

Marek Hetmański

Marie Curie-Skłodowska University, Lublin

METAPHORIC CONFINEMENT OF INFORMATION¹

Abstract. The aim of the paper is to determine how metaphors tackle the probable nature of information and uncertainty in the structure of the communication process. Since the cognitive theory of conceptual metaphors holds that metaphoric thinking and doing are unavoidable, they are employed often in explaining the communicating domains. The metaphorical conceptualizing is recognized in Shannon and Weaver's Mathematical Theory of Communication where such abstract concepts as freedom of choice, choosing probabilities (possibilities), and uncertainty were conceived in that way. It is described in accord with Reddy's conduit metaphor and Ritchie's toolmakers paradigm. In the paper the issue of both the advantages and disadvantages of metaphors is considered: mainly, how they can explain and predict ways in which people communicate their expectations or uncertainties as well as, more practically, how the probable/informational metaphors enable the management of knowledge in libraries or databases.

Keywords: metaphor, information, probability, uncertainty, cognitive theory of metaphor, theory of communication.

1. Introduction

Metaphors, as defined in the cognitive theory of metaphor (Lakoff & Johnson, 1980), are not merely linguistic forms of writing or rhetorical figures of speech and literary style. They play a more crucial role in human thought and action than was traditionally argued. A review of the first linguistic and pragmatic investigations (Ortony, 1993) and the results obtained in interdisciplinary studies conducted by a subsequent generation of scholars (Lakoff & Johnson, 1999; Kövecses, 2006; Gibbs, 2008; Ritchie, 2013) show the variety of functions that metaphors fulfill in both science and culture and everyday thinking. These functions are generally cognitive and communicative. Metaphoric conceptualization assists in revealing complex and obscure aspects of the experienced world. Metaphors are also used as an effective means of persuasion in both common and mass communica-

tion, as well as in public opinion molding. They enable explaining what is not sufficiently known and predicting what is expected. But in their functions of explaining investigated phenomena and promoting people's expectations about the outcomes, for instance, of decision-making processes, metaphors can nevertheless obscure, or even hide, what they would highlight and investigate. This unavoidable feature of metaphoric categorizing of the world and its experience makes the subject interesting and challenging, especially in the areas where communicating and knowledge acquisition takes place.

2. A cognitive theory of metaphor

According to Lakoff and Johnson's cognitive (conceptual) theory of metaphors, this figurative type of thinking is common in all types of human experience. "We have found ... that metaphor is pervasive in everyday life, not just in language but in thought and action" (Lakoff & Johnson, 1980, p. 3). In terms of their role in human experience, metaphors constitute specific cognitive practices and biases revealed especially in public policy and mass communication, as well as in education and science. They facilitate the understanding of one conceptual, complex, and abstract domain through expressions related to another, more familiar and concrete. Each metaphor compares two different things in one aspect, helping to understand one of them in terms of the other. It has a formal structure that is recognizable regardless of its linguistic, pragmatic or historical expressions and contexts. This structure is based on similarities between two ontologically different domains and takes the following form: The *source* in the metaphor is the domain of concrete and empirical processes, events or things, commonsensical and well known, that serve for explanation (as *explanans*) of another destination (targeting) domain. The *target* is the general and abstract metaphor's domain of complex processes, not well or sufficiently known, which is explained (as *explanandum*) by finding some similarities with the source.

Behind each metaphor, image schemas (conceptual frameworks) are located which provide general guidance how to construct and understand particular metaphoric comparisons. They are usually abstract schemas such as time and space correlations, top-down (or bottom up) orientation, before-after events sequences, face-to-face relations, controlling, managing, etc. Underlying metaphorical thinking, conceptual schemas equip people with general images to explain certain facts and situations through others and,

respectively, help to cope with them. Some social traces and cultural context dependence are present in their structure determining how the particular metaphor is constructed, why it is so powerful, and why metaphoric thinking is ambiguous – both highlighting and hiding.

3. The Metaphoric Nature of the Mathematical Theory of Communication

The theory of communication is formal and general, but it also refers to the empirical domain of electric signals transmission in any given communication system (e.g. telegraph, telephony, etc.). For this reason it is entangled in linguistic and epistemological implications with regard to its level of expression and exemplified usage. Neither Shannon nor Weaver,² nor most of their commentators from other disciplines, consider carefully or separately the figurative structure of concepts, words and examples, which have been used in *The Mathematical Theory of Communication*; the explicitly theoretical character of this work concealed the implicitly visible metaphoric and rhetorical expressions about information and communication as such. For decades, it has molded the scientific and common understanding of information and communication in formal and social sciences, and consequently in public opinion; to a certain extent it has also shaped some ways of communicating practices. Whether or not Shannon and Weaver were aware of the metaphoric character of the phrases used in the theory, they nevertheless changed the way in which categories of information and communication began to function outside the formal domain.

