**Pedro MARIJUAN**\* (Foundations of Information Science) *The Advancement of Information Science. Is a*

*New Way of Thinking Necessary?*

The advancement of a new scientific perspective, information science, devoted to the study of the vast field of informational phenomena in nature and society, implies putting together a number of cognizing domains which are presently scattered away in many other disciplines. Comparable to previous scientific revolutions spurred by thermodynamics and quantum mechanics, it would be time to go beyond the classical discussions on the concept of information, and associated formal theories, and advance a "new way of thinking". Cells, Brains, Societies, and Quantum information would be crucial arenas for this discussion. Rather than hierarchy, reduction, or unification, the catchword is unending recombination... A mature information science should offer a new panoramic view on the sciences themselves and contribute to achieve social adaptability & sustainability.

**Juan LARA**\* (Universidad Salamanca) *Intracelular Gestion of Information: from DNA to proteins*

The living features of cells constitute an information flow from a central database, the nuclear DNA, to molecular effectors, proteins, which are synthesized in the cytoplasm. This flow comprises two changes in information units: transcription and translation. Transcription is carried out in the nucleus and consists on the transduction of specific instructions from the DNA to an intermediary, the RNA, which in its canonical form is a messenger (mRNA) that takes out information from the cell nucleus. In the cytoplasm, information of the messenger gives the commands for a specialized molecular complex to build a specific protein. After conformation regulation, proteins are integrated as structural and/or functional units in the complex network of biological functions in the cell.

**Alfredo MARCOS**\* (Universidad Valladolid) *Ideas for a Unified Theory of Information*

The concept of information has become central in our civilization, so much so that we call our societies information societies. I go on to defend a concept of information as a triadic relationship involving a message, a receiver, and a system of reference. This concept contributes to producing a general measure of information, as well as aids in integrating the measure and specific uses of the concept of information into a single framework. Finally, I develop a general measure of information that is based on this concept.

**Roberto GEJMAN** (Pontificia Universidad Católica de Chile) *A set of basic distinctions to build the*

*information concept*

This paper proposes a set of distinctions that may be helpful for the classification and taxonomy of the various theories, approaches, ideas and definitions of the concept of information. It hopes to offer a place as neutral as possible to locate, compare, classify and discuss the quite large amount of those developments. The main benefit is to be able to clean up the discussion from dialogues that expend a lot of time and energy in getting at a name consensus, naming ideas or classes of entities, instead of discussing the deep nature of those ideas or entities.

The paper suggest that most known approaches may be expressed in terms of the underlying distinctions and concludes that after giving consensus names to those dis-tinctions, a unified information and knowledge theory may be build.

## ABSTRACTS OF LECTURES AND PAPERS

**Rafael CAPURRO** (Stuttgart Medien University) *Past, present, and future of the information concept*

This text provides an overview of the complex history of the notion of information in the Greek-Latin as well as in the Medieval and Modern traditions. It connects the Latin etymology of the term information with the Greek concepts of eidos/idea and morphé and shows how the objective meaning of information ('giving form to something') becomes obsolete in modernity where only the communicational meaning ('telling something to someone') remains.

Information theories in the 20th Century are related to the development of technical systems of message transmission. They give rise to a renaissance of the objective notion of information but under a different framework as the one of classic pre-modern philosophy

Establishing a connection between the concepts of informa-tion and message several options are presented leading to a notion of information based on a theory of messages.

## The semantic question (contexts, truth, contradiction)

**Luciano FLORIDI**\* (Universidad Oxford) *Semantic information and the correctness theory of truth*

In recent years, philosophical interest in the nature of information has been increasing steadily. In particular, one of the current debates concerns the veridical nature of semantic information. The debate –somewhat old– justifies analysing semantic information in terms of well-formed, meaningful and veridical data, which suppose that semantic information encapsulates truth.

"Semantic information" is primarily understood in terms of content about a referent. This content is analysable in terms of well-formed and meaningful data. Strings or patterns of data may constitute sentences in a natural language, but of course they can also generate formulae, maps, diagrams, videos or other semiotic constructs in a variety of physical codes, being further determined by their appropriate syntax (well-formedness) and semantics (meaningfulness). By "about a referent" one is to understand the ordinary and familiar way in which the well-formed and meaningful data, constituting semantic information, concern or address some topic. In this paper, we shall be concerned with only this standard, epistemically oriented concept of semantic information.

