Tradução

On scientific discourse and its mediatization[1]

Sobre o discurso científico e sua midiatização

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ABSTRACT – This paper deals with the discourse of scientific popularization, discussing if it would be a translation, a reformulation or a transformation of scientific discourse. Making use of the communication contract model from Semiolingustics, we claim that the discourse of scientific popularization depends on the conditions of the communicative situation in with it emerges. In the media, this discourse would not be a translation, but a construction dependent on the mediatic mise-en-scéne processes. The discourse of scientific mediatisation (DSM) tends to be explicative (didactic discourse) and to present its own captivation strategies (mediatic discourse). After presenting the characteristics of science mediatisarion contract, we assert that DSM produces a rupture in relation to scientific discourse. That discourse is subordinated to four types of discursive restrictions: visibility, legibility, seriousness and emotionality, which provide guidance on discourse organization modes, textual and paratextual composition, selection and thematic organization.

Keywords: scientific popularization, media, discourse, contract, discursive restrictions.

RESUMO – O artigo trata do discurso de divulgação científica, partindo do questionamento sobre se seria uma tradução, uma reformulação ou uma transformação do discurso científico. Utilizando o modelo do contrato de comunicação da semiolinguística, postula-se que o discurso de divulgação científica depende das condições da situação de comunicação nas quais se insere. Ao aparecer na mídia, ele não seria uma tradução, mas uma construção dependente dos processos da encenação midiática. O discurso de midiatização da ciência (DCM) tende a ser explicativo (discurso didático) e a apresentar suas próprias estratégias de captação (discurso midiático). Após a apresentação das características do contrato de midiatização da ciência, postula-se que o DCM produz uma ruptura em relação ao discurso científico. Esse discurso submete-se a quatro tipos de restrições discursivas: visibilidade, legibilidade, seriedade e emocionalidade, as quais orientam sobre modos de organização do discurso, composição textual e paratextual, seleção e organização temática.

Palavras-chave: divulgação da ciência, mídia, discurso, contrato, restrições discursivas.

Introduction

Socially, the purpose of scientific popularization partly consists in making scientific research results accessible (divulgation and dissemination) to a large number of individuals. It does not intend to make individuals wise or specialists on this or that scientific topic, but to allow them to better understand the world phenomena that we are not aware of so we are able to debate those phenomena when they present issues of a moral nature. Thus, that purpose is educational and civic at the same time. In fact, it is only possible to discuss a social problem related to the applications of a scientific discovery or the opportunity of extending research in a certain domain if people have some knowledge of the origins and consequences of the research.

This is particularly the case, in our modern world, of research on a topic that humanity holds most dear: genetic integrity. With Auschwitz, Shoa's symbol, the belief in human solidarity for the sake of belonging to the same humanity collapses; with Hiroshima's bomb, considering all the destructive effects, the idea that scientific progress serves to increase everyone's well-being falls apart; with the fall of the Berlin Wall, the dream about an egalitarian society and the utopia of a better world succumb. Currently, with the possibility of acting, modifying or manipulating what is in the origin of human and natural lives, one of the last mysteries crumbles: the mystery of creation.

At the same time, the citizenship aspect of the work of popularization overcomes its educational nature. It has more to do with debating a social theme than providing

knowledge and explaining the functioning of life phenomena in a rigorous way.

We observe that the great information media are based on the questions that once appeared just in magazines classified as scientific popularization. Therefore, we are not dealing with the "popularization" of science, but with its "mediatization", and it has repercussions in discourse.

The work of popularization is often criticized, being accused both of deforming scientific knowledge and of having interest only in the sensationalist aspects of research. In this situation, however, we can see something positive insofar as every social debate culminates, at one time or another, in the ethical issue: science is approached in order to interrogate citizenship.

About the Situation and Contract of Communication

Scientific popularization discourse can only be denominated as such in relation to the definition of what is understood as scientific discourse. Then, a first question is presented here, that is, the one that wants to know if popularization discourse is a translation, a reformulation or a transformation of a base discourse (the scientific discourse).