Although the authors admit that “this word information in communication theory relates not so much to what you *do* say, as to what you *could* say” (Shannon & Weaver, 1949/1964, p. 8), it appears they did not fully realize the implications of the probabilistic nature of the key concept – especially, difficulties with its commonsensical expression. Why has it happened; why has ordinary understanding dominated the scientific one? Striving for a highly theoretical aim (i.e. to use the thermodynamic concept of entropy in explaining the distortion of transmitted signals), they overemphasize the commonsensical aspect of this matter. They concentrate namely more on the actual, not possible (eventual) aspect of the communication process. Holding remarkably that any linguistic expressions used in defining the essence of information or communication ought to concentrate on *possibilities* rather than *facts*, they nevertheless use at times the ordinary meanings of the concepts. But when they *define* (not just explain

or facilitate) the essence of information, they are strict and accurate. “The concept of information applies not to the individual messages (as the concept of meaning would), but rather to the situation as a whole, the unit information indicating that in this situation one has an amount of freedom of choice, in selecting a message” (Shannon & Weaver, 1964, p. 9). Information is generally conceived as an abstract and objective entity (a “situational” event) whose actual functioning, especially when the agents are considered, is understood to be more concrete, in a very simple manner. And it’s why the authors cope with metaphoric entanglement of information and communication.

3.1. The Abstract “Freedom of Choice”

Trying to make the abstract “amount of freedom of choice” more tangible and conceivable, Shannon and Weaver use a binary system to represent the amount of information associated with particular choices, specifically, the two-choice situation. Each selection provides one bit of information, regardless of the nature of the choice. If other than two-choice situations (still equally likely) are considered, they define information as the logarithm of the number of choices. However, such a conception of the abstract choice is obviously limited by the particular situations with which the decision-making agent is confronted. But since “probabilities which are not independent, but which, at any stage of the process, depend upon the proceeding choices” (*ibidem*) always have to be somehow specified (embedded in the real situation), then the former must be explained by the latter. This is a reason why metaphoric thinking, with its advantages and paradoxes, occurs and prevails.

What should be conceived and consequently defined in an abstract way is usually understood in a more empirical manner. Shannon and Weaver proceed typically by choosing suggestive examples of what information is and how it is correlated with the acts of communication. They tell about, for instance, the sequences of sounds, letters, or words in English, musical notes, written and/or read phrases from the Bible, neural signals in the brain, the vocal system, ears, nerves, etc. The authors enumerate these examples in an effort to make their theory more universal by extending the source domain. They appeal to empirical examples which are, however, not merely illustrations of mathematical formulas but metaphors deepening their formal content. Defining information by the abstract concept of entropy (“the entropy associated with a situation is a measure of the degree of randomness”), they nevertheless assume it must be understood as correlated with the constructing of the particular message, construed and

exchanged by the sender and receiver. But the term “constructing” does not exhaustively describe the management of physical items which comprise any message. It is meant also as abstract, formal constructing which depends on the likelihood of these items (i.e. any possible exchanged signals or symbols) one can have during that process. It depends on a comparison between the actual entropy at the source of a particular message, and the maximum possible value of this entropy. “That information be measured by entropy is, after all, natural when we remember that information, in communication theory, is associated with the amount of freedom of choice we have in constructing message” (Shannon & Weaver, 1964, p. 13). The core of any communication system, particularly the aim of effective signals conveying, is “handling any message that the source can produce”. In all these cases, regardless of the communicating systems or conveyed symbols (physical or abstract, natural or artificial), what really matters is making the *proper choice among the possibilities* at source. These possibilities also pertain to choosing the signals that constitute the message. In order to conceive the former one ought to appeal to the latter.