**Ricardo PÉREZ-AMAT**\* (Universidad R. Juan Carlos I) *Towards a semantic theory of information*

Information can be understood as that which reduces uncertainty, whatever the origin of this. In the field of human communication, information is only meaningful if it is part of an action is finished, intentional. Meaning will be raised from the emprirical perspective of use of language.

If we study processing of signification through transmission of normal use of language, we will see that it take place communicating a set of prototype categories, the medullary or central facts, that defines meaning as empirical hypothesis. But if there are central facts to learn the use of words, also it must exits facts more or less peripheral whitch knowledge is necessary in contexts so far of the "denotative conceptual norm", so that meaning can be represented by a fuzzy set of universe of discourse set.

This concept of meaning can be integrated in a formal model of semantic source. Information can be measured by a non probabilistic entropy.

**J.R. ÁLVAREZ BAUTISTA**\* (Universidad León) *Semiotizing nature & naturalizing culture. a quiasm in the*

    *biological thought*

This work considers complementary attempts to handle both nature and culture from the derived perspectives of two types of sciences: semiotics and natural sciences. It may be considered as a critical attempt to place both of them in their proper space: on the one hand, the initiatives of the so called Biosemiotics (in which causality and signification are purportedly unified in the idea of communication in the whole biosphere); on the other hand, the theory of cultural selection -which most remarked version is the well known Memetics (an application into cultural frames intendedly analogue to the theory of natural selection). The former is a semiotization of biology at the cost of a previous naturalization of semiotics itself, while the second one is a naturalization of the cultural space in terms of the "universal Darwinism" which implies the application of the selection idea (mechanism, algorithm, etc.) to cultural dynamics, mediated by the idea of information.

The thesis here to be defended amounts to consider Biosemiotics -presented as an analytical method to study communication- as ontologically founding communication in causality. Meanwhile Memetics - presented as an application of methodology to selection of cultural processes of production, diffusion and conservation of unities and complex aggregates of information- studies cultural causality in the frame of communicative efficiency.

**J.M. SAGÜILLO**\* (Universidad Santiago de Compostela) *One sense of information: A quick tutorial to*

    *Information-theoretic logic*

One of the multiple meanings of the word 'information' is given implicitly in the postulates and conditions of information-theoretic logic (I-T-L). The tradition of looking at logical phenomena from an informational stance goes back as far as the XIX century. Logicians such as Boole, De Morgan, Jevons, and Venn already suggested that deducing is a sort of unpacking the information already contained in given premises. In the XX century this tradition is recovered by Carnap and Bar Hillel, Cohen and Nagel, and more recently by Corcoran. John Corcoran has articulated a specific information-theoretic viewpoint of logic with its own particular characteristics. I intend to explain the

signalization. In relation to that notion, we offer a quite suggesting definition of semantic content, and we obtain some relevant consequences.

**Manuel CAMPOS**\* (Universidad Barcelona) *Information: objetive?, subjetive?, redundant?*

The term "information" has an obvious ordinary use: from information we obtain in our interaction with the world, we are capable of acquiring knowledge about it. Assuming a realist point of view, information thus interpreted (which is measurable in propositional terms) is acquired by the subject through inductive fallible processes based, in part, on the recognition of natural correlations. This approach to the notion of information has, however, as a counterpart, that it seems to make the notion redundant.

**Salvador GUTIÉRREZ**\* (Universidad León, R.A.E.) *Information and informative functions in linguistics*

The concept of information traces its roots in two sides of linguistics: 1) in mathematical linguistics and 2) in the theory of informative functions. In the first regard, the theory of information appears in connection with communication theory and linguistically statistics, both disciplines generating a concept of quantity of information to be applied in all fields of language, especially lexical. With respect to the second regard, information is linked to the syntagmatic dimension of language, namely its combinatory. This approach is still to be fully developed and was founded by the New Prague School during the sixties, and then assimilated to functionalism and generativist. In this approach, the concept of information is narrowly linked with immanent linguistics, in particular disciplines such as syntax, pragmatics and discourse analysis, in which this exposition is centred.

