Social representations and their connection with science communication

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ABSTRACT
The present work has as fundamental purpose to relate how in contemporary societies the formation of social representations of science have as a fundamental background the processes of social communication. Emphasis is placed on the fact that the different media have a considerable influence on the formation of social representations of science that most people have. In order to analyze how the previous concepts are intertwined, three closely related sections are included, made up, first, of a brief approach to the main concepts that the theory of social representations alludes to; a second part refers to some processes of social communication in the construction of social representations, and a last section deals with social representations in the communication processes of science. In this way, the conclusion is reached that science is constructed and socially represented in people through what circulates through our daily interactions, as well as through what we see, hear and interact with the media, among other types of sources such as formal (or academic) and informal one (family, friends, partner, etc.).

Keywords: Science, Social communication, Social representations.

1 INTRODUCTION

This paper points out how in contemporary societies the formation of social representations of science have as a fundamental background the processes of social communication. It is emphasized that the different media exert a considerable influence on the formation of the representations that most people have of science.

Three closely related sections are included, conformed, first, by a brief approach to the main concepts alluded to by the theory of social representations; A second part refers to some processes of social communication in the construction of social representations, and a last section addresses social representations in the communication processes of science.

2 SOCIAL REPRESENTATIONS: BRIEF CONCEPTUAL APPROACHES

Jodelet (1989:25) mentions that there is always "the need to know what to expect" in the world around us, since it is necessary to adapt, act in it, control it physically and intellectually and solve the problems it poses to us; For this reason, representations are built with this world of objects, people, events and ideas, it is not equipped only with automatisms, nor is it isolated in an eminently social environment, but it is shared with others, it relies on them to understand, face and control it.

She points out that "That's why we say representations are social and why they're so important in everyday life. They guide us in the way of designating and defining together the different aspects of our daily reality, in the way of interpreting them, influencing them and, if not, taking a position before them and defending it" (1989, p. 25).

The observation of social representations might seem an easy task, agrees Jodelet, since they circulate in discourses, in words, in messages, in the media, crystallized in behaviors and material or spatial dispositions; But in reality they are complex phenomena, always dynamic and determining in social life; In its phenomenal richness you can appreciate various aspects or elements, some of which are sometimes studied in isolation, such as informational, cognitive, ideological, normative, beliefs, values, attitudes, opinions, images, etc. However, these elements are organized under the space of a knowledge that says something about the state of reality, and it is the task of scientific research to account for that totality -as far as possible- describing, analyzing, explaining its dimensions, forms, processes and functioning.

Emile Durkheim (1895) was the first to identify collective representations as social mental productions; more is Serge Moscovici (1979) who renews the analysis, emphasizing the specificity of representational phenomena in contemporary societies, characterized by the intensity and fluidity of changes and communications, the development of science, plurality and social mobility.

One of the important characteristics of the theory of social representations is that they are socially elaborated and shared form of knowledge, with a pragmatic orientation and oriented to the construction of a common reality in a social set.

Social representations refer to *the knowledge of common sense* or "*naïf" knowledge,* which is distinguished from scientific knowledge and, nevertheless, this form of knowledge is considered an object of study as legitimate as the scientific one because of its importance in social life and for its contribution in the clarification of cognitive processes and social interactions.

An enunciation proposed by María Auxiliadora Banchs (1984), synthesizes, in a way closer to our language, the concepts expressed by Moscovici and Jodelet, who are the ones who have most contributed to the theoretical field of social representations. According to her, social representations are:

> The form of knowledge of common sense proper to modern societies constantly bombarded with information through the mass media. As such they follow a different logic of their own, but not inferior to scientific logic and are expressed in the specific everyday language of each social group. In its contents we find without difficulty the expression of values, attitudes, beliefs and opinions whose substance is regulated by the social norms of each collectivity. By approaching them as they manifest themselves in spontaneous discourse, they are very useful for us to understand the meanings, symbols and forms of interpretation that human beings use in the handling of the objects that populate their immediate reality. They must be studied in themselves and not through behavior and, by

doing it this way, we can predict the comportment of the groups in front of the studied objects (1984, p. 16).

From the above, we wish to emphasize two aspects: 1) As systems of interpretation, social representations guide and organize social behaviors and communications; They are involved in processes as varied as the dissemination and assimilation of knowledge, individual and collective development, the definition of personal and social identities, the expression of groups and social transformations. And 2) As cognitive phenomena, they link the social belonging of individuals with the affective and normative implications, with the internalization of experiences, models of behavior and thought socially inculcated or transmitted by social communication.