The word “handling” is crucial here as well, because it vividly (in a very metaphoric way) suggests the process of real, empirical managing or manipulating of the items, which any possible message consists of. The discursive character of the paper (treated by the authors as a “story”), independently of its formal nature, straightens this impression. Shannon and Weaver construe a model of communication (“the schematic diagram”), in which they distinguish such elements as information source, signal, message, channel, noise, and destination, as well as the sender and receiver. The graphic diagram inevitably imposes a literal understanding of most of these elements, leading ultimately to certain misunderstandings. The authors talk about three aspects (problems) of their conception: the *technical* problem (“accuracy of transference from sender to receiver of sets of symbols”), the *semantic* problem (“interpretation of meaning by the receiver as compared with the intended meaning of the sender”) and the *effectiveness* problem (“success with which the meaning conveyed to the receiver leads to the desired conduct on his part”). All these aspects, especially the third one, lead to understanding information as a concrete meaning rather than an abstract measure of choice one ought to make in the likely things or states. The stress has been finally and literally put on the meaning that each part of the transmission process – both sender and receiver – could interpret. Yet, the subject of the theory – information in its formal sense – is rather perceived as real message.

3.2. Information as Factual and Potential Entity

Taking into account the assumptions of the cognitive theory of metaphor, one can reconstruct the structure of Shannon and Weaver's discourse ("story") in which crucial abstract concepts are explained more or less empirically. The target domain of the mathematical theory of communication consists of the following, highly abstract, elements: (1) source as a set of the probable states of events which are signals; (2) channel – the abstract space or place where signals are transmitted; (3) noise, i.e. a random interference between signals and other elements of the channel (probabilistically, signals are indiscernible from noise since the latter is the former with a high level of entropy); (4) code, by which the signals are organized into a message; (5) redundancy – the organization of signal transmission (i.e. recurrence) opposed to increasing their entropy; (6) effective transmission of signals with minimal dispersion that would cause loss of information. These particular concepts are defined with different levels of exactness since some of them (i.e. channel, noise) are only approximated.

Explaining the essence of information as entangled in communication, Shannon and Weaver use concrete elements which determine and define the source domain. They appeal to certain empirical phenomena or situations permeating into matters of communication. These are respectively: (1) signals constituting the message or collection of messages; (2) medium – voice, writing, or other physical instruments suitable for conveying meaning; (3) sounds or signs one can hear or see disturbing the process of communication; (4) language and the alphabet coding the content into a material system of signs; (5) linguistic and literary style constituting an utterance or written message; (6) particular processes of communication like utterances or announcements conveying the intended meanings. To explain channel, noise, or code, Shannon and Weaver try to attribute to these concepts – commonly (and therefore seemingly) conceived too empirically – more abstract, mathematical, and thermodynamic meanings. They try also to approach the abstract items by explaining them by particular comparisons (e.g. reduction of uncertainty with receiving curious news). Falling into the "semantic trap", as they honestly admit, seems then unavoidable, especially if one interprets, for instance, noise – both in its concrete and abstract sense – as an obstacle in the communication process:

It is generally true that when there is noise, the received signal exhibits greater information ... This is a situation which beautifully illustrates the semantic trap into which one can fall if he does not remember that "information" is used here with a special meaning that measures freedom of choice. (Shannon & Weaver, 1964, p. 19)

The same happens with the concept of *uncertainty* whose understanding differs from that perceived in a commonsensical perspective. Since it is also entangled with information (“in these statistical terms the two words *information* and *uncertainty* find themselves to be partners”), its value depends on the evaluation of formal relations between the signal at source, the received signal, and the noise which changes signals. The less expected (not recognized) the signal is, the more information it carries. Thus, both information and uncertainty depend on reducing one level of probability to another. “It is therefore possible for the word information to have either good or bad connotations. Uncertainty which arises by virtue of freedom of choice on the part of the sender is desirable uncertainty. Uncertainty which arises because of error or because of the influence of noise is undesirable uncertainty” (*ibidem*).

Both meanings of uncertainty – from the perspective of the sender and receiver as well as good or bad effects – are distinguished formally in the theory of communication, however their sense and value is explained by appeal to everyday life, which makes them in the end dissimilar. And that is why metaphors appear in *The Mathematical Theory of Communication*, bringing about some paradoxical consequences. The authors repeatedly use both formal and ordinary explanations in order to grasp the essence of cognitive aspects of communication. Their conception pretends to be both objective (formal and dispassionate) and subjective (linguistically and emotionally determined).