**Tomás ORTIZ ALONSO**\* (Universidad Complutense) *Neural communication: approaching behavior from*

    *brain rithms*

Neural communication occurs by means of bioelectrical processes that can be registered by EEG (electroencefalography) and MEG (magnetoencefalo-graphy). Along the time axis, these processes may be periodic, thus generating different cerebral rithms or oscillations (theta, alfa, beta, gamma). EEG or MEG signal analysis implies the analysis of cerebral activity in a global, regional, synchronic or frecuential way. This fact makes it possible to associate such activity with cognitive functions or with specific behaviors, by means of different mathematical models. We exemplify this analysis with the study of relations between the theta rithm and memory processes and, moreover, the relevance of complexity in the diagnose and evaluation of treatment in children with attention deficit.

**Juan Miguel AGUADO** (Universidad de Murcia) *Information, observation and self-reference*

By attempting to fix an observable magnitude, the concept of information involves a cognitive model that enables a double ontological rupture: between subject and world, on one side, and between cognition and action, on the other side. A genealogical approach to information as a simultaneously epistemological and cognitive crossroad highlights the centrality of observation theory in the resolution of its contradictions. The recursive nature of observation inherent to informational logics makes constructivist assumptions especially relevant as a key contribution for an epistemological revision of the ideas of information and communication.

## Is it possible a unified theory? (reductionism, holism, unified theory)

**Wolfgang HOFKIRCHNER**\* (Universidad Salzburgo) *How to Achieve a Unified Theory of Information*

The paper deals with the necessity and feasibility of an integrated information theory. It develops guidelines for how to conceive information in a way that avoids the pitfalls of certain ways of thinking like reductionism, projectivism or disjunctivism.

Web environment. Finally, it is analysed how these languages are used in the Web 2.0, and the incorporation of ontologies in the Semantic Web.

**José María DÍAZ NAFRÍA** (Universidad Alfonso X) *¿Are "the semantic aspects" actually "irrelevant to the engineering problem"?*

Well at the beginning of his famous "Mathematical Theory of Communication" (MTC), Shannon removes from the technical task the semantic questions, and such exoneration seems to be commonly accepted, even for those who certainly care for 'semantic questions'. However, the own MTC communication model is built upon this fundamental assumption, which at a time is used in other information theories and –with even wider practical consequences– as a design pattern for the Information Technologies.

When the human communication is more and more dependant with respect to information technologies, the suitability of the communication model used to design the technological systems has to be put into scope. Non essential element needed to establish a proper human communication should be omitted; otherwise this technology could isolate people, betraying its hypothetical purpose. Comparing the technological model to other based on several pragmatic theories of communication (emerged in linguistics, semiotic, psychology and anthropology) it is shown the insufficiency of the technological model, pointing out some elements that a new model should not forget.

# Is information a subjective or an objective category?

**Alberto GALINDO**\* (Presidente de la Real Academia de las Ciencias) *From bit to qubit*

The irruption of quanta in physics has radically disturbed our view of reality. The relativity demolished the widespread belief in the space and time absoluteness; but one may safely assert that the quantum principles of complementarity and indeterminacy have been more deeply perturbing, as they have obliged us to renounce knowing one half of reality in order to know the complementary half. Moreover, the embodiment of randomness in the quantum formalism, not because of incomplete knowledge, but as an essential imposition of nature, is another feature of the new scientific discourse, implying thereby the abandonment of the Laplacean determinism. Finally, there is an even more intriguing feature of quantum physics: the entanglement. Related to the linear structure of the quantum formalism, the entanglement is responsible, in particular, for the possibility that we might know the state of a compound system while ignoring the states of each of its parties.

Information, seen as memory, processing and communication, is undoubtedly physical. It abides by the physical laws, which give to it their strength and their weakness. The classical information relies on the bits, physical entities which are both robust (under external perturbations) and clonable, and it has a dominant presence in our modern society, which is unimaginable without the support of computers or without the world wide web. But information and quanta met each other about twenty years ago, and from their encounter a promising quantum information has sprung up. Now the dramatis personae are the qubits, fragile and non-clonable. Quantum cryptography and quantum computation outstand as the main research areas in this field.

