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## Original Article

# Educating 'cerebral subjects': The emergence of *brain talk* in the Argentinean society

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**Abstract** This article focuses on both the dissemination of neuroscientific knowledge and its social implications through the analysis of a television program entitled *The Enigmas of the Brain* hosted by an Argentinean neuroscientist. My main concern in this article is to analyze some of the discursive uses of brain talk, that is, the many ways in which brain terminology is engaged in accounts about what the brain does and how some terms are linked together in order to create a sense of brain causality in a number of heterogeneous processes. The research that led to this article follows a qualitative design. The content of the television show was transcribed and analyzed following a content analysis strategy. This data is part of a sociological research project about the cognitive neuroscience field in Argentina. I suggest that brain talk is more about creating new words to explain and make sense of life than about communicating scientific information to a lay audience. As it is explained in the program, the purpose is to educate the public, but I argue that not in the sense of giving new information, but in the sense of producing linguistic resources that encourage the emergence of new self-narratives.

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## Introduction

Neuroscience has contributed to changing the status of the brain, giving it a social value in politics, everyday life and cultural references. These transformations have been analyzed from different sociological, ethical and philosophical perspectives, such as the notion of the 'cerebral subject' (Ehrenberg, 2004, 2008; Ortega, 2008; Vidal, 2009), which refers to an anthropological figure that embodies the belief that human beings are essentially reducible to their brains. In the same line, the concept of 'neurochemical selves' (Rose, 2003, 2007) depicts the emergence of a new way of thinking related to the notion that any kind of psychiatric disorder and personal sorrow is caused by a chemical imbalance in the brain.

This article focuses on both the dissemination of neuroscientific knowledge and its social implications. Despite evidence as to the importance of neuroscientific implications in European and North American societies, it is necessary to determine if these findings are relevant in different contexts. For this purpose I consider the case of Argentina, a peripheral but relatively up-to-date country with respect to the central traditions that have dominated modern science (Kreimer, 2010).

The central aim of this article is to explore the popular representation of the brain through the following questions: Which are the concepts and ideas about the brain that are being spread out to the lay public? How is the role of neuroscience explained to the audience? In order to address these questions I have analyzed a television program hosted by an Argentinean neuroscientist entitled *The Enigmas of the Brain (Los Enigmas del Cerebro)* that, in the presenter's words, "attempts to educate Spanish-speaking audiences about the brain and cognition".

Previous research has described how the popular press has shown an increasing interest in brain-related findings (Racine *et al*, 2006; Beck, 2010) and in describing the dissemination of functional neuroimaging techniques, such as functional MRI (fMRI) and positron emission tomography technology. One of the principal concerns of these studies is the process of communication to the public, specifically in relation to the dissemination of improvements in the clinical domain. Some of that research warns about how the misrepresentation of neuroscientific data may result in misleading conclusions in the media (Gonon *et al*, 2011). Thus, claims about a more informed, critical press were made (Racine *et al*, 2005), especially considering that neuroscience is prone to misinformation and inaccurate reporting.

Along similar lines, Racine *et al* (2010) examine how different features of neuroscience are depicted in the print media and how the media's coverage of neuroscientific innovation could have potential undesirable consequences. In particular, these researchers warn about the impact of unrealistic expectations, which could suggest capabilities of neuroscience such as mind-reading, which are far beyond what can be achieved (*ibid*, p. 726). They also highlight how public understanding and appreciation of neuroscience may shape debates about the ethical use of neuroscience, for instance, in the field of health care. Johnson and Littlefield (2011) explore some of the textual changes that result from the translation of neuroscience to popular neuroscience and through rhetorical analysis examine the way in which popular neuroscience is used to support claims in emerging disciplines like neuroeconomics and neurolaw among others. Their analysis shows how popular neuroscience is spreading into other areas of knowledge, which clearly shows its cultural impact in society.

Even if there are several of European and North American research on public images and media coverage in the field of neuroscience, those studies focus specifically on the press media and their concern is more about the correct translation of scientific information to the lay public than about approaching the cultural implications of popular science. As some authors have pointed out, the extent to which neuroscientific discourses are actually changing concepts of personhood, personal identity and social and institutional practices, among other aspects of popular culture, is still a novel area within social studies (Pickersgill, 2011; Whiteley, 2012). However, there are some illuminating empirical studies addressing these issues. The connection between science and society values is worked through the interesting historical work by Cooter (1984), who describes the transformation of phrenology into a scientific vehicle for ideas on social life and its organization, showing how social interests are revealed through science. The research on brain talk by Singh (2013) analyzes children's

discourse about the brain, the self and behavior, and she suggests how children's discursive engagements with the brain show not only significant evidence of self-agency but also a relatively autonomous vision of a brain-centered identity. The research on functional neuroimaging by Whiteley (2012) is a warning against premature conclusions concerning the reductive impact of popularized neuroimages in lay public. This is comparable to studies that have also reported the relative impact of the perspective of neuroscience in personal beliefs when it comes to oncologic patients, clinical practices in the treatment of depression and the treatment of psychopathy, respectively (Gross, 2011; Helén, 2011; Pickersgill, 2011).

On the other hand, Vrecko (2006) examines the ways in which neuroscientific ideas about treatments for problem drinking are providing new means for individuals to think and talk about behaviors. More related to a cultural analysis of the impact of neuroscience in society is the interesting research by Thornton (2011), a study of brain science at the level of culture, in terms of the transformation of the brain as a contemporary cultural icon and its impact in everyday life. He explores the main characteristics of brain culture and highlights the central role played by brain imagery in driving popular conceptions of neuroscience and in thinking almost every aspect of personhood and behavior through the brain. "Popular neuroscience makes life calculable in terms of both assessment and intervention", says Thornton (2011, p. 6) and he supports this statement showing how the dissemination of brain-based vocabularies is a means to expand this belief.

Although in Argentina there are no previous studies on this topic, a similar one is the inspiring study by Azize (2010), an anthropological research carried out in Brazil focusing on the notion of 'person' depicted by popular neuroscience among a wide ethnographic material ranging from the popularization of neuroscience proper (in books, theatricals plays, television), the advertising of psychopharmaceuticals (promoting 'diseases of the brain') by pharmaceutical laboratories and representations that run through the spontaneous cosmology of modern western culture. Through an analysis of the process of dissemination of brain vocabularies, Azize examines how the equivalence between brain and the individual is being expanded to the lay public. He considers some neuroscientific claims concerning the meaning of well-being, mental health and pleasure, among others, and suggests how a brain-based notion of person, invested with the ethos of scientific authority is embodied in practices of the self. One of his most interesting insights is the description of how children are being socialized within a *neuro* view of the person through theatrical plays.