For these reasons, in the successive decades as well as in many areas of research, information theory has continued to be used also in explaining diverse and complex phenomena such as life, inquiry, or heredity. It is still used both in the exact and a less strict sense of its merit. The authors summarize their theory, which is especially interesting, in a tellingly metaphoric way: “An engineering communication theory is just like a very proper and discreet girl accepting your telegram. She pays no attention to the meaning whether it be sad, or joyous, or embarrassing. But she must be prepared to deal with all that come to her desk” (Shannon & Weaver, 1964, p. 27). In other words, they suggest that their conception has universal meaning which they express through metaphoric words. But presenting information in this phrase as merely a physical thing (by analogy to the *meaning* of a message which is always a concrete thing), they unintentionally but inevitably deprive it of its abstract sense, which depends on its *probabilistic* nature. In that way theory of information and communication due to its metaphoric confinement has been involved in a paradoxical situation.

4. The Conduit *versus* Toolmakers Metaphors and Their Limits

Many problems emerging in interdisciplinary studies on individual, mass, or cultural communication are discussed from the perspective of the mathematical theory of information and communication. Shannon's theory, thanks to its diagram and suggestive phrasing, has been widely used in areas of research far removed from the thermodynamic perspective. It implies not only the mechanisms of conveying signals but also, if not above all, exposes the *cognitive* aspects of communication which override the formal ones. Most such interpretations aim at explaining the following, mostly asked, issues: (1) what intellectual activities are required to make communication possible at all; (2) what happens when people receive extreme amounts of signals; (3) how do they cope with ambiguous meanings or equivocal replays; (4) why and how is routine communication possible without reciprocal understanding? For many interpreters, especially in the cognitive sciences, Shannon and Weaver's conception seems to offer simple and unquestionable answers to the above issues. But the fact that it has wide currency and impact on many disciplines makes it also susceptible to simplifications. Its metaphoric nature brings about this situation; the concept of the so-called conduit metaphor provides a good example of this process.

According to Michael Reddy (1993, pp. 164–201), the *conduit metaphor* is an example of popularization of the mathematical theory of communication. It relies on four statements to create its "major framework": (1) in communication (both verbal and written) language functions like a conduit (a pipe) transferring a person's thoughts; (2) people insert (in writing and speaking) their thoughts and emotions into the words; (3) words accomplish the transfer by containing thoughts or feelings and conveying them to others; (4) listeners or readers once again extract thoughts and feelings from the words:

The major framework sees ideas as existing either in human heads or, at least, within words uttered by humans. The "minor" framework overlooks words as containers and allows ideas and feelings to flow, unfettered and completely disembodied, into a kind of ambient space between human heads. In this case, the conduit of language becomes, not sealed pipelines from person to person, but rather individual pipes which allow mental content to escape into, or enter from, this ambient space. (Reddy, 1993, p. 170)

A simplified and individual character of that model has pretty much dominated scientific and popular thinking. The conduit metaphor involved in

the rather simple conceptual framework suggests that communication and thinking are reasonable, almost effortless, and do not bring about any interpretative problems. Human communication that conveys thoughts and ideas through signals is simplified as a linear, serial, one-directional, and fully determined process. Thoughts are conceived as reified entities (the mental content of words-containers) ejected by speaking or writing in the external, ambient “idea space” that exists independently of any need of the people communicating. Besides, all these things can go on without expending any energy.

Reddy suggests, however, that people do not get their thoughts across in such a simple manner. They change rather their interlocutors’ states of mind or emotions, and consequently their ways of communicating. In short, communication takes place first in human heads and acts, rather than in language. It is not the logical or linguistic containers or conveyers – words or phrases, signals of the language – but psychosocial (both mental and emotional) changes that constitute human communication. Reddy states that the conduit metaphor leads to many “bizarre assertions” and false viewpoints such as: (1) words have their “insides” and “outsides”; (2) the faults in a communication failure lie not with the speaker but the listener who is usually blamed for wrongly extracting thoughts from the speaker’s words. The author suggests it is a false image of communication. “Partial miscommunication, or divergence of reading from a single text, are not aberrations. They are tendencies inherent in the system, which can only be counteracted by continuous effort and by large amounts of verbal interaction” (Reddy, 1993, p. 175). If words, orders, or instructions are scattered, it is a natural and unavoidable tendency. The expenditure of energy as well as troubles with mutual understanding are unavoidable; they are what make human communication.