By definition, scientific popularization discourse appears in a situation of communication that is different from the one in which scientific discourse emerges; otherwise, why should it be popularized? The point here is to know the characteristics of the situations in which scientific discourse and scientific popularization discourse are presented.

If, as we are going to show, scientific popularization discourse depends, due to its characteristics, on the conditions of the situation of communication in which it is in, the question of knowing if there is one or more types of situation as well as one or more types of scientific popularization discourse is posed.

In order to answer these questions, we are going to use the model of "contract of communication" (Charaudeau, 2004), which depends on the way the situation of communication and its device can be conceived.

The Situation of Communication of Scientific Discourse

The *purpose* of scientific discourse is characterized by a *demonstrative* intention, i.e., an action of willing to establish a truth for which it is necessary to develop an activity of argumentation that situates some types of reasoning (axioms and rules) and the choice of arguments that must play the role of a proof. Thus, a discourse will be developed according to a triple organization: problematization (the presentation of a questioning), placement (the engagement of the arguing individual in a position that is to be defended), persuasion (the presentation of proof strategies), according to a hypothetical-deductive reasoning (see further).

The partners' *identity* is that of peers, of individuals who are supposed to have the same references of specialized knowledge and to share a position of ideological neutrality. This way, the instance of production of scientific discourse can economize explanations and use a specialized vocabulary that is presumed to be known by the instance of reception. It is necessary to say that the scientific individual, expressing himself/herself orally or in writing, is aware that he/she is addressing multiple addressees – even though they are in the same knowledge community, the scientific community. In fact, the addressees take several positionings based on different theories. In view of this, the individual of scientific discourse has to take into account those several positionings, thus previously responding to some objections that could be made. The fact that quoting and opposing live together simultaneously derives from that.

We could say that the *theme* of scientific discourse is always the aim. It is inscribed in a macro-theme, which constitutes the question at the same time. For example, the macro-theme "procreation" can be studied by biochemistry, by molecular physics or by a subject of human and social sciences (psychology, sociology, etc.). In each one of these cases, it will be specified in a thematic variant.

In relation to the material circumstances of production, they are either monological, such as in an (oral or written) exposition in conferences or articles published in specialized magazines (or online), or dialogical (much more unusual), when exchanges can be made in colloquia or researchers' meetings.

The Situation of Communication of Didactic Discourse[4]

The purpose of the teaching situation, considered from the point of view of the individual who teaches, is characterized by a triple intention: *information*, *captivation*, and *evaluation*.

The first one consists in transmitting a knowledge (which will be conceived as a knowledge-object of knowledge or *savoir faire*) in order to make the learner move from a not-knowing state to a knowing state. The teacher is inscribed in this purpose as a *mediator* between the reference knowledge and the student, playing, thus, the role of a guide. In this case, the knowledge to be transmitted

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[4] It would be more exact to write about "teaching situation," being the didactic discourse a type that can be found in several situations.

is conceived as a pre-existing object representing a truth (whatever truth) that is considered beneficial for human beings (otherwise, it would not be taught). The second intention consists in facing obstacles that are susceptible of being presented in the process of teaching/learning and that derive either from student's unwillingness (refusal, forgetfulness, inattention, tediousness, etc.) or from their lack of power (intellectual or psychological unfitness judged this way by different partners of the educational system). It is necessary, therefore, that the teacher find strategies to captivate student's interest, or actually, student's desire. The third intention consists in verifying the results of knowledge acquisition that is materialized by means of grades and/or appreciations. The student is inscribed in this purpose by *working*, that is, by responding to the instructions given by the teacher (the contract presumes that the student will work).

The partners' *identity* is, as the purpose entails, asymmetric. The teacher, on the one hand, is invested with an *institutional power* and, on the other, is supposed to have a competence of knowing and knowing-how-to-do related to the purpose of the contract (he has a knowledge to transmit / he knows how to transmit it). What he says must be considered the word of truth by the students. The social institution places the student in a position of not-knowing, but also as having the desire of learning (there are problems when he does not manifest this desire, that is, when he does not respect the contract.)

The *theme* of didactic discourse depends on the subject being taught and its object is fragmented into a *program*, which represents, anyway, the "objects of truth" that must be taught.