My main concern in this article is to analyze some of the discursive uses of *brain talk* in Argentina, borrowing the terms of Fox Keller (2000):

Finally, one last function of gene talk must be mentioned, which concerns its use as a tool for persuasion. Never in the history of the gene has the term had such force in the popular imagination as in recent years, and accordingly, never has gene talk had more persuasive – that is, rhetorical – power. The invocation of genes has proven not only in securing funding and promoting research agendas but also (and perhaps even especially) in marketing the products of a rapidly expanding biotech industry. (p. 143)

I define the notion of *brain talk* as the many ways in which brain terminology is engaged in accounts about what the brain does and how some terms are linked together in order to create a sense of brain causality in a number of heterogeneous processes. Similar to the gene case, the

legitimacy of the brain talk is built on its rhetorical power. As Thornton (2011) has pointed out “The brain is rhetorical not only because it is mediated but because its very ontology – or what we think that the brain is in essence – is conditioned by the social, political, and economic milieu”. I suggest that the importance of the rhetorical power is not in the explanations provided of what the brain really does but in the ways in which the brain is shaped as a locus of multi causal agency (Fox Keller, 2000) and especially in the emphasis given to its *enigmatic* character, which contributes to perform an idea of the brain as a mysterious object but possible to be revealed through scientific inquiry.

The argumentative orientation of the TV show analyzed in the article could be described through four discursive strategies. First, the constitution of a therapeutic future created through the idea of improving neurological conditions. Second, the notion of neuroscience as a corpus of knowledge valuable to answer broad questions related to human nature. Third, the connection between brain facts and social and political life as part of a whole process. Fourth, the definition of a materialistic view of human beings used to explain the emotional and psychological aspects of human identity. Along these pages I will describe these strategies in detail. The success of this discursive process lies in placing the brain in a space usually given to some other notions, such as the psyche, the unconscious and the society, among others.

The popularization of science is generally understood as a point of contact between the scientific profession and the interested public, and a principal channel for the transfer of science information into the public domain. However, I argue that the main function of popular science is not to facilitate the public understanding of neuroscience, or to transfer of science information to the lay public, but to create a space for the recognition of neuroscientific facts in the public sphere and in doing so to contribute to shaping and reconfiguring concepts of personal identity and parameters of social life. I propose an analysis of the cultural effects of the popularization of science, an approach similar to Azize’s (2010) and Thornton’s (2011). Within this perspective, one relevant aspect to address is the way in which popular science “frame neuroscience as an accessible body of knowledge that has direct, concrete applications for almost every aspect of daily life” (Thornton, 2011, p. 1).

## Argentinean Therapeutic Culture

As pointed out in previous studies, the influence of psychoanalysis in Argentinean urban centers has a strong presence not only in the clinical domain but also in everyday culture (Vezetti, 1995; Plotkin, 2003). The tradition of a humanistic psychology conversing with philosophy and the social sciences to the detriment of a scientific psychology is a constituent feature of the Argentine psy field (Dagfal, 2009). Argentina’s therapeutic culture is culturally influenced by a dualistic vision of human beings, especially in the conception of mental disorders, expressed by the humanism versus scientificism opposition, which gives a central position to the subject, and not to the brain, as the *locus* of mental disorders. From this perspective, psychoanalytic knowledge becomes the way into this subjectivity, as opposed to the approach of neuroscience, in the search for behavioral regularities that would not be enough to comprehend the uniqueness of human suffering. However, in the last decades,

psychoanalysis has overlapped with the growing influence of other psychotherapeutic discourses. I am referring to cognitivism, cognitive and social neurosciences, and other discourses on well-being, such alternative or complementary therapies, the new age movement, yoga and reiki, to name just a few of the options that complement or at times compete with the classic models of treatment for mental disorders (Carozzi, 2001; Saizar, 2008; Sarudiansky *et al*, 2009; Korman *et al*, 2010).

In this context, the current scenario of the therapeutic cultures in the City of Buenos Aires cannot be defined from an exclusively psychoanalytic hegemony. In light of the present changes, the resistance to the neuroscientific paradigm described by Lakoff lacks all its representativity. The author claims that in Argentina “*Diagnostic and Statistical Manual of Mental Disorders* (DSM) faced professional resistance on both epistemological and political grounds”. (Lakoff, 2005, p. 41). According to him:

The pervasive presence of psychodynamic models among psy-professionals led to an emphasis on the unique clinical encounter between doctor and patient, and a suspicion of diagnostic categories that purported to generalize across cases. Meanwhile, there was political opposition to the incursion of such standards on the grounds that they were being imposed in the interest of managed care and the pharmaceutical industry. Many Argentinean psychiatrists associated the use of DSM with neoliberalism, the privatization of national industries, and the dismantling of the welfare state. (ibid, p. 39)

Such description is acceptable to understand the historic structuring of a psychotherapeutic tradition in the country but, even if it is still valid, it is susceptible to revisions. First, it is important to mention the acceptance of DSM as the official diagnostic system in Argentina, regardless of its resistances and obstacles.<sup>1</sup> On the one hand, the mental health system follows the diagnostic patterns imposed by the DSM. The authorization of mental health services requires a diagnosis in accordance with said manual, the disability certificates granted by the State, which give their holders access to a number of social benefits, can be processed following a diagnosis based on the DSM guidelines. Even though in the public mental health system (which the hospital where the author carried out her field work belongs to) most professionals bear a psychoanalytic educational background and there occurs disputes between both models of conceiving mental disorders, the resistance to the neuroscientific paradigm diminishes because of the official adoption of the DSM. Taking into account the growth of cognitive therapies, in particular in the private sector and private health insurances, resistance to the neuroscientific paradigm describes more reliably the working of the public sector, that is, just a part of mental health services available.<sup>2</sup>

1 In this regard, see Bianchi (2012), who shows the dispute around the Attention Deficit Hyperactivity Disorder diagnosis and Mantilla (2010a, b, c), regarding the different approaches in psychiatric hospital admission and in the diagnostic conception.

