

# THE ROLE OF SCIENTIFIC DISCOURSE IN BIOEXHIBITIONS PRODUCTION

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## Abstract:

This paper is the outcome of a PhD thesis produced at the School of Education of São Paulo University and studies the transformation process of scientific discourse - particularly the biological - into expositive discourse in the construction of science museum exhibitions. The methodological approach was based on the principles of qualitative research. Five exhibits were selected from the following museums: Zoology Museum, Veterinarian Anatomy Museum, Oceanographic Museum, Science Station, all belonging to the University of São Paulo (SP), and the Museum of Life – Biodiscovery Space of the Oswaldo Cruz Foundation (RJ). To understand the construction of the expositive discourse, we used the studies carried out by Basil Bernstein (1996) in the field of educational sociology. Also, others authors, related to museum communication and to the concept of didactic/museographic transposition were used. Based on the articulated study \_ of the history of Biology and \_ the history of museums, the exhibits were described and their constitutive elements such as texts, objects, the relationship between collection, research and exhibit, the discourses present and the role of the biological discourse in the formation of the expositive discourse were analysed. The results suggest the necessity of going deeper into the question regarding the production of biological knowledge, its history and epistemology. The introduction of biological phenomena in science museums raises questions about the particularities of this type of knowledge and may contribute to the understanding of these particularities in teaching and broadcasting.

## I - Introduction:

This article is the outcome of a PhD thesis produced at the School of Education of São Paulo University and studies the production process of science museums exhibitions, i.e., the transformation process of scientific discourse - particularly the biological - into expositive discourse. The characteristics of the various discourses and areas of knowledge that participate in that process were described as we identified what happens to scientific knowledge when is to be expressed in bioexhibitions.

References from the areas of education, scientific divulgation, communication and language, in addition to the works on museology as well as on the history of biology and science museums provide theoretical basis for the study. As such, it focuses on understanding what happens to scientific knowledge when it is presented in museum exhibitions treated as pedagogical entities.

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In this work, we present part of the data from the research related to the role of the biological discourse in the construction of bioexhibitions.

## II – The Studies on Transposition and on Recontextualization of Scientific Knowledge: A Brief Synthesis

The transposition of scientific knowledge to other social arenas has increasingly been the theme of studies in educational and scientific broadcasting areas. Researches in Education have been defending the idea that "scientific knowledge and the knowledge acquired in school lies on different learning spaces and school disciplines hold a different epistemological and sociohistorical background than scientific disciplines" (Lopes, 2000:150). Among other implications, this idea recognises the existence of a "school culture", with the school as "also being a true producer or creator of cognitive configurations and original habits" (Forquin, 1993:34).

Chevallard (1991), for instance, introduces the concept of didactic transposition stating that "Knowledge-as-it-is-taught, the taught knowledge, is necessarily distinct from the knowledge-initially-designated-as-being-the-knowledge-that-must-be-taught, the knowledge to be taught." (Ibid., p.17). According to Chevallard, the knowledge contents designated as those to be taught are true didactic creations, caused by the educational needs and go through a collection of adaptive transformations. The work involved in transforming a subject of knowledge to be taught into a teaching subject is what he calls "didactic transposition".

Other authors have been working with the concept of didactic transposition and there are indications that other elements than the wise knowledge - as, for instance, the social practices, are references for the construction of \_ school knowledge (Astolfi and Develay, 1990; Caillot, 1996).

Regarding the subject of didactic transposition in museums, the work by Simonneaux and Jacobi (1997) stands out, since they propose the notion of museographic transposition based on Chevallard's work, to describe the transposition of the acquired knowledge into a knowledge to be displayed in exhibitions. Also, we used works about museum communication from Davallon (1999).

Another important reference for the comprehension of the process of translating scientific knowledge are the studies carried out by Basil Bernstein (1996), in the field of educational sociology. This author goes further into the subject of the construction of pedagogic discourse, stating that "pedagogic discourse is a starting point for seizing other discourses and putting them in a special mutual relation, aiming at its conveyance and selective acquisition". As such, to Bernstein (1996:259) "pedagogic discourse is thus a principle that removes a discourse from both its practice and context and relocates that discourse in accordance with its own focusing and selective reordering principles". Thus, the constitution of the pedagogic discourse implies a *recontextualising* principle that selectively appropriates, relocates, refocuses and relates other discourses in order to make up its own order and orderings. Bernstein's work helps us to better understand the process of creating the pedagogic discourse. If we regard museum exhibitions as pedagogical entities and the expositive discourse as a kind of pedagogic discourse then it is essential to consider that this discourse *recontextualised* other ones, including the scientific.