From this point of view, social representations are approached both as the product and the process of an activity of appropriation of outside reality towards thought and psychological and social elaboration of this reality; In other words, they are modalities of thought under constituent aspects (the processes) and constituted (the products obtained), which obtain the specificity of their social character.

Precisely, representing or representing oneself is understood as an act of thought by which a subject is related to an object, which can be a person, thing, material, psychic or social event, idea, theory, etc., and this object can be real, imaginary or mythical; There is no representation without object. This is how the mental, pictorial, theatrical or political representation replaces the object, is in its place, makes it present when the object is distant or absent, and it is then that the mental representation of the object is its symbolic substitution.

It is important to note that as a concrete content of the act of thinking, social representation bears the imprint of the subject and his activity, an aspect that refers to the constructive, creative, autonomous character of representation, which implies a part of reconstruction, interpretation of the object and expression of the subject.

In short, social representations must be studied through the articulation of affective, mental, social elements, through the integration of cognition, language, communication, consideration of social relations that affect representations, and the material, social and ideal reality on which they intervene (Moscovici, 1979, 2001).

This brief conceptual overview of the theory of social representations provides an approach to its fundamental characteristics. It is not intended to delve into this vast theoretical production, but rather to enunciate main features with the purpose of linking them with the processes of social communication that, as already seen through the previous lines and paragraphs, are intimately interrelated and the first could not exist without the latter and vice versa, an aspect that will be seen below.

3 SOCIAL COMMUNICATION PROCESSES IN SOCIAL REPRESENTATIONS

A fundamental premise in the study of social representations is that of an interrelation, which in turn implies a multitude of relationships, including: 1) The correspondence between the forms of organization of social communications and, 2) The modalities of social thought, seen from the point of view of its categories, its operations and its logic.

Some scholars emphasize some of these interrelationships, or develop the relationship differently according to the attention paid to the connection between social communication, on the one hand, or social structure, on the other. For this paper, the aspects or processes of social communication are taken up, realizing the multiple links with other mediations.

Moscovici (1979, 2001) has particularly insisted on the role of social communication because it plays a fundamental role in the changes and interactions that lead to the construction of a consensual universe and because it refers subjects to the phenomena of influence and social belonging, decisive in the elaboration of intellectual systems and their practical forms in everyday life.

The incidence of communication is examined by Moscovici at three levels:

- At the level *of emergence* of representations whose conditions affect cognitive aspects. Among these conditions are a) the *dispersion* of information concerning the object represented and which are unequally accessible according to the groups; b*) the focus* on certain aspects of the object according to the interests and involvement of the subjects, and c) the *pressure on inference* due to the need to act, take a stand or obtain the recognition and adhesion of others. These elements differentiate natural thinking in its operations, its logic, and its style.

- At the level of *training processes*. Objectification (materialization of abstract ideas, - correspondence of things with words or images-) and anchoring (assignment of meaning to the represented object) that account for the interdependence between cognitive activity and its social conditions, the agency of its contents, the meanings and the utility that are conferred on it.

- At the level of the *dimensions* of the representations that refer to the construction of behavior: opinion, attitude, stereotypes on which the media intervene (television, cinema, press, radio, internet) and other socialization agencies (family, school, peers, etc.). The media, according to studies on their audience, have different structural properties corresponding to dissemination, propagation and propaganda. Dissemination is related to the formation of opinions; the propagation with that of attitudes, and propaganda with that of stereotypes (Moscovici, 1979, 2001; Jodelet, 1984). Thus, social communication, under its interindividual, institutional and mass aspects, appears as a condition of

possibility and determination of representations and social thought.

As Ibáñez (1988) also points out[1], it is, in fact, in the processes of social communication where the construction of social representations originates: this cannot surprise those who know the importance of the media to transmit values, knowledge, beliefs and models of behavior. Both media that have a general reach, in the style of television, and those that target specific social categories[2], play a fundamental role in shaping the vision of reality that people under their influence have.

There is, however, a form of social communication whose influence is equally capital but has not received the same attention as the media; it is *interpersonal* communication, and more specifically the countless *conversations* in which every person participates during the course of his daily life. "It is obvious that we are immersed in a *permanent conversational background* that constitutes another dimension of our environmental framework" (Ibáñez,1988, p. 179). Put another way, at home, at work, at school, on the street, in bars, in cinema queues, in the supermarket, etc., conversations are engaged in (usually inconsequential, more or less conventional and ritualized, more or less prolonged) that may or may not be of interest, but in these conversations not only social representations emerge (they could be enunciated as a certain type of "mediations") but in them social representations are literally constituted.