Reddy finally proposes a richer model of communication, one that is more informative than the conduit metaphor, however, due to its very figurative mode, still entangled in some paradoxes. The new model, called the *toolmakers paradigm*, conceives communicating people as isolated in slightly different environments. They are located in “a huge compound, shaped like a wagon wheel”, where they live independently. They have the opportunity to exchange only a small set of generally informative instructions about what they do and how they cope with their environments. And all that happens, metaphorically speaking, “at the hub of the wheel” – where the direct exchange involves not the things in the environments, but only instructions about them. People know of one another’s existence indi-

rectly, solely through “a cumulative series of inferences”. Their mental and emotional experiences are, as Reddy admits, “radical[ly] subjective”; nevertheless, they can convey reciprocally their thoughts and emotions and act effectively on their basis. This actually happens if communicating people are deeply engaged in common, practical-cognitive undertakings, during which conveying signals is only the initial and final task, and one that demands more complex cognitive activity constituting communication.

Both metaphors and paradigms are in “a basic conflict”, Reddy remarks, since they are based on different image schemas. The conduit metaphor assumes namely a linear and cause-effect sequence of events, whereas the toolmakers paradigm implies the opposite schema – nonlinear and feedback. If the former is deeply rooted in the semantic structure of English (no one can discard it), the latter has its own support in different, more sophisticated, far from commonsensical, areas of experience and knowledge. “The toolmakers paradigm is very much in accord with the long-postulated connection between information, in the mathematical sense, and the entropy expression on the second law of thermodynamics”, Reddy admits (1993, p. 175). Information conceived as negative entropy (negentropy) is both the effect of conveying the signals and the measure of scattering them. Neither signals dispersion nor confusion and/or misunderstandings damage the thinking processes and information production while communicating. To the contrary, they are conducive for them as they force the participating agents (both sender and receiver) to engage in reciprocal acts. Distortion of signals is only a technical fault, but it also compels the communicating agents to improve their communicative efforts.

Whereas the above model remains rather a theoretical point of view (a new figurative concept), the practical aspects of it are somewhat different to conceive and utilize. Why is it so? Thermodynamic interpretation of information assumes namely that individual and group agents that take part in communication are confronted with a *choice of possibilities*. They should reasonably distinguish among all the probable (more or less likely) things, facts, or events and then effectively act by selecting one of them; there is no information without choice, the theory of information holds. If agents did not choose, the information associated with signals would not appear and change both its quantitative amount and qualitative value. But what type of agent’s choice and what kind of probabilities (objective or subjective) are to be entertained? Moreover (as a linguistic aspect of it), what expressions, including metaphoric phrases (unavoidable in a such situation), are suitable for this cognitive undertaking – both deciding and describing?

5. The Problems with Probability and Uncertainty

Since conceiving the randomness of events and probabilistic nature of choices is crucial for performing communicative acts, its role must be explained in detail. How is it possible at all? How is it realized while conveying or receiving signals, the news or messages? Does it really manifest in any cases in a metaphorical way?

5.1. Biased Cognition

One can find the answers to the above questions in many research programs conducted in cognitive science. People, both laymen and experts (even from statistics or the social sciences), inevitably perceive and imagine – as the results of these programs show in a convincing as well as astonishing way – complex, random, probable, and obscure things in very biased ways. It happens mostly to the things which they could not conceivably imagine and, consequently, empirically measure. As shown by the results of many classic studies (Tversky & Kahneman, 1974/1998) and recent research programs (Gigerenzer, 2007), the uncertainty which characterizes unpredictable situations and peoples' knowledge is related with acting and communicating while making decisions. Tversky and Kahneman say that when making a decision or solving a complex practical-cognitive problem, a person will adopt relatively constant cognitive biases which reflect her specific cognitive errors. These also include intuitive judgements and beliefs which play a particular part in the assessment of random events. “[P]eople rely on a limited number of heuristic principles which reduce the complex tasks of assessing the probabilities and predicting values to simpler judgmental operations” (Tversky & Kahneman, 1998, p. 3). Among many natural errors (e.g., misidentifying representativeness in a sequence of events, excessive ease in evaluating such sequences, or incorrectly settling problems based on an erroneous evaluation of input data), there are some which result from the agent's cognitive *inability to conceive probabilities of events*. The agent assumes erroneous representativeness relative to the transfer of qualities or probability from one class of events to another. This is because of the incessant *search for similarities* between facts and events, despite differences between them. In such cognitively biased thinking, the agent is especially open to any suggestive expressions (especially these of a metaphorical nature) that strengthen this tendency and disturb communication.