## III – From Natural History to Biology: Walking through the History of Science Museums

The knowledge stemming from the field of biology has long been the subject of science museums exhibitions. Natural History Museums began serving the purpose of collecting, preserving and studying specimens that allowed the systematic investigation and research of nature (Gil, 1988:72). The so-called "Curiosity Cabinets", originated in the 16<sup>th</sup> Century, gathered heterogeneous collections with samples from nature, historical items and antiques and had their role slowly changed, in an attempt to "replace their old displays by catalogued exhibitions which

became a way to introduce 'an order of the same character established among the alive' in the world's conceptual definition and, thus, offering another way of making history" (Lopes 1997:13).

Some milestones were essential in the development of these museums throughout their history. The modern origin of Natural History Museums can be represented with the French example of the *Museum National d'Histoire Naturelle* (1793), the first modern museum of this kind, (Gil, 1988:75), although it has a long history. In the end of the 19<sup>th</sup> Century, Darwin's work was another milestone in the history of these museums, since: "(...) it produced a decisive evolution in the Natural History Museum's concept and objectives which developed from mere galleries for admiring curiosities into institutions that, apart from broadcasting natural knowledge, play the role of research institutes with the aim of promoting the methodical exploration and systematic study of nature." (Ibid.).

Influenced by Moebius' theory a new transformation takes place in these museums. This theory "is based on the principle of a clear separation between a scientific collection (for research purposes, therefore as comprehensive as possible) and the one which is put to public display, based on the latter but carefully organised and displayed with its most representative items, or their accurate replicas, for a convenient and fruitful approach of the treated subjects by non-specialists" (Idem.).

Natural History Museums have developed throughout the years and are still constituted of collections that highlight scientific research. However exhibitions are becoming more and more important, increasing the use of the resources of modern museology.

On the other hand, Science and Technology Museums have also developed in the history of museums, also with important milestones that help understand contemporary science museums. The origin and aims of these museums are different from those of Natural History, since they were from the beginning "created with essentially utilitarian objectives" (Gil, 1988:77). One may, however, state that this utilitarian aspect depicted a gradual concern with showing scientific and technical evolution to the public and this has become one essential element of these museums.

The 20<sup>th</sup> Century thus inaugurates a new type of museum in this field, the so-called *Science Centres*. These museums are originated with the "perception of the imperative educational needs, attempting to revolutionise its teaching methods through observation and experimentation" (Ibid., p.80). Such institutions are firmly gaining space within society and among the several transformations they have been going through, some stand out: those most recent ones, related to their perception of the role of the public, since these museums were the ones to have found, through educational activities, a new way to regard the relation between visitor and displayed object.

Another way to perceive the history of these museums is indicated by Cazelli et al. (1999), based on the work produced by McManus (1992). Science Museums are thus characterised by the themes that initiated them, that is: a) the first generation ones, i.e., the Natural History Museums; b) the second generation ones, where emphasis is put on the world of labour and on the aspects related to science and industry; and c) the third generation ones, centred on scientific phenomena and concepts. To Cazelli et al., this third generation of science museums encompasses the concern to improve education and holds a central focus on scientific phenomena and concepts. At the same time, in these museums the communication between visitors and science is mediated by a stronger interactivity with the different displayed devices and the role of the visitor in the learning process is emphasised.

However, the perspective of interactivity in museums only recently has been argued (Gil e Lourenço, 1999; Falcão, 1999). It is, for instance, stated that the *hands on* type of interaction does not necessarily guarantee an intellectual engagement. Another criticism concerns the natural identification of the interactive expression with Physics, turning the application of this type of

communication in fields like Chemistry and Biology a much harsher task to undertake. Besides that, the lack of concern with the historic-cultural dimension and with the scientific processes, their history and their implications in the social context are also argued.

Regarding Biology, its constitution as a discipline as we know it today is relatively new. Since its birth in the 19<sup>th</sup> Century, this area of knowledge has been kept in separate parts for a long period of time and according to Smocovitis (1992), the proposition of the Evolutionary Synthesis in the 30's, was a key factor for its unification. The autonomy and even the idea of a unified Biology are not consensual among epistemologists and science historians (Jacob, 1985 in Wortmann, 1994). However, the changes occurred in the field of Biology towards becoming a scientific discipline and the discussions related to the questions on Biology and Society as well as on Ecology and Environmental Crisis have also been influencing the conception of Natural History Museums. Brown (1997:39), for example, argues that the present role of these museums vis-à-vis the innovations in biological fields, such as the development of modern genetics, and proposes a new way of *collectionism* that is able to meet the planet's needs. Other authors have been raising the questions associated with the impact of the new research perspectives in Systematic and in Modern Biology in defining the role of museums (Mayr, 1988; Erzinçlioglu, 1993; Brandão, 1999).

