

# Introduction

## The Social Brain and Connective Intelligence

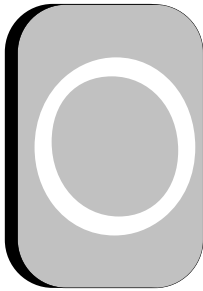
Cerebro social e inteligencia conectiva

*Guest-edited special issue:*

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Over the last two centuries, social communication was based on the assumption that access to information, intellection and subsequent decision-making, operated through two exclusive channels: firstly through reason, which gave rise over time to modern techniques and 'élite' media; and secondly through emotions or instincts that amplify feelings and sensations, which led to the foundation of means and techniques for mass sensationalist persuasive media. However, ever since 2003, it was clear that the entire industry of social communication and media was going to endure a profound crisis for its survival. Advertising, "mass media", consumer marketing and dominating political marketing, which had been designed for a mass market and society, were ceasing to be useful and to fulfil individual and social objectives. It became necessary to find and establish new management models and parameters. Basic working processes needed to be rethought such as: how collect and receive data and transform it into stages of knowledge; which processes actually make consumers of this knowledge jump to voting or purchasing decisions; and to what extent do these processes and decisions act at individual levels and parameters or does collective intelligence or the social brain really exist.

We began to take interest in this issue at the Complutense University of Madrid –and at other research groups from other universities– in 2005. We did not believe we could answer these questions by using traditional advertising, marketing or information sources but foresaw more promising openings in what are considered "frontier sciences": Neuroscience and Network Theory, with the support of Genetics, the Theory of Mind, Big Data's algorithms as well as developments in other areas such as Pedagogy, Linguistics, or Discourse Theory. Special attention was given to Neuroscience. These disciplines, which are now advanced, open the way of understanding and accessing information on those processes, as demonstrated by Damasio and Rizzolatti. Derived applications of neuroscience to other scientific fields and specifically to social sciences have been made since the middle of the 1990s. The best-known pieces of research are A. Damasio's study (2003) on the ability of emotions to access and organize information, Lakoff's research (2008) on neurolanguage and its implications for political action, those by Darren Schreider on Neuropolitics or the applications of mirror neurons in the vote process (Schreider, & Lacoboni, 2003) or experiments on "neuromarketing/ neuroshopping" and the relationship between brain, advertising and purchase options carried out at the Iacoboni labs at UCLA (Montague, King-Casas & Cohen, 2006). The brain's capabilities discovered by Damasio (2010) and the discovery of mirror neurons by Rizzolatti and his team (2006) unleashed the establishment of new parameters and basic models to manage ideas and decisions in such a way that advertising professionals, journalists and communication and marketing managers could create, identify, produce and develop efficient tools, products, systems and protocols with returns.

In parallel, since 2005, networks have emerged physically and conceptually, at the heart of scientific innovation.

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We started working on this idea under the influence of Mark Buchanan's book (2002) which unveils the connections underlying human behaviour. From each of their different perspectives, mathematicians, physicists, neurobiologists, geneticists, computer and social scientists present these networks as the actual fabric of evolution and life. It seemed then that the most interesting of such networks and connections were human connections. To "be connected", the link, the system, is what explains life. In addition, these connections are necessarily collective and go beyond the mere mechanics of physics and chemistry. Therefore, the process of evolution outlives matter, incorporating successive strata to its dynamic network of links.

Within this framework we have been working on projects supported initially by "Plan Nacional del MINECO" and now by the Santander Universidades foundation. This special issue of "Comunicar" is meaningful within this context. We asked researchers to present their conclusions on this extensive and topical field: on brain behaviour when processing access to knowledge; the decision making process; actions of connective intelligence; individual or group data organization process; the formulas that develop, generate and set complex models defined in algorithms that give meaning to correlations between different information packets such as they are already being processed by Amazon or credit card companies - something never possible or hardly attainable before ; connections between health and air quality; the use of genetic connections to create drought-resistant seeds; prediction of increasing delinquency and crimes in cities, etc.

In this special issue, we attempt to answer some of the big questions posed today in the world of neuroscience, whether on methodologies applied in various fields, or the obstacles and difficulties -mostly of an ethical nature- that other experimental studies in this area are facing. In addition, further orientations have been analysed through the research proposals chosen for this monograph, for example: the new challenges faced by researchers working on how information and behaviour relate to each other in the 21st century, and how our knowledge of both the individual brain and the social brain (or collective intelligence) lead to applications in fields such as information processes, education, research and co-creation of ideas among others.

Thanks to the papers brought together in this issue, we play "knowledge games" offering concrete applications to practically all human activities: information management, monitoring, brand analysis, studies of competition, promoting networking and public relations, identifying new opportunities and business niches, accessing and managing market data, all within the perspective of increasing business profitability, driving sales, improving customer service and/or renewing the economy.