2 Argentina's health system is made up of three subsectors: public, private and social securities. The first one comprises public hospital and primary health-care centers providing free assistance under the coordination of the Ministry of Health. The social security system is made up of institutions that provide health services to workers on the payroll (who give a compulsory contribution through their salaries to support the system). Finally, the private health sector is made up of health-care institutions that provide paid services to their users.

Second, and closely related to the previous point, the progressive establishment of a therapeutic culture associated to the brain discourses weakens the argument that points at the psychoanalytic culture as an obstacle to neurosciences. The growth of the therapeutic repertoire inspired in scientific studies of the brain, such as mindfulness<sup>3</sup> and EMDR,<sup>4</sup> among others, as well as the proliferation of brain vocabulary amalgamated to well-being discourses and self-help that appear in several current affairs and popular psychology magazines, all account for an amplitude toward brain discourses.

Lastly, the resistance against the neuroscientific paradigm referred to by Lakoff (2005) has its counterpart in clinical practice. The intervention processes exhibit combinations between the psychoanalytic and biological perspectives, given that clinical practice imposes the articulation of both models. In previous research (Mantilla, 2010a), I recorded both the professionals' allusion to an "artisanal practice" (the combination of therapeutic resources in order to give an answer to the complexity of the situations experienced by the patients), and I also documented disputes between a psychoanalytical (Lacanian) paradigm and another orientated to biological psychiatry. Nevertheless, resistance to the neuroscientific paradigm did not appear as a rejection of the pharmacological resource, but rather it presented biology as the basis of the etiology of psychiatric disorders. Lakoff himself describes the "ironic use of psychotropic drugs", given that when calming down the patient, they favor interventions in subjectivity and the alliances between a neuroscientific perspective and a psychoanalytic one.

However, this shift in psychoanalysis as the epicenter of a therapeutic culture in Argentina is a recent phenomenon that is in constant transformation and therefore studies on it are still lacking studies.

Just as during the twentieth century the influence of the French thought was central in the construction of psychological discourse, the last decades show a cultural shift toward the Anglo-Saxon influence, especially the (North) American one. On the one hand, as mentioned before, this was because of the establishment of the DSM as a diagnostic system for mental disorders. On the other hand, this was because of the growth of the cognitive approach both as part of the psychotherapeutic offer in the health system<sup>5</sup> and the training of psychologists, especially at private universities (Dagfal, 2009; Korman *et al*, 2010), and lastly, it was owing to the proliferation of self-help literature, which since the 90s has become a phenomenon of relevant cultural consumption (Carozzi, 2000; Papalini, 2006).

Likewise, during the first decade of the twenty-first century, the neurosciences field began to expand in the country. The creation of research institutions specifically devoted to

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3 The practice of mindfulness meditation supported by the encounter of Buddhism and neuroscience is introduced by Dr John Kabat Zin at Massachusetts University and has a growing presence in Argentina through different non-government associations whose pioneers were trained in the United States. The mindfulness method is offered as an 8-week-stress-reduction program and is open to all the people.

4 'Eye movement desentization and reprocessing' (EMDR) is a psychological method developed in 1987 by Francine Shapiro, a researcher at the Mental Research Institute, for the treatment of post-traumatic stress disorders and for anxiety disorders. It was introduced in the early 90s by Pablo and Raquel Ferrazzano de Solvey, among others, ([www.terapiasdeavanzada.org](http://www.terapiasdeavanzada.org), [www.emdr.org.ar](http://www.emdr.org.ar), Asociación Civil EMDRIA Latinoamérica), and has slightly developed since then.

5 According to Korman *et al* (2010) the health system has incorporated contemporary criteria such as "efficacy", "effectiveness" and "efficiency" into the psychotherapeutic treatments, which are closer to the cognitive model.

neuroscientific research,<sup>6</sup> the return to the country of researchers trained abroad (in the United States and England) in the field of cognitive neurosciences and the emergence of small research groups are the main factors that account for this fact.

## Methodology

This data analyzed in the article is part of a sociological research project about the cognitive neuroscience field in Argentina. Through a combination of interviews, ethnographic and documentary research methods I have studied scientific and clinical practices in the brain as well as the dissemination of brain facts to the lay public. The research that led to this article follows a qualitative design.

Twenty-three episodes of the TV show *The Enigmas of the Brain* broadcast on cable television during 2011 have been analyzed for this article. The verbal content of the television show was transcribed and the visual aspects of the presentation of contents were registered through fieldnotes. The data was codified using a coding framework and analyzed following a thematic analysis strategy (Dey, 1993).

The data was categorized into the following main categories: the role of neurosciences, intervention areas, new questions, brain definitions and brain areas among others. The coding was done identifying the repetition and frequency both of words and of specific statements, as well as the different ways of making statements (the emphasis placed on one of the ideas, the way in which the topics were highlighted and the appeals to the interlocutor, among others). The categories emerged from the identification of the recurrence of words and key topics related with the main issues in the article.

Here, I will focus on some discursive elements, chosen because of their rhetorical power in delineating the main features of brain talk.

## The Brain on TV

In recent years popular science in Argentina has increased its interest in the findings of neuroscience, which is evidenced by its increasing appearance on the news, on radio programs and in special issues of some magazines. Further proof of this is the presence of neuroscientists in the media, both on radio and on TV programs, to which they are invited in order to present their opinions on everyday life issues and on the management of human difficulties. The growing number of journalistic articles on the emergence of self-help bestsellers, plays, social networks and Webpages on the topic and the discoveries of neuroscience presented in scientific congresses are just a few examples of this process. The growth of social spaces and cultural platforms (Illouz, 2010) where neurosciences are present shows the importance of the brain discourses in the social arena and the emergence of new therapeutic cultures. The show *The Enigmas of the Brain*, broadcast on one of the cable television channel with highest

6 The Instituto de Neurología Cognitiva (INECO) [Cognitive Neurology Institute], directed by the neuroscientist who also hosts the analyzed TV program and the laboratory of Integrative Neuroscience of the University of Buenos Aires.

audience figures on Saturdays at night, during 2011, is an example of this growing interest. The main purpose of the show is to educate the lay public about what they consider the most relevant issues in the field of neuroscience. The next quotation is an example on how these issues are presented to the audience:

Doctor Manes now hosts a new TV show, entitled “The Enigmas of the Brain” (*Los Enigmas del Cerebro*). The show explores some of the most fascinating issues of brain functioning and attempts to educate Spanish-speaking audiences about brain and cognition.