Gerd Gigerenzer's research programs reach the same conclusions as regards problems with evaluating probability. He claims that both intuitive and rational decision-making is not based on comprehensive information,

nor does it always involve equally reliable knowledge. In the course of intuitive action, a person ignores cognitive difficulties or overly complex situations. Ignoring them is a condition of efficient inference and the form of reasoning known as *the heuristics of recognition*. Its characteristic feature (or even paradox) is the fact that intuitive decisions (“gut feelings”) tend to have a higher rate of accuracy compared to actions based on relatively comprehensive diagnoses. Heuristic methods are therefore far more effective than strictly optimising principles such as “more is better”. Why? Because they allow one to limit the number of available choices, all of which would have to be calculated before a single answer could be offered. The latter solution would not prove effective as the likelihood of selecting an adequate and usable solution grows with a smaller number of choices. People tend to make *correct choices* (e.g. when buying or investing) more easily and more often when they are faced with relatively few choices whose analysis does not overwhelm them during decision-making. This strategy belongs to the scope of gut feelings, to intuition:

They take advantage of the evolved capacities of the brain and are based on rules of thumb that enable us to act fast and with astounding accuracy. The quality of intuition lies in the intelligence of the unconscious, the ability to know without thinking which rule to rely on in which situation. (Gigerenzer, 2007, pp. 240–241)

It is intuition that might also give the agent a chance to use more discretionary ways of expression, which he/she conceives as similar as well as more (or less) probable. In this sense, metaphoric thinking overlaps with intuition in helping to understand complex situations when a person is making a decision or communicating.

5.2. Statistical *versus* Epistemological Probability

The aforementioned empirical studies on cognitive biases and intuitive reasoning, manifested in probable situations, are concurrent with the remarks made by those who continue studies on metaphoric thinking, especially in mass communication and education. As these domains, due to the rhetorical tradition, are still open to figurative (metaphoric) expressions, the similes, for instance, of voice/radio signal transmissions and noise derived from Shannon’s theory are deeply rooted and constantly misleading. As David Ritchie observed:

Note that “random noise” is itself doubly metaphoric: *error variance* (the influence of all the unobserved causal factors in an experiment) is expressed

in terms of “*the random perturbations of a radio transmission*” that block clear transmission of the signal, itself expressed in terms of the “distracting sounds” that make it difficult to carry on a conversation on a busy street or at a cocktail party. The “random noise” introduced by unknown and untheorized causal influences is subsumed into “sampling error” by the assumption that a subject susceptible to any particular untheorized influence is equally likely to be assigned to any condition. (Ritchie, 2003, p. 6)

The highly theorized concept of noise (an unavoidable statistical element of any signal transmission) is metaphorically conceived as a physical disturbance that comes from the environment and changes the receiver’s behavior. It is commonly assumed that thermodynamic noise allegedly has an empirical influence on the receiver’s cognitive faculties, disturbing her ability to recognize the signals. The crucial differences between both domains of such comparison (formal and empirical) are then omitted or ignored.

Besides, as Ritchie mentions, the agent’s mental states (which are only to a certain extent random “events”), such as imagining, evaluating, or forecasting, are understood (both by the agent and researcher) in terms of the familiar realm of dice, roulette wheels, coins, and other gambling devices. The decision-making engaged in communication is compared with casting dice or betting in games of chance. Consequently, people become caught up in perceiving decision making as concrete games, play, or receiving news. The probability of scientifically investigated events (e.g. statistics) is crucial at such times. But the notion of probability comes in two meanings: statistical and epistemological, which have been misread for centuries. “Statistical probability was the sole legitimate form of probability, the sole basis for knowledge. Consequently, ‘statistical probability’ – and the associated world of ‘randomizing devices’ – has become a metaphor for epistemological probability” (Ritchie, 2003, p. 11). *Epistemological probability* is the result of preferred theoretical interpretations but not statistical facts, i.e. correlations between events. In this case, conversely and paradoxically, the formal (mathematical/statistical) feature is used, accordingly to the cognitive theory of conceptual metaphor, as the source for presenting the target – the agent’s mental state of uncertainty. In other words, what is abstract serves as a metaphor for what is concrete, with the normal structure of metaphoric schema being reversed.