The *material circumstances* are quite variable, once it is possible to teach in different situations and with the aid of different supports, each one reflecting the way of teaching: classroom situation, with interaction between teacher and student; school manuals of monitoring or of replacement, distance education, diversified technological supports, etc.

The Situation of Communication of Mediatic Discourse

The *purpose* is characterized by a double intention: *information* and *captivation*. The information intent consists in transmitting to another individual, the citizen, a knowledge that he is supposed to ignore. But this intent is not exactly aimed to make the addressee acquire a knowledge, as in the case of the teaching situation, but to allow him to form an opinion. Towards the justification

of this act, it is necessary that the referred knowledge be recognized as true. The information intent compels to "tell the truth", not a truth that aims to be *the* truth, but a truth that is plausible/realistic. Thus, the information media have to respond to a question of credibility, which leads them to use strategies of *authentication* of facts, with the aid of testimonies and documents; of *revelation*, with the aid of interviews, surveys or debates; and of *explanation* on why and how the event occurred. The captivation intent comes from the situation of economic competition faced by the media: by reasons of economic survival, the media must seek to serve as many readers, listeners and viewers as possible. For that, the media use several procedures of discursive *mise-en-scène*, which tend to present world events in a dramatic way, being supported by popular beliefs and collective emotions.[5] Observe that the purpose of mediatic communication, with its double intention of information and captivation, is served based on three logics: the democratic logic, the market logic, and the logic of influence.

Considering the instances of production and reception, the partners' *identity* is not the same: the relation between them, in contrast to scientific discourse, is asymmetric. In fact, the first one has to play a certain number of roles, which are linked to the intents of the purpose: selecting, reporting, and commenting on the event. Each one of these intents exposes a problem. Selecting presents the double question of the choice of events and the identification of sources. It poses the media a dilemma over having to choose between journalistic scoop and verification; reporting places the problem of loyalty to truth, and commenting refers to the issue of choosing the type of explanation, knowing that it cannot aspire to scientification (it would be incomprehensible), historicity (there would be the lack of distance and absence of methodology), or didacticity (it would be too austere). In relation to the instance of reception, it is heterogeneous, constituted of a very wide set of reception situations and of individuals who have knowledge and beliefs that are difficult to determine. This instance, called public, is considered, in fact, as the one that represents several sets of opinion; it is heterogeneous.

The *thematic* of the information media (what it talks about) is related to what happens in the world and, more particularly in this case, to the events that are produced in the public space. If we argue that it is never the reality in raw stage that is communicated, but a construction of this reality,[6] we understand that the media do not transmit the event in the raw stage, but an event built by them. This construction happens according to three prin-

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[5] Remember the way in which the media dealt with both the death of the princess of Wales and the wars in Bosnia and in Kosovo. See Charaudeau (2001).
[6] Death, in raw reality, is just death. For it to mean a homicide, murder, disaster, or genocide victims, it is necessary for a discourse to symbolize this reality, that is, to give sense to it. There is no relation of transparence between discourse and the world, but a relation of opacity. Sense is built in this opacity.

ciples: a *perception* principle (to be able to see), a *salience* principle (to be surprised), and a *pregnancy* principle (to be able to reencounter what is already known).

The material circumstances are constituted of supports by which the transmission of information occurs: the written support for press, the audio-oral support for radio, the audiovisual support for television. The characteristics of each one of these supports lead to a particular way of placing information discourse in scene (Charaudeau, 2005).

Let us observe, then, the differences between those three types of situation. Scientific, didactic and mediatic discourses are all related to truth, but in different ways: scientific discourse aims to establish a truth – that is why it is predominantly *demonstrative*; didactic discourse seeks to transmit a truth already established – because of that, its discourse is predominantly *explanatory* (and not demonstrative); mediatic discourse aims to discover a truth – consequently it is predominantly *narrative*.

