three types of self-regulation: FBA, FBC and FCA which seeks answers to A's

opinion related to an important theme X_m in trying to make a separation between mass communication that has an informative and the communication that has the role of influencing, seeking the help of “gatekeepers” (social sources that select those subjects/topics of major importance in the communicational process), Figure 7.

Figure 7. Westley-MacLean's model

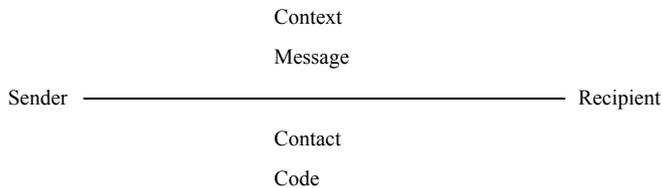


Source: adapted from Westley B. Malcolm, S. MacLean Jr. (1955), “Conceptual Model for Communication Research”, Audio-Visual Communication Review, Winter (<http://zimmer.csufresno.edu/~johnca/spch100/notes.htm>, accessed on 12/08/2012).

The difference in the light of subsequent developments through Festinger's and Westley and MacLean's models, is given by this last presentation of mass communication, which alerts on the limitation regarding the balancing of the two new elements introduced A and C which have a dominant role, and where B is available to them. This also represents the criticism of this model because an ideal communicational situation, of harmonization between transmitter and receiver control is difficult due to the implications of political, economical control, the exchange and filtering of information.

1.8. The linguistic model of Roman Jakobson

Jakobson studied the variety of functions of the message via the mathematical model of communication. The emergence of this new hybrid communicational model made a connection between structuralism and functionalism (Mukařovský J., Trubetzkoi N.) and the chart for information transmission. This model is applicable to verbal communication, Jakobson emphasizing certain factors through the following form, Figure 8:

Figure 8. *Communicational elements in Jakobson's model*

Source: http://en.wikipedia.org/wiki/Roman_Jakobson

To this scheme, Jakobson added for each factor another function, Figure 9:

Figure 9. *The functions of communication in Jakobson's model*

Source: http://en.wikipedia.org/wiki/Roman_Jakobson (accessed on 15.08.2012).'

Centered on the transmitter, the emotional function, shows its relations with the message, putting into evidence a certain state of the individual. The main function of language, the referential function, centers, in the context of communication, on an objective orientation of the message. In particular, Jakobson was concerned about the poetic function, which highlights the relations with itself, this poetic language being found even in everyday speech.

Focusing on contact, the empathic function shows open support of communication channels through ritualized forms (rules of politeness, speeches). Closely related to the code the metalanguage function requires a speech about the language itself, while the persuasive function focuses on defining the links between him and the transmitter.

1.9. The Dance F.E.X. model

Dance's helical model is newer, and we chose to present it only because it can be considered an exciting development of Osgood and Schramm's circular model.

In a debate about linear versus circular models of communication, Dance F.E.X. (1967) notices that, today, most experts refer to the circular approach as being the most suitable for the accurate representation of the communication process. But it also has weaknesses.

The circular approach suggests that the communication flow returns, thus describing a perfect circle, exactly at the point it started. The helical representation of communication helps us understand those cases where the circular model fails. She notes that the process of communication is ongoing and that what we communicate now will influence the structure and content of the communication later on.

Most models give a "frozen" aspect of the communication process, emphasizing the dynamic nature of communication (Figure 10). Like all social processes, the

communication process involves elements, relationships and contexts, all of which are in permanent change. The helical representation captures the change process in time of the various elements of communication. For example, during a conversation the knowledge increases steadily for both participants, Figure 10. They acquire throughout the conversation, more information about the topic under discussion, about the views and knowledge of the other etc.

Figure 10. *The helical model of Dance*



Source: Dance, F.E.X., “Hearing voices” in Vocate, D.R. (1994), “Different Voices, Different Minds”, Hillsdale, NJ: Lawrence Erlbaum Associates, LEA's communication series, p. 198.

The spiral in Figure 10 takes different forms in different situations for different people. For some, because they are familiar with the topics discussed, the spiral tends to widen very much, while for others, who are not familiar with the same themes, the spiral extends in a slower pace. The model can be used to illustrate gaps of information, as we will see in Chapter 4 and the thesis according to which knowledge is more advantageous to those who already have more knowledge. It also can illustrate communication situations such as that of a teacher who gives lectures on the same subject; the teacher assumes that the audience becomes gradually more informed and, considering this he reformulates his lectures based on the attained by the audience.

Conclusions

First, our paper provides a new theoretical framework that incorporates multiple theoretical mechanisms. Second, it offers behavioral models that incorporate theoretical mechanisms, to social and economic actors. Third, it shows how modeling can be useful for exploring the evolutionary dynamic of communication.

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