Therefore, both *objective* and *subjective* aspects of probability are very often confused, which has epistemological consequences. People commonly conceive probability as a state of their beliefs, but not events and states of affairs. Statistical probability becomes a metaphor for experiencing the world and knowledge possessed, Ritchie remarks, as “a kind of shorthand

for the complex web of reasons that underlie social processes, and an approximation of the way these reasons are balanced in the decision-making process” (Ritchie, 2003, p. 11). This metaphor serves the descriptive function of supplying an explanation for unstable, unpredictable, not well-known cognitive phenomena as predicting or deciding under uncertainty. Besides, to a certain extent it plays the rhetorical function of encouraging people to perform special social-cognitive acts (i.e. blogging or twittering) with expectations of some profit from randomized events, such as attention from strangers. In both cases, the metaphor (in versions of the conduit and/or toolmakers paradigm) can nevertheless obscure what it is really intended to reveal.

The question of why metaphoric thinking is responsible for the above-mentioned effect has interested cognitive linguists from the very beginning. “[A] metaphorical concept can keep us from focusing on other aspects of the concept that are inconsistent with that metaphor” (Lakoff & Johnson, 1980, p. 10). Raymond W. Gibbs recognizes a specific “‘paradox of metaphor’ in which metaphor is creative, novel, culturally sensitive, and allows us to transcend the mundane while also being rooted in pervasive patterns of bodily experience common to all people” (Gibbs, 2008, p. 5). This seemingly contradictory nature of metaphoric thinking means that people who are engaged in it are not able to exceed their bodily and culturally entrenched limits. While transcending what is empirically evident and, consequently, entering cognitively into new, more complex intellectual domains of experience, people are determined by many empirical constraints – brain functions, gestures, both mental and language schemas, and/or social customs. Since their perception, imagination, and figurative linguistic intellection are determined by many circumstances which usually govern people’s actions, the metaphors deeply change the world’s representation.

6. Practical Effects of the Probable/Informational Metaphors

The problem of metaphoric models of information and communication has its practical consequences. If the conduit metaphor or toolmakers paradigm might confuse people conceiving what information is, it may also influence the way they both send and receive any type of message (orders, requests, the news, pictures, texts, etc.) while participating in the public domain or mass culture where communicating is crucial. Some of the consequences are especially evident in education as well as in the management of library holdings. These social areas, institutions, and organizations illus-

trate how the metaphoric concept of information and knowledge is simultaneously disturbing and challenging. The role of proper, rich metaphors with dynamic and probabilistic, not static or linear, connotations in the source domain is then of special practical importance. Only these metaphors can describe adequately the processes of knowledge organization and its communication.

Libraries and their particular elements are not the repositories of the ideas connected, in a constant and unchangeable way, with the books or any records they hold. They constitute databases, which are not containers of ideas, but only *chances* and *opportunities* (conceived probabilistically) to become both information and knowledge in the area of the subjects' cognitive undertakings. Information is not a simple element of knowledge, as knowledge does not only consist of signals or data. Knowledge as *a system of writers/readers' mental states* and dispositions, as being embedded in their particular behaviors (understanding, interpreting, predicting), is an effect of their active and complex intellectual undertakings; one cannot find it exclusively in a library alone. The cognitive processes constituting knowledge acquisition are complex, non-linear *intellectual reconstructions* (not linear constructs) which are neither additive data/information aggregations nor simple processes of their revision. They have *probable* and *potential* status depending on the agents' activities like choosing and deciding. "All that is preserved in libraries is the mere opportunity to perform this reconstruction" (Reddy, 1993, p. 187). Libraries are not the place where people merely acquire knowledge, they are also abstract areas of a special, intellectual *play* where opportunities and probabilities become reality and, generally speaking, where chances become necessities. This happens with regard to the particular intellectual and cognitive faculties and skills of many people who use them accordingly to their demands and needs; it applies not only to libraries or books but all types of information embodiment and management. Individual preferences and faculties of users, shaped by education, learning, or training, ultimately decide finally what information and knowledge is, and how much of it the agents are able to absorb, convey, and effectively use, changing their particular undertakings.

The particular (psychosocial as well as epistemological) theses sketched above allow concluding the paper with some general remarks pertaining to metaphoric confinement of information and communication. Proper recognition of information, communication, and probability (uncertainty) entanglement should take the following into consideration:

6.1. If communication is the transfer of information conceived (as the mathematical theory of communication deeply suggests) as a selection from

a set of alternatives which the particular message evokes and carries, then neither the signals nor the news are really sent during the processes of transferring. But “sending alternatives and possibilities”, as Shannon and Weaver say, is not a process comparable with all technological matters entailed by the newest forms of communication. It is rather a matter of both the sender and receiver’s mental states – their cognitive abilities to recognize the possibilities and probabilities as well as their linguistic skills to reciprocal communication of them in a proper way. As the selected alternatives are related by the *code*, one should properly discriminate between what is “received” and what is “transmitted”. It is not the sent or absorbed signals but the potential value of information which the message carries. Not the message alone but responsible understanding and effective managing of the information it carries, is what should matter in communicating or acquiring knowledge.