The host of the show is a neuroscientist, the head of a private center for the research, prevention, diagnosis and treatment of cognitive and behavioral disorders. As a researcher, having trained in leading research institutes in the United Kingdom and the United States, where he is still working on shared research projects, Dr Manes is one of the pioneers in cognitive neuroscience in Argentina.

The show consisted of 23 episodes, about half an hour long and some of the titles were: Sleep & Cognition, Brain & Music, Anxiety, Mysterious Cases, Happiness and Reward, Intelligence and Decision Making, to name just a few. The series can also be watched on the presenter’s YouTube channel, on his Facebook page and on the Webpage of the research center he directs. These virtual spaces are greatly visited and receive plenty of comments, which might be indicators of a favorable response to the program.

The structure of the show is similar across the episodes: each one opens with a number of key questions, a description of the challenge of explaining the complexities of the brain and a brief summary of the scientific trajectory of the host. Each episode ends with a brief summary of the contents preceded by the question: “What have we learned today?”

The information is communicated in layman’s terms; explanatory cases such as patients’ stories are frequently used to illustrate the dynamics of neuroscience discoveries; and the language is clear enough and supported with examples from everyday life.

As the presenter develops the topic, different sorts of images are shown, from people walking on the streets or doing spare time activities to scans of the brain and scientists doing research. Most of these ‘street images’ do not appear to have a real function, but others, like some scenes from movies or brain images, are used to illustrate the scientist’s explanation. The mix between images of everyday activities and scientific images (such as brain scans or scientists in a lab) facilitates the process of making sense of the brain in our regular lives and in doing so, it brings the brain closer to the lay public. What is remarkable here is how the brain appears to be linked to our everyday life. This connection is seen along the episodes and allows brain talk to be introduced as part of the lay vocabulary, enabling regular people to incorporate the brain as a resource to narrate the self.

Each episode shows an interview with a scientist, most of the times a foreign researcher, well-known worldwide. Over the 23 episodes, only two Argentinean scientists were interviewed, one of whom works in the United Kingdom.<sup>7</sup> In general, the purpose of the interviews is to update the state of affairs in a particular area of neuroscience. In most of the interviews the lack of certainties in relation to many of the research inquiries is made a point of, however,

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<sup>7</sup> International guest interviewees have included Mike Gazzaniga, Joseph LeDoux, Antoine Bechara, John Cacioppo, Martha Farah, among others.





the tone of the show is hopeful regarding neuro-advances. This could be interpreted as an example of how the main interest of the show is more to persuade the public about the importance of the brain than to disseminate scientific knowledge.

As mentioned before, each episode starts with a group of key questions and ends with a summary of the main points addressed during the show. The following are some examples of the kind of questions posed:

- What happens in our brain when we experience happiness?
- Is it possible to explain love in scientific terms?
- How does the brain process and modulate positive emotions like rewards, pleasure and love?
- How is neuroscience reflected in creativity, especially in the building up of artistic expression?
- How does a politician's brain function?
- Are there any brain differences when it comes to political ideology?
- Which areas of the brain are involved in the production and reception of language?
- How does the brain acquire its language function?
- How does the brain observe the world?
- Is the complexity of our brains a product of social complexity?
- To which extent is the brain a social organ?

Some of the questions are not necessarily answered during the show, but seem to be presented as flashy topics to gain the audience's attention.

## Why is it Important to Talk about the Brain?

In what follows, I describe the main issues surrounding brain talk. In other words, the ideas, notions and beliefs that are spread to the audience through the show, such as the role of neuroscience as a discipline and the emergence of the brain as an *actor* involved in different processes, from health and illness to political decisions. From sociology of culture approach I organize the description of the brain talk into what I called *discursive strategies*, communicative ways in which the information in the show is formulated, organized and translated to the lay public. However, the focus is not on the communicative ways *per se*, but on *cultural materials* that could be understood as significant practices that use and recreate social and cultural elements (Felitti, 2010).

The argumentative orientation of the show could be described through four discursive strategies. First, the constitution of a therapeutic future created through the idea of improving neurological conditions. Second, the notion of neuroscience as a corpus of knowledge valuable to answer broad questions related to human nature. Third, the connection between brain facts and social and political life as part of a whole process. Fourth, the definition of a materialistic view of human beings used to explain the emotional and psychological aspects of human identity.

In the following sections I will explore and describe these discursive strategies, which appear to belong to different purposes but are in fact deeply connected because of their same practical function: to build up the legitimacy of neuroscience and to create a space for the brain as an object of cultural significance.

## Neuroscience and the Construction of a Therapeutic Future

Even though the brain is the main character in the show, one of the most significant topics repeatedly argued in most of the episodes is the relevance of neuroscience as a discipline dedicated to find answers to human nature. The consolidation of neuroscientific authority is built through what Rubin (2008, quoted in Pickersgill, 2011, p. 448) might call the “therapeutic promise”, which implies the possibility to enhance a variety of clinical practices. In this sense, the role of the media is relevant to the expansion of the credibility of neuroscience and also to expanding the belief of what Clarke *et al* (2003, p. 171) would call “health as moral obligation”, which implies that health becomes an aim to pursue in order to become a good citizenship.

In this case, the construction of a therapeutic promise is built around the future, which means that the value of the therapy itself is postponed for a future time in which scientific efforts will come together in clinical practices. However, this therapeutic hope is built through neurological diseases much more than through psychiatric disorders, which are described with ‘an unknown etiology’. Both dementia and Alzheimer disease are defined as priority areas of neuroscientific intervention; and especially Alzheimer disease is described as “the next global epidemic needed to be recognized by Public Health”. In the presenter’s words, “the challenge for neuroscience is to delay the illness at least five years”.