The partners' identities in those three types of situation of communication are equally different: a relation of symmetry in the position of knowing for scientific communication and a relation of asymmetry for the other two. But these last ones are different from each other, once, in the teaching situation, the individual (who teaches) is recognized, in principle, as the knowledge holder, while in the mediatic situation not only is the individual (the specialized journalist) only supposedly specialized in a type of knowledge, this knowledge is not more than partial. This makes the credibility of the individual of the teaching situation not be challenged, while the mediatic individual must constantly present proofs. As to the instance of interpretation, the addressees of scientific discourse are supposed to have the intellectual means to understand and discuss the topic proposed by the scientific enunciator. In contrast, the addressees of didactic and mediatic discourses are not supposed to have previous knowledge. However, the former are there for the appropriation of knowledge (spontaneously or out of obligation), while the latter are there simply to know the existence of what is being informed and perhaps to have an opinion on it.

Finally, if the theme is the result of a *value object* understood by means of a discipline in the scientific and didactic situations of communication, in the mediatic situation, it is an event that emerges and treats the object as free from any particular discipline, and, still, it is covered by a dramatic *mise-en-scène*. Nevertheless, there is a difference in the thematic of the first two situations: the thematic of the scientific situation is constituted of a *corpus* of reference and a language that are common to the partners, which is not the case in the didactic situation.

The Specific Situation of Science Mediatization Discourse

In relation to *popularization discourse*, knowing that it occurs in situations of didactic or mediatic communication, it is easy to understand that it borrows characteristics from either and sometimes from both at the same time. In fact, popularization discourse does not have its own situation of communication. If there is a situation of communication, it will be always hybrid. Therefore, it is necessary to distinguish between what is inscribed in a teaching situation and what is situated in a mediatic situation. We can even say that, in the first case, the discourse is confused with didactic discourse, sharing the same purpose, the same identity positions of the individuals and the same type of theme. In contrast, in a mediatic situation, the discourse has characteristics that are peculiar to them. For this reason, we will distinguish between science popularization discourse and science mediatization discourse.

In its *purpose*, mediatization discourse shares two intentions: of information (making-know) and of captivation (raising interest), but there is a contradictory relation between them. In fact, it does not have to do with raising an opinion as in mediatic discourse, but with exposing facts already established to the public knowledge, as in didactic discourse. On the other hand, the perspective is wider: we will say that it is educational and cultural (although not always) and not instructional.[7] We can even suppose that sometimes it has to do with raising an opinion when the object of the scientific information raises moral issues. We know, however, that it may not have the same effect that it would have if it were the case of making known a social or political knowledge, because that which allows forming an opinion is not of the same order. It makes the produced discourse, as we will observe, tend to be explanatory (didactic discourse), producing its own captivation strategies (mediatic discourse), and its credibility will depend on the way the strategies are conducted.

The partners' *identity* shows us more about this contradiction. With regard to the instance of reception, the individuals may have different levels of knowledge. Readers of specialized magazines are more expert; readers of generalists or popular newspapers and even viewers, which receive information only by TV, are considerably less expert, maybe completely lay. As to the instance of production, this specification of audiences has to be taken into account, and popularization discourse will vary according to this diversity. But this variation will also occur according to the identity of the producer of the popularization discourse, who may be

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[7] It is "educational and cultural" because it deals with sensitizing, in a recreational way, a public toward a specialized knowledge that has several civic purposes (interesting youths, preventing damage, developing technologies, etc.). It is "instructional" because it transmits a knowledge in order to make people appropriate and reproduce it.

a scientist popularizing his/her work, as it may occur in specialized journals or in interviews, or a specialized journalist attempting to explain scientific facts. Obviously, the characteristics of popularization discourse will not be the same in each case. For example, the scientist is led to use expressions that do not correspond to the concepts with which he works, which makes him experience a state of mind unknown by the journalist. And this fact brings consequences to the explanation discourse produced by the scientist. Nevertheless, we can think that these states of mind are compensated by the strong desire of popularizing science (by educational responsibility, by the search for financial resources, by the desire for visibility, etc.). On the other hand, the journalist – who would be a specialist – can only justify his popularization work by considering that all scientific language can be deprived of its esoteric terminology and translated into a simple language that reaches everyone.