**Manuel LIZ**\* (Universidad Laguna) *Information, world and mind*

The paper analyses the thesis that all reality may be, in the last term, no more than information and also the thesis that our mind may be, in the last term, no more that information. Both theses are rejected. And it is argued for the need to take into account non-informational aspects of reality which are epistemically accessible. Only that way, the problem of selecting a determinate semantic content and the problem of error could be faced. The two more common strategies to deal with these problems go through the appeal to some primitive "referential capacities" or to the appeal to some special kinds of "functions". We propose another strategy, much more simple and explanatory, based on the notion of

basic ideas of I-T-L by motivating their philosophical underpinnings. One desideratum is to complement and to shed light on some of the philosophical shortcomings of the nowadays paradigmatic model-theoretic concept of logical consequence. Another is to provide a brief sample of questions to be newly addressed form the I-T-L, such as insufficiency as well as redundancy of information in a given axiom-set.

**Gemma ROBLES**\* (Universidad La Laguna) *Weak Consistency and Strong Paraconsistency*

In a standard sense, consistency and paraconsistency are understood as, respectively, the absence of any contradiction and as the absence of the ECQ ("E contradictione quodlibet") rule that allows us to conclude any well formed formula from any contradiction. The aim of this paper is to explain the concepts of weak consistency alternative to the standard one, the concepts of paraconsistency related to them and the concept of strong paraconsisteny, all of which have been defined by the author together with José M. Méndez.

**Carlos AGUILAR**, Lydia SANCHEZ y Manuel CAMPOS (Universidad de Barcelona) *Una aproximación situacional al estudio de los contenidos audiovisuales*

This paper presents a mathematically solid framework for the study of audio-visual contents based on the development by Keith Devlin of situation theory. In order to obtain this framework, we present accounts of the processes carried out by agents from the reception of the audio-visual content to the extraction of information, in accordance with the definition by Israel and Perry. We finally justify why these accounts concerning the extraction of information from audio-visual content can be included as part of a mathematical formulation of situation theory.

**Anto FLORIO** (Universidad del País Vasco) *The notion of information in situation theory and the naturalized epistemology of information and language*

After a concise introduction about the idea of correspondence and correlation, in the first part of the paper two notions of information are grasped by the analysis of Situations Semantic and Situation Theory. The first is that of correlation, the second that of constraint; the latter is reducible to the former. More than that, the phenomenon of "alethic nature of information" is highlighted, a clear concept of information is gained and the nutshell of any possible "informational theory of truth" is point out. In the second part, an informational epistemological synthesis and lecture of language is propounded. The difference between a meaning-oriented language and an informational-oriented language is outlined and 'messages' are recognized as being the atomic constituents of language. In the conclusion the attention is focused on naturalized epistemology of information and language.

**Julio OSTALÉ** (Universidad de Salamanca) *Análisis of semantic information via information reports*

Semantic information is analysed by means of two consecutive approaches. Firstly, we consider semantic information via ordinary-language reports of the form "X carries the information that Y". Secondly, and partially based on the previous analysis, we obtain a number of a priori conditions a physical system has to fulfill for semantic information to take place in such a system.

**Margarita VÁZQUEZ** (Universidad La Laguna) *Conocimiento información y sorpresa*

In this paper, I analyze the paradox called "The surprise exam paradox" or "The unexpected hanging paradox". I study some interpretations of this paradox, like Quine and Ned Hall ones, and give my own view about its solution, making some approaches from classical logic and from temporal or epistemic logics.

# The pragmatic question (systems, person and society)

**Peter FLEISSNER**\* (Universidad Técnica de Viena) *The «Commodification» of Knowledge in the Global Information Society*

With the increasing division of labour and the emergence of markets, useful things have started to become sold and bought. They began a new career as commodities. Since Aristotle the dialectic face of commodities, later on in detail elaborated by Karl Marx, is well known, they carry value in use and value in exchange. Nowadays, where we understand the economy as a social construction and are aware of the relativity of value given to objects, we are still confronted with the same distinction and also with the transition of objects into commodities. The commodification process has not come to an end yet.

The paper gives an overview on the processes of commodifi-cation and de-commodification of goods and services as a background for analysing developments in the emerging information society on a global scale.

Possible strategies on how to go on from now are pre-sented, among them the struggle and on-going resistance of the European Parliament on the one hand, against the European Commission and the European Patent Office on the other, also the movements of open source/free software and the ideas of copyleft to create new rules for information goods.