As mentioned during the show, “in order to detect the changes of the brain before the symptoms appear” and because “it is easier to protect healthy neurons than to repair the sick ones”, the discourse of *prevention* becomes a central characteristic of brain talk. The importance of prevention enables neuroscientists to encourage the population “to protect their brains in order to reduce cognitive deteriorating risk” as it is said in some episodes. The concept of medicine based on risk, from treating the sick to treating those at risk of becoming so, is the general assumption (Castel, 1986; Clarke *et al*, 2003; Rose, 2007; Novas, 2008) underlying this proposition. A case described during one of the episodes is a good example: it is the story of a large Colombian family that carries a genetic mutation of Alzheimer disease without presenting the symptoms. Because of this genetic mutation, they were offered to take part in an experimental pharmacological research study for which all the family members were given some medication that would be tested on them. Quoting the presenter’s words: “This is amazing, because what science is looking for is to stop the disease before the symptoms appear. This is hope for a cure”. This idea corresponds to a conception of prevention that enables some kind of intervention, in this case, a pharmaceutical one. Not only do prevention and intervention assume a relevant role as part of brain talk, prediction is also another powerful element in the expertise of neuroscience, and it is especially articulated to the advances of neuroimaging, as they mention in many episodes. The following is an example related to brain damage:

Thanks to functional images it is possible to predict which person that is going to recover better and also which type of cerebral circuits take control for the damaged ones.

Owing to this discursive strategy, prevention turns into intervention, reinforced by the force of prediction and, as a consequence *therapeutic future* becomes possible sustained by a “policy of hope” (Novas, 2006). Novas uses this concept in the case of genetic diseases to understand the effort and illusions that not only patients, but also professionals, researchers and the

pharmaceutical and biologic market direct toward new life technologies. This notion can be applied to the studies of the brain. It is hope that mobilizes civil society when it comes to the management, support and follow-up of research, while the new technologies, because of their experimental character, tend to search (economic, organizational and symbolic) backing as some sort of investment in future.

In Rose's (2007, p. 17) words "These technologies of life seek to reshape the vital future by action in the vital present". This is part of a larger transformation, the technologization and scientification of biomedicine (Burri and Dumit, 2007)<sup>8</sup> that erase the lines between treatment and enhancement (Rose, 2007) allowing the possibility to reshape the self-capabilities independently from the definition of a human condition as a situation to cure or improve.

## New Answers for Old Questions

With regard to the second discursive strategy, more than explaining how the brain functions or the novelty of ideas and developments generated by neuroscience research, I argue that the main focus of the show is on highlighting how neuroscientific claims emerge as a new realm of knowledge to address questions historically defined as a competence of sociology and philosophy, such as consciousness, willpower, human nature and the explanation of morality among others:

For thousands of years our civilization has been asking about the origin of thought, speech, language, decision making. This has been addressed by religious leaders, scientists, and philosophers. Today, due to the advances in the study of brain images and genetic studies we can address these themes from the perspective of neuroscience.

For many years, happiness was the topic of debate of philosophers and religions. For some decades, neuroscience has started to study this fundamental area in the life of human beings.

These fragments appear as opening words on some episodes, suggesting the importance of the perspective of neuroscience. The growing legitimacy of the discourse of science in society, poses neurosciences as a legitimate body of knowledge, perhaps a more appealing perspective than the philosophical or sociological one. The quotations above illustrate this procedure and also depict how the key to gain social credibility is to pursue the conception of a broad brain domain. This breadth is built through a pervasive notion of the brain that enables the combination of many different topics (language, memory and happiness) under the influence of the brain despite they depend on different domains: language and memory could be easier defined as biological functions than happiness. Moreover, two characteristics are significant in order to describe the human brain: 'complexity' and 'enigmatic':

The brain is such a complex structure that it proposes the big goal of understanding itself; to reveal the enigmas that our brain hides is the challenge of neurosciences;

8 Rose (2007) describes a series of mutations that characterize contemporary biomedicine and that, because of their impact, go beyond the medical field and show incipient processes of cultural transformation. The "molecularization of vitality" is key in this spectrum of mutations.

to understand scientifically why we fall in love, or why we take one decision or another, to ask ourselves what is going on in the artist's brain when he is painting a frame or in the sportsman's brain. Neuroscience studies the organization and functioning of the nervous system and how the different elements of the brain interact and give birth to human behaviour. The brain is the most mysterious space for us to know, and the advances of technology offer an unprecedented view of its functioning.

The brain is the most complex structure in the Universe, the brain which solves mathematical problems and economic operations is the same that makes us love and hate. It has more neurons than the galaxies stars<sup>9</sup>.

In their study of genetics, Pramling and Saljo (2007) describe how in bridging the two domains of 'popular' and 'scientific' knowledge, metaphor becomes central. Thus, regarding the comparison between the 'brain' and the 'star', the role of the metaphor is to highlight the unimagined complexity of the brain. The use of metaphors and the extension of the brain domain develop the symbolic efficacy of the brain as a multiple point of reference in the contemporary culture. Ortega and Vidal (2011) point out that the efficacy of neuroscience is symbolic "not in the sense that it is somehow unreal, but in that it derives less from mechanisms or features that inhere in them, than from their meanings and usages" (p. 11). As a consequence, the non-resolved complexity surrounding the brain helps to create a public attraction to neuroscientific findings.

## The Social Brain

As a result of the previous discursive strategy, a third element of brain talk is built around the connection between social life and the brain: the social brain. The social brain hypothesis, offered during the late 1980, is built on the idea that the size of the brain is related to the demands of the complex social systems (Dunbar, 1988), therefore increased complexity can derive from more elaborated individual relationships. This hypothesis is developed within the field of social neuroscience that seeks to understand the relationships between social behaviors and their physiological and neurobiological substrates (Norman *et al*, 2012). Social neuroscience is posed as an integrative field that examines how the nervous endocrine and immune systems are involved in sociocultural processes as well as how social processes influence the brain and body (Jones-Harmon and Winkielman, 2007).

Some of these ideas are worked during the show, specifically in one of the episodes of the show named "The social brain", a summary of its content is provided on the Website:

In this episode we will understand how our brain enables social interactions through multiple functions, such as the capacity to infer the feelings and thoughts of others and empathy. We will interview Dr. John Cacciopo from Chicago University, an expert in the field of social neurosciences. We will analyze how our social abilities are being

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<sup>9</sup> It is important to note that several non-reductive materialisms can be advanced that sustain the view of a co-constitution of the biological individual and its historical, cultural social environment (for more references on this topic see Rose, 2013). For this reason, I have highlighted the importance of this interconnection between social and biology that is suggested through the claims made in the show.



modified through our lives, and Ezequiel Gleichgerrcht will show us how these differences are manifested at different ages through an experiment performed by children during the show. We will also investigate some alterations which the social brain can suffer, such as psychopathy and autism.