The characteristics of the *theme* show us the hybrid character of this type of discourse. In fact, the theme corresponds to a knowledge object as in the scientific and didactic discourses, but it is more often disconnected from the subject to which it is usually attached, once the audience is not supposed to have this body of reference. It will produce an explanatory discourse without possible reference to the knowledge domain to which it belongs. In other words, the popularization discourse cannot have support from any discourse that founds this or that discipline.[8] Moreover, having to satisfy the mediatic intention of captivation, this knowledge object is transformed into an event and, in consideration of this, is treated according to the same dramatization strategies as any event. Thus, a *desacralization* of scientific discourse occurs, sometimes compensated by a kind of ethics of scientific knowledge popularization.

We conclude that it is about a mediatization discourse, which is distinct from the popularization discourse, once there is not a proper situation of communication. In turn, we can determine specific situations as variants of the global mediatic situation, taking into account the identity of the producers and receivers, whose specificity has effects on the purpose, privileging the intent either of credibility or captivation.

All these assumptions lead us to claim that, as it goes through the information media, popularization discourse is not the translation of an original scientific discourse written by authors who are experts in a subject and address their peers, but a discourse created by a mediatic agency according to the purpose of its communication contract. It cannot be confused with the didactic discourse, even though one borrows some discursive aspects from the other due to identity (a teacher is not

a popularizer) and to purpose (teaching is allowing the appropriation of a knowledge in order to reproduce it and not to form an opinion). Finally, a last question: are general popularization discourse and science mediatization discourse situated in a *continuum* of scientific discourse, as D. Jacobi proposes (1986, p. 28)? The answer is not simple. As a discourse that responds to the responsibility of making known the result of scientific research, allowing the social debate of ethical order, popularization and mediatization discourses are part of a democratic concern. However, this causes a significant transformation of the original scientific discourse – if it were not like this, those discourses could not be understood and validated by a large number of readers – producing a rupture and a non-continuation between scientific discourses on the one hand, and popularization and mediatization discourses on the other.

The Discursive Instructions of Mediatization Discourse

As we have already discussed, this framework of restrictions provides the two partners of the exchange with *discursive instructions,* which need to be understood more as instructions of language behavior than as instructions of the use of specific linguistic structures. The situation of communication cannot, in fact, give linguistic or semiologic instructions in order to indicate which words or which grammatical structure will have to be used, which image, which graphics, which color or which gesture will have to be used, because it is related to the speaker's choices. On the other hand, the situation will determine which modes of discourse organization (descriptive, narrative, argumentative), which textual or paratextual compositions, which thematic selections and organization will have to be used in discourse. For example, the instructions given by the situation of advertising communication state that, in one way or another, as a product is presented, it has to show or suggest its benefits, in a thematic domain that is related to the problems that could be faced in the search for individual well-being (youth, prestige, health, physical appearance, pleasure of seduction, etc.). But these instructions do not inform how to configure the slogan, how to act in order to suggest the product qualities or how to use icons to present the product.

Due to the fact that scientific popularization is inscribed in the mediatic information contract as a specific subset, it is submitted to four types of restrictions, which are translated into a certain discursive organization and in some linguistic procedures: the restriction of *visibility*, the restriction of *legibility*, the restriction of *seriousness*, and the restriction of *emotionality*.

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[8] For the notion of "founder discourse" or "constituent discourse", see Maingueneau and Cossuta (1995).

The Restriction of Visibility

It leads the information agency to select only the scientific facts that are judged as extraordinary, odd, unusual (and to never discuss what is common in scientific research), those that are susceptible of provoking an impact more or less immediate on individuals' daily life (mainly related to technology), those that touch humanity's destiny and that are susceptible to introduce an issue of moral or ethical order.

This visibility will be placed on scene by means of some iconographic presentation (the image is preponderant here) and of the choice for a headline or slogan that will have the strength of an epiphanic announcement: "The men and their double" (about cloning), "The babies of last chance" (about watched medical procreation); or a threatening dramatization force: "Cloning, in the course of a new eugenics?"

The Restriction of Legibility

It is characterized by two obsessions that are already present in general mediatic information discourse and that are particularly prominent in every popularization discourse: *simplicity* and *figurability*.