6.2. Disclosing what is “behind” the news or any type of message – in other words, what constitutes their context – entails the special responsibility of both the sender and the receiver. It is not the sender (as interpreted by the conduit metaphor), allegedly single-handedly choosing the code, who is decisive here. The receiver is no less important as he/she has to properly recognize to what possible states the particular message belongs and consequently what amount of information it might carry. Briefly, both agents must imagine all the possible “answers” to the “question” asked and then make a proper decision. They are thus responsible for disclosing and measuring the amounts of information which communication may reveal, and then evaluating it. It is noteworthy that the same happens irrespectively of the existing and ever more enhanced feedback in the newest media (i.e. reality-TV, interactive games, etc.) which seemingly gives both sides merely the “chances”, not actual possibilities, to respond to signals. Real and epistemologically important information/knowledge use demands two specific things: (1) intellectual faculties such as imagination, foresight, and empathy, and the corresponding (2) linguistic skills of recognizing and discerning figurative expressions including slogans (present especially in advertising) which may cause and encourage misunderstanding of communication. Without them, people are overexposed to misinformation, which causes misunderstanding and hinders their decision making.

6.3. The metaphors of uncertainty and possibility (i.e. the toolmakers paradigm) governing communication and knowledge management, if used in a premeditated and designed way, can change the effectiveness of a library and database systems. They are a type of informational metaphor

meant as an instrument of choosing (answering) one of the options (questions) in information/knowledge systems like libraries or databases. The latest research (*Knowledge Organization*, 2013, 40(6)) shows that the role of sophisticated metaphors in knowledge organization – spatial and aquatic as well as nonlinear, dynamic, or probabilistic like a rhizome or labyrinth – increases. They help researchers and practitioners design and supply more effective individual user-oriented tools and instruments for navigating different information repositories: libraries, databases, office filings, internet stocks and holdings etc. “It is necessary to create innovative environments ... that can enable individuals to create, imagine, and preserve information in personalized, idiosyncratic spaces as well” (Marras, 2013, p. 394). These new dynamic and probabilistic metaphors embedded in IT tools like browsers or search engines have therefore *informational* (i.e. communicative) characteristics; they “send” the “message” in a double sense: (1) about themselves (i.e. about their informational power) and (2) to all eventual users of them. One can analyze them as specific *news* (meta-news, metaphors *per se*) concerning any type of information/knowledge systems, measuring their informational quantity according to the probabilistic account: the more sophisticated (unexpected) the metaphor, the more information it carries. They do not only tell about the essence of knowledge or information one can have, but also instruct which instruments should be chosen while navigating the knowledge systems. All these metaphors also *inform* (predict, forecast) expectations about social outcomes, whether they are winnings or losses, and the means of decision-making as rational, effective, and objective. In other words, they head off people’s expectations about decision-making processes as attainable and profitable.

The “gambling devices” which these informational metaphors include have an interesting cognitive (informative/communicative) impact on the agents’ minds: they present knowledge acquiring and information seeking, as well as the research into them, as a *gamble* worth taking. They help to live (both conceive and act) in unpredictable and uncertain situations while learning, training, and teaching, hoping that less or more reasonable solutions (choices) will present themselves. This would only happen if probable metaphoric thinking and doing could be applied. One cannot then preclude that these probabilistic metaphors “we live by”, however counterintuitive and not commonsensical, encourage us to conceive the uncertain world in a more certain way – in the limits marked out by the cognitive theory of (informational) metaphors and mathematical theory of information.

NOTES

¹ This article is a revised and expanded version of a paper delivered at An Interdisciplinary Workshop on Information: Space, Time, and Identity held at The Open University, April 8–10, 2013.

² The question of who is responsible for making which particular statements is not considered in detail here since the impact Shannon and Weaver's paper has had is more crucial for present purposes than individual authors' contributions to articulation of the theory. However, it should be noted in passing that it was Warren Weaver who was responsible for most of the general, figurative (metaphoric) statements made about the theory.

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