These conversations are far from having the prestige of the "noble" objects that the preferences of the social sciences have. The conversation constitutes a continuous and repeated contribution of material to form social representations, since it is a continuous flow of images, values, opinions, judgments, information, which impact without even being aware of it. Sánchez-Ruiz reminds us that communication is a historical, social and cultural process in which meanings are produced and meanings are constructed. "When we speak of human communication, we refer to the process of producing meaning through the exchange of signals and messages between human subjects" (Sánchez-Ruiz, 2004, p. 15). This means that in communication processes meanings are given to certain facts, relationships, situations, products, etc.

On the other hand, it is obvious that neither the contents nor the conversational contexts are identical for the various social groups. The groups to which a person belongs, the places he occupies in society, predispose him to enter certain conversational contexts instead of others and to be exposed to certain conversational contents preferentially to others. Thus appears one of the mechanisms by which different social insertions give rise to disparate social representations.

However, the importance of social communications for the formation of social representations should not obscure the impact of other sources of influence. For example, social insertions do not

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[1] Although this author has made severe criticisms of the theory of social representations, he presents good approaches to what this theory implies. So not being Manichean, I have consulted it and add -the pertinent- in this section.
[2] Like popular science magazines, for example.

intervene only through selective exposure to different conversational contents, but also exert an influence on the type of personal *experience* that is established in relation to the object of representation.

This experience – variable according to the different social locations – conditions the relationship with the object, as well as the nature of the knowledge that is achieved about it. All these elements contribute to the configuration of social representation, intertwining its effects with those that come from social communications.

4 SOCIAL REPRESENTATIONS IN SCIENCE COMMUNICATION PROCESSES

One of the key aspects in the public perception of science is the interaction between science and society through processes of social communication of scientific activity. The circulation of scientific information in society must be understood in the context of the practices of a circuit of public communication of science (with institutions and mechanisms of dissemination and distribution of knowledge, for example). The best known modalities are those of dissemination and scientific journalism, but it also involves the baggage of knowledge imparted by the formal education system at its different levels, as well as the information incorporated in products, processes and socio-political practices.

The circulation of scientific information in society involves a series of processes through which knowledge, codes and values of science and technology are transmitted to society, are incorporated into the cultural heritage and become a certain daily use of science by building diverse social representations on it, not necessarily articulated with each other, although not entirely disjointed, since they have cultural practices as a common background.

Communication, as a process, necessarily has to be understood in the context of historical, social, geographical, political, cultural, etc. conditions; it is not possible to consider it in the XXI century as an isolated phenomenon, but it must be thought and understood from the mediations (Martín-Barbero, 1987; 2002).

Mediation could be understood "as a *structuring process* that configures and guides the interaction of audiences and whose result is the granting of meaning by them to the media referents with whom they interact" (Orozco-Gómez, 2003, p. 23). In fact, mediations (which in terms of Martín-Barbero [2002] are everything that surrounds and includes the human being: culture, society, school, family, media, etc.) are more than the work of transferring scientific knowledge through materials that are possible to read, learn or understand by the receivers.

Through mediations, and therefore social representations, the articulations between hegemonic sectors, practices and representations (which claim domination over society) and subaltern sectors,

practices and representations (the dominated) are realized. They are articulated and related in the sense that both are transformed: those who do not have power, for example, do not suffer domination, but end up working in favor of it.

Thus, the concept of mediation is intimately linked to that of hegemony, which indicates a power relationship that is not only visualized in political and economic issues, but can be observed fundamentally in cultural and ideological processes and, of course, communicational (Huergo, 2001). And obviously, this vision also affects science (who holds it, who makes public science policies, who dictates how much of the budget – GDP – should be allocated to it, who does science, where, how, why and for what, etc.).

The emergence of critical social groups of latinoamerican country's meager scientific-technological development—and others with similar levels of development—has greatly boosted interest in public perception and attitudes toward science and technology. It can be said that in the last forty years the problems related to the public perception of science and "scientific culture" have become the object of interest of institutions (although not in desirable terms, especially in under developed countries) and of all those actors related to the processes of innovation and development.

According to Albornoz (2003), in the last fifteen years a scenario has been configured in which the assumption that democratic participation in the modern world needs a greater understanding of science and technology by citizens has been validated. This situation favored the flourishing of discourses that support the crucial importance of the public being informed, knowing and understanding science, which implies knowledge about the nature and dynamics of scientific research. The common denominator of these proposals indicates that the whole society should be a participant in scientific achievements, and in addition, the whole society should be able to discuss the dilemmas posed by scientific research.

On the other hand, scientific culture is not an attribute of individuals but of societies, and although societies are formed by individuals, it could not be assured that each individual "represents" society and, therefore, the whole of its culture, but that each of them maintains a relationship with society that is irreducible to both society and the individual.