The notion of a social brain, which also implies the idea of a plastic brain, is explored by philosophical studies such as Slaby (in preparation) and Malabou (2008), among others, which correlate brain sciences with a capitalist spirit (Boltanski and Chiapello, 2002). This correlation is sustained by mutual demands for adaptability, flexibility, emotional and social intelligence, creativity and self-motivation. Within this perspective, the sciences of the brain help to expand those values and specifically point out that neuroscience studies place in a biological order the realization of these social values.

Social neuroscience, even from a non-reductionistic perspective, presents some problems for some sociologists who specifically analyze the notion of the social brain and its derivation on the research about empathy. For example, to Ehrenberg (2011), the notion of the social brain reflects the idea that not only mental disorders but also social behavior can essentially be explained in terms of cerebral activity. In his perspective, the brain is established as a supreme value, to the extent that it is the primary active entity, the biological substrate that conditions human sociality and psychology (ibid, p. 118). This leads to the hierarchization of the brain as a social actor and, in philosophical terms, it proposes the identification of the knowing of the self with the knowing of the brain (Ehrenberg, 2004). More specifically, Ehrenberg criticizes the theory of empathy, and is concerned with how this theory cannot represent social relationships and therefore does not account for anything social. He compares how we see humanity in natural terms or in social terms and states that “neurosciences have (not) discovered anything social at all because the meaning of social is a complete different thing, in social facts, function is subordinate to meaning, in contrast, in biological facts, function is preeminent” (Ehrenberg, 2011, p. 129).

These insights are interesting and shed light on some significant aspects of the relationship between neurosciences and society and the differences between a sociological conception of the notion of social and a neurological one. Nevertheless, I am more interested in describing the novelty of making sense of social life and social events from a cerebral perspective and also in describing how our human nature is shaped from a *neuro* perspective.

In this regard, two important notions are developed during the episode. On the one hand, ‘the complexity of the brain is a product of social complexity and it is believed that the brain evolved because of the social evolution of the species’. This idea implies that the brain is defined as a changeable artifact of cultural evolution that increases its complexity in correlation with the amount and intensity of social networks. The dichotomy nature/society, which constitutes modernity (Latour, 2007), is redefined within the transformations in contemporary biomedicine,<sup>10</sup> finding support in the field of neuroscience through the concept of a brain integrated into the social environment, likely to change as a result of the influence of this environment.

10 In this process, it is the notion of biology itself that is altered, as it is no longer a predetermined destiny but is open to intervention, to the redesign of our vital capacities. Therefore, the modern division between nature and society is re-signified.

On the other hand, there is the attempt to connect brain function with social life through the importance given to social interactions. The following are some of the related ideas that appeared on the show: “the pain and suffering of not being in touch with others affect certain regions of the brain”, “Some animals die faster without social contact”, “well-designed scientific studies have demonstrated that living with intense social relationships enables us to live longer and better”, “our brain changes when we are in front of other people and the others experience cerebral change when they interact with us”. The relevance of these claims is that boundaries between biology and culture are redefined as more interdependent. Rose and Rached (2013) describe the new brain sciences as a way of thinking in which our corporeality is in constant transaction with its milieu, and the biological and the social are not distinct but intertwined. Therefore, having an intense social life turns out to be a valuable characteristic to possess in order to protect and improve our brains. This improvement in better brain function makes sense because of the underlying assumption that creates a deep connection between better brains with better selves.

It is important to note how brain function appears directly linked to pleasure and social activities within a continuum. ‘Eating chocolate’ or ‘having a special dinner’ are positively evaluated because they would impact directly on brain activation, these proposals are indicative of a direct relationship among the following notions: a brain state/an exterior act/a sense of well-being.

Dopamine is the critical neurotransmitter of the brain systems of reward. The forefront area is the most evolutionary in human beings. This area has an important role in social interactions and it is not a coincidence that social interaction generates reward activation. For example, an enjoyable meal will activate the rewards system.

In addition, the proposal of connecting the social with the brain is focused on the activities that would improve brain conditions: “social involvements make your brain better”, “learning new things is what the brain needs”, “a healthy diet and a healthy lifestyle improve your brain state”. These types of claims are the same ones that medical discourse has given for years as part of the recommendations for improving health quality, so is there a difference? As Rose (2003) has explained, the environment, biography and social problems all have an impact on the brain. In other words, the difference is the consequence of this shift: brain talk shows the brain as a space for understanding why and how our acts, emotions, physical and emotional processes are shaped and at the same time, brain dynamics is presented as an effect of biographical and daily events, extending the boundaries of what biology means to human life thanks to this interconnection between brain processes and our daily lives.

It is possible to find comments on social brain in others episodes, in some of which the brain is described as a separated organ, for example, when the presenter talked about ‘the social brain’ or ‘the political brain’. It is not clear if there is an area within the brain or if some people develop these types of brain qualities. This discursive strategy could be described as a way to get the brain both closer and more distant, conveying through the use of the third person, the sense that ‘we are our brains’ and the idea of the externality of the brain, at the same time. According to Dumit (2003, p. 45) in his analysis of depression and neuroscientific facts, “the brain-type, while objective, is simultaneously subjective”. In other words, *subjectification* and *objectification* are both main elements of brain talk that contribute to locating the brain in an ambiguous space thus creating meaning in different contexts.

The connection between social activities and the brain also shows a pervasive moral notion across the episodes: the belief that human beings naturally look for their own benefit in most life circumstances: "All that we do in life is oriented to gaining happiness, our actions tend to search pleasure and escape from the things that we do not like", said the presenter when he introduced the issue of "Happiness and Rewards".

When the explanation goes further to establish a distinction between "long-term rewards" and "short-term rewards", the question arises of what happens when these two types of benefit compete against each other. In that regard, the host of the show explains the following:

The brain areas involved in pleasure are the same ones which are activated in the decision making process. These areas help to consider the long term decisions and restrain the immediate rewards.

Therefore, if these areas do not work properly, and, for example, someone cannot help trying to obtain an immediate benefit, this behavior is considered to be dysfunctional. There is a particular assumption of the meaning of personal well-being within this perspective, which draws a line between 'immediate rewards' and 'long-term consequences', classifying the latter as the normal ones and consequently, the expected human answers.