Simplicity is translated by means of two linguistic characteristics: the first one is about sentence construction (simple sentences in which independent propositions follow each other by juxtaposition and not by subordination, nominal sentences, simple syntactic constructions, etc.); the other one is related to the choice for lexicon words supposedly clear and transparent, which must replace technical words (synonyms, hyperonyms, glosses, periphrasis), except if the aim is, in contrast, to produce an effect of scientification (see further). Obviously, the simplification degree depends on the specialization degree of the information agency: more simplification in popular media and less simplification in scientific journals.

Figurability (expression borrowed from D. Jacobi (1986), who, in turn, took it from Freud) is translated in written-visual procedures of paratextual semiologic composition, which consist in using texts, headlines and subheads, images and graphics in order to enable a more immediate understanding (consequently, often, simplified and schematic structures) of the topic addressed and the apprehension of the reader's interest. Obviously, it has to do with suppositions done by the writer individual of this *mise-en-scène*.

The Restriction of Seriousness

This restriction is characterized by some of the same aspects used for ensuring the legibility of popularization discourse, that is, the *mise-en-scène* of an iconography that presents tables, schemes, figures of statistical results (histograms, section graphics, diagrams), and of infinitely small (cells, atoms) or large (the space, the celestial dome) pictures – besides the procedures that, in fact, play the role of an *authority argument*.

However, the restriction of seriousness can be equally characterized by the use of certain punctuation (quotes) followed by metalinguistic tournaments ("as you prefer…", "stated otherwise…", "in other words…", "as it could be stated…", etc.). This procedure intends to show that the enunciator of popularization discourse is conscious of the distance that exists between scientific language and the understanding of an open audience and that, therefore, he/she is a good mediator, a good transmitter of the scientific knowledge, translating scientific language into common language.

This restriction can equally lead the producer to choose a mode of discourse organization, descriptive and explanatory at the same time, which, instead of satisfying the simplicity condition, proceeds to the text construction in different stages, using subheadings, making sentence construction complex, using logical connectors, and making use of resumptions and anaphoric resends. Once again: it depends on the degree of specialization of the medium.

Finally, the restriction of seriousness can equally appear, in variable dosages, by means of a dialogical play of scientific references intent to remind the reader that he/she is in a domain that is reserved to specialists – unless this play of references is more philosophical: when it has to do with suggesting that a certain scientific discovery presents issues of an ethical order. We still need to see how this play of reference operates, as it varies according to the information media.

The Restriction of Emotionality

It is characterized by several procedures already mentioned, but, in this case, it privileges affective effects: an iconography organized in a way that produces an unusual or threatening effect (there are different ways of taking photos of Dolly, the sheep); a play of dramatic headings and subheadings, as the already mentioned "Cloning, in the course of a new eugenics?"

However, this restriction is also characterized by a descriptive and narrative organization, which sometimes presents scientific research as an adventure of seeking the truth, sometimes anthropomorphizes natural elements or chemical components of the body, giving them intentions, converting them into active agents who have an intention and search project: "Will human embryo have success imposing its will on researchers?" In the same way, it is possible to use a metaphoric and metonymic vocabulary that transforms inert and cognitively unable elements into characters of more or less mythic narratives.

With the same purpose, an explanatory discourse is developed, which abundantly uses comparison and analogy, sometimes announced by means of "it is as though…"

Conclusion

Scientific popularization has been the object of several studies: popularization conceived as the translation of a source scientific text by a mediator who plays the role of intermediate between a specialized language and a common language, a thesis that was preponderant in communication sociology during the 1960s; the "rhetoric of popularization", which follows the previous position, reinforcing it by means of an analysis of modes of reformulation of scientific writings, leading to a classification that distinguishes this type of discourse from scientific, didactic and encyclopedic discourses; more recent linguistic works that allow the understanding (more than they show it) that "scientific popularization discourse does not replace the source esoteric discourse, nor does it really translate it: popularization discourse builds scientific discourse by means of spectacularization, showing it, exhibiting it without ever deleting it". We follow this last perspective, once we consider that popularization discourse, going through the media, is not a translation of scientific discourse, but a construction dependent on the mediatic *mise-en-scène* procedures.[9]

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[9] See Jacobi (1986).