In this sense, the culture of science, and therefore of technology, not only consists of a deposit of codified knowledge that incorporates the individual, but also implies other dimensions no less relevant, for example, distribution of information and knowledge in the general culture; the quantitative dimension of the scientific system (human resources, investment, organizations, patents, etc.); mechanisms of sustainability of the scientific-technological institution, and the orientation of these activities.

Likewise, it has been pointed out that the scientist is a worker of the signs and that science is a

social space of permanent transactions and communicational negotiations (Huergo, 2001); Therefore, communication is not only one of the fundamental aspects of the historical-social study of science, but it is one of the basic questions for any action that tends to return the relationship between science and society.

Science is the product of a complex set of social activities carried out by individuals who are immersed and share historical, social, political spheres; Areas in which the representations of reality produced by scientific work also carry the conflicts and social interests that give them life and that have as a limit the possibilities of knowledge and the production of "truths" in a given place and time.

Moreover, public understanding of science cannot be seen as a luxury in the information age. Several studies, including that of Manzini (2003) show that scientifically literate societies are stronger economically, since a better informed citizenry can be more innovative and more critical of the products and services of science and technology. The effect is best seen in health and overall improvement in the living standards of members of a society.

Effective science communication has consequently become a socio-economic imperative in developing countries. The discourse on science communication has to consider epistemological issues. Depending on the conception about the nature of science, communication strategies will be made about it; If science is simply seen as a body of knowledge, communication will be characterized by transmitting information from experts or scientists to the general public, but passively.

According to Manzini (2003), this paradigm reduces the public to an uncritical vessel of scientific knowledge. If science is seen as a rational effort in process to discover physical labor, for example, the public will be critically empowered from this scientific process. Seeing science as a process, rather than as a product, demystifies it and opens the door for ordinary people to see for themselves and as participants this process of discovery. In this sense, the social representations that people have of science following the second epistemological presupposition, will be more oriented to practical, close and concrete issues of the daily situations that involve science, instead of seeing it as something far and distant, outside of everyday life without involving the users of it.

The issue of public knowledge of science in multicultural societies – according to the role of science in a global economy based on the increase of knowledge – needs to be addressed, also, from a perspective of justice and social equity. Therefore, how science can be communicated in a fair and balanced way will depend, among other things, on public policies, citizen participation, education and a close relationship with the media. In some cases it has seemed convenient to hide certain historical, cultural, economic and political relations, among others, to sustain and legitimize situations of power over the popular sectors.

Communication can contribute to returning transparency to this relationship through a

conception and a communicational practice that can distance itself from simple dissemination and, of course, from concealment. A "mature" approach to the public communication of science, as Manzini (2003) says, does not try to hold science as a tool of hegemonic power, to exercise dominance over the so-called non-scientific community; Such an approach would only exalt the *status quo* of the general apprehension of science within communities.

Now, if we pay attention to the wide variety of studies, for example, those carried out by the *National Science Board's Science and Engineering Indicators Survey* that synthesize very well Nisbet (2002) that provide evidence that different media – newspapers, television programs in general, television programs on science and scientific journals – do affect perception, in a different way, that people have science, then it is possible to use the former in favor of the latter.

The influences of these media are indirect, mediated through the effects of scientific knowledge. Reading newspapers, watching science programs on television, and reading scientific journals all promote—in principle—positive perceptions of science, but given the relative size of the audience, the impact of watching television programs in general remains the most salient and astonishing finding. Television is the medium, point out Martín-Barbero and Rey (1999) and Martín-Barbero (2002), which will most radically disorder the idea and limits of the field of culture, with its sharp separations between reality and fiction, between avant-garde and *kitsch*, between leisure and work space:

> Today the television flow is the most real metaphor for the end of the great stories, due to the equivalence of all discourses -information, drama, advertising, or science, pornography, financial data-, the interpenetrability of all genres and the transformation of the ephemeral into a production key and a proposal for aesthetic enjoyment. A proposal based on the exaltation of the mobile and diffuse, the lack of closure and temporal indeterminacy (Martín-Barbero and Rey, 1999 p. 26).

Of course, television is currently seen from multiple screens as streaming, hence its expansion is increasingly with greater reach among the population assiduous to the media.