We open this monograph with a fascinating contribution on the use of neuroscience for the innovation of televised content. This research, produced by professors Verónica Crespo-Pereira (University of Vigo), Valentín-Alejandro Martínez-Fernández (University of A Coruña) and Francisco Campos Freire (University of Santiago de Compostela) analyses the ability of neuroscience to optimise the production of content adapted to the viewer's preferences and verifies how these methodologies are introduced within main public European radio and television companies. Through an extensive analysis of annual reports, consolidated accounts and digital content from radio and television corporations in the European Union, enriched with the opinions and experiences of leading experts in neuroscience, the authors show that Neuromarketing is being used by an ever increasing number of European broadcasting institutions as an innovative audiovisual tool. They use this tool to test and design entertainment products, commercial blocks and improve competitiveness, in particular in their application to educational programming strategies, which is the main task of these public services. According to the researchers, the deficit in neuroscientific research by public radio and television institutions in education is mainly due to the tendency for these institutions to compete under the same standards as commercial television, leading them to give priority to entertainment over public service content.

Effectiveness of communication in the field of advertising is also the subject of the paper entitled "Evaluation of the Emotional Responses to Televised Advertising through Neuromarketing", by professors Antonio Baraybar-Fernández, Miguel Baños-Gonzalez, Oscar Pérez-Barquero and Rebeca Goya-Esteban, all from the Rey Juan Carlos University of Madrid, and lecturer Alexia de la Morena Gómez from the International University of La Rioja. The authors analyse the relationship between emotions induced in audiovisual advertising messages and their impact on the subject's memory. To achieve this purpose, based on a thorough selection of advertising messages representing all six basic emotions (joy, surprise, anger, disgust, fear and sadness) and other purely rational aspects, different impact measurement techniques were applied to the subjects participating in the study using tools such as the cardiac electrical activity (ECG) and the electrical activity of the Dermis (AED). Based on this methodology, the authors analyse how different types of emotions used in audiovisual advertising messages influence the heart's electrical activity and the electrical activity of the subject's dermis, and how these values vary according to emotional or rational messages. Researchers argue the existence of significant variations in measurements recorded in messages of joy, surprise and anger. At the same time, whether applied to suggested recall of the transmitted message or to the advertiser's activity, the best-performing ads were those focusing on sadness. With this and other truly striking findings, the study demonstrates the importance of Neuromarketing as an efficient research tool for the advertising market.

The paper entitled "Connective Intelligence for Children's Mathematical Education" discusses acquisition of knowledge in a specific field, in this case of mathematics, by professors María-Luisa Novo and José-María Marbán (University of Valladolid), Angel Alsina (University of Girona) and Ainhoa Berciano (University of the Basque Country). According to the authors, knowledge we already have on individual and collective brains has hardly been taken into account in the development of mathematical thinking in early childhood education, when children begin to develop key elements for decision-making, and everyday life problem solving, data processing and understanding of their environment. This research uses a connectionism approach to analyse the process of teaching and learning mathematics in early childhood, determining on one hand what common characteristics of mathematical practices promote connections and, on the other hand, identifying various types of math connections to promote connective intelligence. Applying a methodology based on the combined use of research-action and Grounded Theory, the authors conclude that a prototype of activity or set of activities, whether conceptual, educational or practical, is produced which promote, in form of a didactic sequence, different types of mathematical connections to develop connective intelligence in early childhood education.

Undoubtedly, one of most ambitious questions we attempt to answer relates to the process by which we acquire knowledge, i.e. what makes learning meaningful to our brain? This research is led by professors Ubaldo Cuesta-Cambra and Jose-Ignacio Gonzalez-Niño (Complutense University) and José Rodríguez-Terceño (ESERP Business School in Madrid). In "The Cognitive Processing of an Educational App with EEG and Eye Tracking", the authors study how information is analysed and learnt, what type of visual attention is given, taking account, among others variables, possible gender differences. Through an experimental methodology based on the use of techniques such as "Eye Tracking" and electroencephalogram, this research demonstrates the existence of different patterns of visual activity between men and women, that in fact do not affect how they are recalled from memory. This, according to the authors, is determined by the emotional values of the image which has an inversely propor-

tional relationship between complexity and visual fixation. Through the results' analysis, this research indicates that the subjects' conduct towards an educational app resembles the low commitment behaviour found in advertising and suggests a redesign of these applications to be more effective.

We close this issue with a study focused on education entitled "Communication Efficiency in Education: Increasing Emotions and Storytelling". This is the link to analyse neuroscience's applications in the world of communication. The professors Joan Ferrés and Maria Jose Masanet, of the University Pompeu Fabra in Barcelona, discuss the effectiveness of educational communication in a four-pronged approach: that provided by the Church, schools, journalism and advertising. The authors analyse what different communication professionals understand by 'communication' and how they face the challenge of interacting with others' minds, paying special attention to the challenges and difficulties encountered in the communicative processes. Based on the results obtained in their study, the authors point out that teachers and educators need to open up to the communicative potential of emotion, interaction and storytelling, thus going beyond communication uniquely centred on the cognitive, focused on transmitting, and more concerned with ensuring supply rather than creating demand. The researchers conclude that the brain's powerhouse is not the cognitive system but the emotional system and, therefore, to enhance the emotional dimension of educational communication, it is necessary to design new strategies in which the multiplicity of diverse interests that motivate different students be addressed.

Only spatial limitations prevented us from answering many other questions raised in today's changing and innovative world of neuroscience. We hope that the selection of topics collected here is of interest to researchers in each field of application of neuroscience and may serve as reference material for future research in this field.

## Referencias

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