These assumptions are based on moral descriptions reflecting the connections between moral values and scientific constructions. Nevertheless, this link leads to a biological explanation; brain talk creates an immediate correlation between brain activation and cognitive processes.

The human brain has specific circuits for modulating rewards, pleasure and even love. Normal circuits which process fear when working incorrectly could result in pathological anxiety. The circuits which normally regulate rewards and pleasure could be responsible for addictive behavior when they start to function incorrectly. Understanding these rewards systems and how the brain takes decisions choosing between immediate rewards or long term consequences, we can understand diseases such as pathological gambling, mania phase of the bipolar disorder and even some aspects of depression.

These ideas suggest that social skills are redefined as brain functions; merging with the concept of how some alterations in brain functions are associated with social pathologies, such as autism and psychopathy, also referred to in "the social brain" episode.

Besides, the program has a complete episode addressing the notion of the "political brain":

The brain and politics are linked because human beings interpret process and generate the information to adapt them to social life.

In this case, the very human characteristic of interpreting events, which is a central step in the cultural process of constructing meaning, is reshaped into a main feature of the brain. The importance of neuroscience in this area is also linked to its utility as a new knowledge that promises to understand the reasons and logic of human decision process, 'the future of basic research depends on determining the brain mechanisms of political decisions and on understanding its neural substrate'.

## Toward a Materialistic View of Human Beings

The aim of creating a materialistic view of human beings is not new.<sup>9</sup> As an extensive number of researchers argued (Vidal, 2009; Meloni, 2011; Ortega and Vidal, 2011 among others), it is part of the modern attempts to understand ourselves through science in which the brain has played a central role. However, the development of new technologies of images creates a different scenario, brain images are a tremendous tool to look for the answers in the brain. Considering images as explicitly rhetorical, particular points can be made and arguments and data can be illustrated, and as a consequence, these images are put to persuasive use in specific contexts (Dumit, 2004).

During the show, it is possible to find some specific procedures in which this aim is pursued. A special one is the relevance given to brain images created through the account of experiments done by researchers around the world and also by showing some *in vivo* experiments. As an illustration, during the episode about economic decisions, an experiment with a woman in an fMRI scan was depicted. The purpose of the experiment was “to utilize the functional magnetic resonance to see which areas are activated in economic decisions”. During the scene, a woman was put through a scanner and a researcher explained to her that “the utility of the fMRI is to see the lively brain activity”. He presented a hypothetical situation to her in which she had to respond and take some financial decisions. The objective of the experiment was to verify which areas of the brain were activated when taking these economic decisions and to show how the emotional dimensions of experiences could be recognized as specific areas of the brain through this technology.

This leads to a further point, the possibility of visualization of subjectivity and feelings as a major theme of neuroscientific promise. This promise is built also through reshaping psychological matters into a cerebral domain within a cause–effect relation between the brain and the emotional realm. This connection is spread through the idea of personality as strongly dependent on brain process. As an example, one of the show’s episodes (Heart & Brain) suggests the brain as the cause of heart problems, which can be seen in the following extract:

How do the brain’s decisions have an influence on our heart? Even though it is usually believed that the heart represents human beings’ personality and goodness, in fact it is the brain the one responsible for all our personality traits, which depend on complex networks within it.

Two realms of human capabilities, the rational and the emotional, constructed as opposites within a dualist paradigm, are in fact, part of the same process. Thus, as it appears in the quotation above, “The same brain that makes us love makes us solve mathematical problems”. Some of the episodes focused strictly on showing how these spheres are intertwined and explored how rational decisions are deeply affected by emotional areas in the brain. In this process, as some have addressed previously (Dumit, 2004; Rose, 2007; Ortega, 2008), subjective responsibility turns into brain responsibility, at least in a theoretical domain.

However, in spite of the increasingly importance of neuroscience in reframing mental illness as a cerebral disease, there is not a specific episode to address this issue within the show. In contrast, references to mental disorders are provided during episodes related to other issues



without special consideration to a neuroscientific understanding, such as in the “Film & the Brain” episode, that contains a number of examples related to mental illness. As it is said in the opening words:

In this episode we intend to understand a bit more about neurological conditions in human beings through the relationship between neuroscience and films. We will analyse filmmaking, how this marvellous resource provides us with more knowledge about psychiatric and neurological illnesses. Therefore, film production helps to increase consciousness about these problems and reduces stigma and the negative impact of these conditions on society.

In general, most of the information regarding mental illness provided within the episode corresponds with a DSM IV approach and, as a consequence, it focuses mainly on a description of the symptoms related to the disorder. Mental disorders are not explained with the brain as a point of reference, instead, it is mentioned that “the causes of mental illnesses are still unknown and diagnosis is based on patients’ accounts and family environment and that is the reason why they are difficult to establish”.

Throughout the show there are only two examples of disorders that are redefined from a neuroscience perspective. One of them is stuttering, which is mentioned in the “Film & Brain” episode, and the other one is addiction, which is mentioned in the “Decision Making” episode:

For a long time stuttering was thought to be caused by psychological problems, today we know that there is a disconnection between the brain motor programmes and the coordination of the necessary muscles involved in the production of language.

Addiction is a cerebral disease. In the past it was thought that addiction was a moral weakness, now it is known that it is caused by a corrupt brain circuit.

Moreover, there are many references to the linkage between neuroscience research and psychiatric treatments improvements along the episodes. The gap that normally exists between research practices and their applications overlaps with an explanation of the natural cause–effect relation. The following quotation sums up this reasoning:

Scientific advances have enabled us to know what happens in the brain of an anxious person, this has led to improvements in future and current treatments.

However, the idea of treatment is not necessarily related to the consumption of psychoactive drugs, there is a special consideration during the show to one case of compulsory obsessive disorder, illustrated by the experience of a patient who is interviewed to give an account of his own cognitive psychotherapeutical experience. Afterwards, the importance of cognitive psychotherapies in reframing brain function is stressed:

Changing the ways in which we think about life could change the brain without medication; some brain areas are positively affected by cognitive psychotherapies, which is a way of learning.