Some of the weaknesses of our civil societies are the long political "bogged down" and a deep "cultural schizophrenia" in the elites, which daily burden the excessive capacity of representation that television has acquired. It is a capacity for interpellation that cannot be confused with the *Ratings* of hearing, they conclude Martín-Barbero and Rey (1999), Not because the amount of time spent on television does not count, but because the political or cultural weight of television is not measurable in direct and immediate contact, and can be evaluated only in terms of *social mediation that their images achieve.* It is through television images that the representation of modernity becomes daily accessible to the majority: it is they who mediate access to modern culture in all the variety of their lifestyles, which includes, of course, science and technology.

Negative images of science on television seem to cultivate reservations towards it, although

science on television also sometimes appears as omnipotent, hopeful for the future and as a promoter of competing schemes related to "promises" in science. Although it should be noted that the indirect effects of television on these reserves are reinforced through the negative relationships of mediations with scientific knowledge (Nisbet et al. 2002).

So, if these findings are taken into consideration, together with the works of Orozco-Gómez (2001), Martín-Barbero (2002), Quiroz (2003), and Fuenzalida (2005), the image can be used (on television, for example, although it can be extended to other screens) for purposes of empowerment and critical stance of audiences, in favor of a positive representation of science. Starting, for example, with the analysis of the images of scientists and their findings shown on television, magazines, newspapers, cinema, from basic education to higher education.

Educational institutions of all leves should care, mainly, about urgently considering a deep reorganization through which both the world of languages and writings cross, with the transformation of the ways of reading, that is, readings of the plurality and heterogeneity of texts, stories and writings (oral, visual, musical, audiovisual, telematic, etc.) that circulate today; or else, it will die in obsolescence. This is one of several options proposed by several communication scholars – including those mentioned above – but which can be translatable, considering its specificities of course, to the field of popularization of science, based mainly on processes, rather than on products.

Based on the above, it remains to be added, although they are not final words nor do they pretend to be, that the study of social representations about science is considered important and necessary; One approach consists of starting from what people "know" or "think they know", for the planning of effective communication strategies through formal, non-formal and informal education of science, technology, their innovations, as well as citizen participation as far as possible.

REFERENCES

Albornoz, M. (2003). Resultados de la encuesta realizada en Argentina, Brasil, España y Uruguay. Proyecto: Indicadores Iberoamericanos de percepción pública, cultura científica y participación ciudadana. *Revista Iberoamericana de Ciencia, Tecnología, Sociedad e Innovación.* Número 5, enero-abril.

Banchs, M.A. (1984). *Concepto de "representaciones sociales": análisis comparativo*. Revista Costarricense de Psicología, Nos. 8-9, pp. 27-40.

Durkheim, E. (1989). Representations individuelles et representations collectives, *Sociologie Philosophie*, Paris: PUF.

Fuenzalida, V. (2005). *Expectativas educativas de las audiencias televisiva,* Colombia: Grupo Editorial Norma.

Huergo, J.A. (2001). La popularización de la Ciencia y la Tecnología: Interpelaciones desdela comunicación, *Seminario Latinoamericano: Estrategias para la Formación de Popularizadores en Ciencia y Tecnología.* Red-POP-Cono Sur, La Plata, 14 al 17 de mayo.

Ibáñez, T. (1988). Representaciones sociales. Teoría y Método, *Ideologías de la vida cotidiana,* Barcelona: Sendai.

Jodelet, D. (1989). *Representaciones Sociales*. Paris: PUF (traducción de D. Páez y C. San Juan).

Manzini, S. (2003). Effective Communication of Science in a Culturally Diverse Society, *Science Communication*, Vol. 25, No. 2, december.

Martín-Barbero, J. (2002). *La Educación desde la Comunicación*, Buenos Aires: Grupo Editorial Norma.

Martín-Barbero, J. (1987). *De los medios a las mediaciones*, México: G. Gili.

Martín-Barbero, J. y Rey, G. (1999). Experiencia audiovisual y des-orden cultural, *Los ejercicios del ver. Hegemonía audiovisual y ficción televisiva,* Barcelona: Gedisa.

Moscovici, S. (1979). *El psicoanálisis, su imagen y su público*, Argentina: Huemul.

Moscovici, S. (2001). *Social Representations. Explorations in Social Psychology*, New York University Press.

Nisbet, M.C. (2002). Knowledge, Reservations, or Promise? A media effects model for public perceptions of Science and Technology, *Communication Research*, Vol. 29, No. 5, october.

Orozco-Gómez, G. (2001). *Televisión, audiencias y educación*, Buenos Aires: Grupo Editorial Norma.

Quiroz, M.T. (2003). *Aprendizaje y Comunicación en el Siglo XXI*, Colombia: Grupo Editorial Norma.

Sánchez-Ruiz, E. (2004). *Comunicación y democracia*, México: IFE-Cuadernos de Divulgación de laCultura Democrática.