**Mario PÉREZ-MONTORO**\* (Universidad Barcelona) *Information in organizations*

One of the most visible phenomena taking place within the field of economics in the past decades concerns the growing importance and value that information has acquired within the context of organizations. This value is based conceptually on the critical distinction between the following concepts: data, information, knowledge and document. However, this distinction exhibits a deep conceptual confusion that has hindered its adequate use (conceptual and pragmatic) in organizational contexts. This paper's goal is to show some clarification relative to this distinction. On the one hand, this article characterizes the standard model and evaluates its limitations. On the other hand, this work presents an alternative analysis of the concepts of data, information and knowledge. Finally, it offers a description of the role of the concept of document in this conceptual context.

**Juan Carlos FERNÁNDEZ-MOLINA** (Universidad de Granada) [presentado por Blanca RODRÍGUEZ BRAVO\* (Universidad León)] *Competing views of information: human right vs. commodity, private vs. shared property*

Two competing perspectives of information are analysed. First, the opposition among considering it a human right, so all people should access to it regardless of their economic power, or a commodity, to which only can access who can pay for it. In the same vein, the dichotomy between private or shared property of information is examined, specially meaningful in the intellectual property and copyright legislation field.

**Félix BARRIO**\* (INTECO) *The promotion of the information society from the State administration*

The modernization of a State cannot be limited to a single sector or branch of knowledge, since government is intrinsically intersectorial and interdisciplinary. A government will only be able to enter the era of knowledge and innovation when the question itself is treated as a priority. Programs, plans and projects involving information technology must be treated strategically. The short-, medium- and long-term efforts these plans imply must become points of "consensus" in the various sectors of society that are in any way involved in the question, because the perspective proposed here is not confined to the strict scope of government and public Administration.

**Christian FUCHS** (Universidad de Salzburg) *Towards a Critical Theory of Information*

Critical information theory is an endeavour that focuses ontologically on the analysis of information in the context of domination, asymmetrical power relations, exploitation, oppression, and control by employing epistemologically all theoretical and/or empirical means necessary for doing so in order to contribute at the praxeological level to the establishment of a participatory, co-operative society. Three foundational aspects of a critical theory of information are discussed in this paper: the relation of immanence and transcendence, the relation of base and superstructure, and ideology critique.

The logical figure of immanent transcendence is based on the dialectic of essence and existence and poses a viable counterpart to positivistic and postmodern definitions of critique. As an example for the logic of immanent transcendence to critical information theory, a contradiction of the Internet economy is discussed.

The debate on redistribution and recognition between critical theorists Nancy Fraser and Axel Honneth gives the opportunity to renew the discussion of the relationship of base and superstructure in critical social theory. Critical information theory needs to be aware of economic, political, and cultural demands that it needs to make in struggles for ending domination and oppression, and of the unifying role that the economy and class play in these demands and struggles. Objective and subjective information concepts are based on the underlying worldview of reification. Reification endangers human existence. Information as process and relation enables political and ethical alternatives that have radical implications for society.

**Estela MASTROMATTEO** (Universidad Central de Venezuela) *Latin america's information technologies: promises and realities*

This contribution emphasizes that in order to achieve a real and sustainable human development in Latin America, and for this region to be part of the information society is extremely important to create conditions for a free access to information, education for everyone and permanently, and a development in science and technology destined to serve society. Access to information and information technology are major promises in this era, but at the same time, become new forms of exclusion. In Latin America the two realities coexist. Is crucial in the solution, to rethink the ethics of information and values that underlie it, respect for human rights, the commitment of societies and our leaders. Highlights the role of libraries as mediators in the production process, organization and retrieval of information access, in safeguarding the freedom of information and the right to free expression through technology, with ethics and values into a real development in Latin America.

**Leticia BARRIONUEVO** (Universidad de León) *Open access: scholarly information at society's reach*

The concept of scholarly information and the importance of Open Access is analysed along with the importance that initiative is giving in the academic-scientific field and in society. The model of scholarly communication is studied, as well as, the concerns and problems that could arise. Two paths drive to Open Access: gold road, that suggests the publication of research in OA journals, and green road, whereby authors self archive their papers in repositories, which are other choices to traditional model of scientific dissemination.

**José Antonio MOREIRO** et al (Universidad Carlos III) *Indexing languages in information management ¿a promising future or an obsolete resource?*

Indexing languages have traditionally been an essential tool for organizing and retrieving documental information. The inclusion of indexing languages into the digital environment leads to new frontiers, but also new opportunities. This study shows the historical evolution of the indexing languages and its application in document management field. We analyse diverse trends for their digital use from two perspectives: its integration with other digital and linguistic resources, and the adjustment of it to the