In this way psychotherapy is interpreted from a scientific perspective, which gives a sense of effectiveness to therapeutic interventions: the modifications brought about by this practice

correspond to a quantifiable neural modification. The possibility of investing psychotherapy with the power of scientific explanation is based on the assumption that the brain is a *plastic* organ, which can be reframed by external influences. The plasticity of the brain is also linked to the connectionism theory, which claims that many areas of the brain can be recruited for multiple tasks. These ideas are spread throughout the show:

The brain works through networks, there is no specific area involved in one cerebral function except in some cases. However, nowadays we can know which circuits are involved in the reward systems. The neurons of these circuits communicate with each other through chemical messengers, one of them is dopamine, which people liberate when smoking, when eating chocolate or having sex.

However, as we can see from the examples referred to within this article, in most of the explanations given through the episodes it is possible to find a different idea of brain function focused on which structures of the brain are responsible for specific functions. This conception belongs to the localization theory, the traditional frame for the study of the brain that enables neuroscience discourse to create a sense of causality in some of the areas that are the object of *neuro* explanation, such as emotional, social and moral experiences. But as Thornton (2011) pointed out, languages of localization and languages of distribution and connectivity cohabit and expand both the idea of the brain as a natural (rigid) and social (plastic) artifact.

## Concluding Remarks

In this final section I will run over the main elements of the brain talk connecting them with the arguments I presented in the introduction. First, the suggestion that the importance of the brain talk is not in the explanation provided of how the brain functions but in the ways in which the brain is shaped as a locus of causal agency and especially in the emphasis given to its enigmatic character, which contributes to shaping the idea of the brain as both mysterious and scientific.

Second, the proposal that the main purpose of popular science is not to facilitate the public understanding of neuroscience, or to transfer information to the lay public, but to create a space for the recognition of neuroscientific facts in the public sphere. In doing so, neuroscience contributes to shaping and reconfiguring concepts of personal identity and parameters of social life.

Regarding the first argument, two opposite characteristics appear to be relevant to explain brain function. On the one hand, the idea of ‘specificity’ involved in brain process, and on the other hand, the term ‘network’, which implies lack of specificity, since different brain areas seem to be involved at the same time in different brain processes. As a consequence, the status of the brain is located in an *ambiguous* space that blurs the distinctions between the specificity and non-specificity of brain areas and their functioning, which turns the brain into a *plastic object*, to which different and opposite meanings can be ascribed.

Given that technical and scientific expertise is highly valued in contemporary society, the social power of neuroscience comes from the authority of the science. However, if we pay close attention to the content of the claims of neuroscience, we will find not only that the brain

is located in an ambiguous space, but also that there exists a gap between the explanation of brain function and the social and psychological consequences involved. It is not clear how this linkage between biological facts and social events happens. It leads to a paradoxical effect, the lack of a specific and detailed description of brain function, even if it could be seen as problematic from a scientific approach helps to view neuroscience as a promising science. Moreover, the idea of the brain as an enigmatic object helps to create the image of the brain as a mysterious artefact, which could be revealed only by the expertise of neuroscience. Thus, the effect of the brain talk is not its internal coherence but the constitution of the brain as a plural point of reference in everyday life and as a locus of causal agency.

In a number of claims made during the program, the importance of neuroscience lies in the future; it depends on the possibility of developing knowledge about issues that remain uncertain at the moment, but that future neuroscience research would conceivably be able to address. Therefore, the construction of *hope* becomes a central element in brain talk and is deeply based on the belief in the progress of science. Owing to this belief the boundaries between the actual possibilities and the good intentions are blurred. As a consequence, neuroscience is posed as a science of total man, paraphrasing Ehrenberg (2008), it is a complete body of knowledge that promises to cover biological, social and moral human conditions.

Regarding the second argument, the show contributes to legitimating neuroscientific claims and also to facilitating the circulation of bioscientific information among the experts and the public, which is one of the main characteristics of the constitution of biosocieties (Rabinow, 1996), but more important, it contributes to reshaping social and personal subjectivities. I suggest that brain talk is more about new vocabularies, new narratives and languages to express ourselves and to explain and make sense of life than about communicating scientific information to a lay audience. As it is explained in the program, educating the public is the purpose, but I would say that this is not educating in the sense of giving new information, but in producing linguistic resources and cultural beliefs that encourage the emergence of new self-narratives.

Finally, although I agree with Vidal (2009) when he points out that the cerebral subject is a prerequisite, not a result of neuroscientific investigation, I would suggest that the notion of cerebral subject is definitely a result in the case of popular science analyzed. Vidal's proposition is supported by historical research that shows how the importance of the brain dates back to the nineteenth century. Nevertheless, the practices through which humans are shaped as cerebral subjects have changed. The context in which the brain has cultural and scientific meanings, the moral values associated with it and the personal and social habits in which the brain is involved may be different. As a consequence, historical and comparative studies should be done in order to reflect on the different sorts of *brain talk* that can be described.

As it has been explained along this article, popular science helps to spread the importance of the brain as a point of obliged reference in our daily lives and in doing so, to expand "brainhood ideology" (Vidal, 2009, p. 9). The television program, as a tool among many other cultural materials, which work together to expand a neuroscientific perspective is spreading contemporary ideas of 'cerebral subject' or 'neurochemical selves' and in so doing is reshaping the notions of identity, suffering and illness, among others. The novelty of popular neuroscience is about the creation of new vocabularies, of a new background to narrate and

understand social, political and personal life considering the brain as a discursive reference in areas not previously connected with.<sup>11</sup>

Moreover, these changes are happening in a society traditionally defined by the influence of psychoanalysis in mental health practices and in cultural beliefs about the self, personal suffering and psychiatric disorders. But neither the progressive influence of the perspective of neuroscience in different areas of clinical psychiatry nor its cultural impact mean that psychoanalysis does not continue being an influence. Rather than replacing the psychological gaze, the Argentinean society, in particular in Buenos Aires city, shows the coexistence of these different perspectives, theories and practices, and their mutual influences on the lay public.<sup>12</sup>

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- 11 Even though this article does not interrogate the impacts of these claims from a lay viewpoint, the comments posed on the Website of the program contribute to generating an idea of the public reception of neuroscience. The next quotation comes from one of these comments: 'Few are those who can see that the value of these documentaries is not in acquiring knowledge but in implementing it. Imagine how you could change the world thanks to these developments. We could combat behavioural problems, improve learning, be happier, etc. Thanks for sharing these videos'.
- 12 There is a vast literature that indicates the combination of different practices and approaches (neurosciences and psychoanalysis). I may mention Lührman (2000), Ortega and Vidal (2011) and Rose and Rached (2013) among others.



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