As such it is possible to say that the particularities of the teaching/broadcasting and learning processes in science museums have been pointing at the necessity to consider the results produced by research in this field in the preparation and evaluation of both the exhibitions and the cultural and educational activities in these settings. One may thus say that for the elaboration of bioexhibitions in science and natural history museums today, aspects concerning the history and structure of the biological knowledge as well as the incorporation of the educational and communicational references must be considered. Questions pertaining to the relations among scientific research, collection, assets and display, as well as to aspects of management and administration, also influence the conception and construction of the expositive discourse.

#### IV – The Construction of Expositive Discourse: Some Considerations

Based on the articulated study of the history of Biology and the history of museums, the exhibits from the research were described and their constitutive elements such as texts, objects, the relationship between collection, research and exhibit, the discourses that were presented and the role of the biological discourse in the formation of the expositive discourse were analysed.

Taking in account the data obtained in the research, three items were discussed. The first refers to the educational and communicational perspectives of the exhibits. A second aspect relates to the 'game' taking place in the expositive discourse constitution: the expositive discourse has a behaviour similar to Bernstein's pedagogic discourse, for it displaces other forms of discourse based on its own principles and objectives and assumes the characteristics of the "recontextualizing" discourse. Nevertheless it is worthwhile observing that the expositive discourse has specific characteristics different from the school pedagogic discourse, which results from the relationships between time, space and the objects in the museums with direct implications upon the evaluative rules of the discourse constitution. It is postulated that the expositive discourse constitutes a specific discourse, since it has its own objectives and it arranges other discourses according to its own logic, it behaves similarly to the pedagogic discourse.

Finally, modern questions on the issue of biology exhibitions in museums were discussed. After an analysis of the role of the biology discourse in the making up of the expositive discourse, challenges, limitations and possibilities that the biology area must impose in order to be

presented, were discussed. Various perspectives were suggested aiming at presenting Biology in museums.

In what concerns the biological discourse in the constitution of the expositive discourse, some elements will be pointed out. From the point of view of the studies about the history of biology and the history of the museums it is possible to affirm that the presence of authentic objects, scientific and natural, as conserved beings, fossils, living creatures, etc. marks the legacy of Natural History and its role as a science at a time where the Museums of Natural History were the main centres of production of knowledge in this area. At this moment, more than understanding biological concepts, it is necessary to present natural sciences, its discourse and its logic so that the exhibits show the systematic and taxonomic organization of living creatures. That perspective considers the object the main element. On the other hand, with the sprouting of dioramas in the Museums of Natural History and, later, the increase of the use of the devices, models, rejoinders, etc. in Museums of Science and Technique and the Science Centres, such objects had clearly more didactic objectives, related to the presentation of the concepts to the public.

As mentioned before, Natural History had been through deep modifications in its growth, mainly with the Theory of the Evolution. Recently, Biology became an autonomous discipline, although there is no consensus in the debate on this subject. This new picture also brought new contents, especially in Genetics, Molecular Biology, as well as Ecology. Other challenges appeared to the exhibition development at museums.

The final of the 20th century is strongly marked by the questioning of the objectives of the Natural History Museums and one of the quarrels is to which thematic choice these museums must be dedicated today. Many defend that the Natural History Museums must give priority to environment problems, since these possess a high level of penetration in the society and influence some aspects of the human life and all beings of the planet. On the other hand, some scientific researchers from the Natural History Museums criticize the perspective of assuming a thematic body in the displays that is not connected with the research in Biology developed in the institution. In these cases, the exhibitions would have to present the research in Zoology and Botany, mainly in the aspects related to Systematic and the Evolution, but also in Ecology if it is a subject of research in that place. Subjects related to the human being, in Physiology, Anatomy, but also in Health, would be out of the Natural History Museums and, in this case, these issues could be presented in bioexhibitions, carried out in Centres and Museums of Sciences and Technology, where there is no research in the biological field. Bioexhibitions from other types of museums and centres of scientific culture, not the ones of Natural History, would have to develop these thematics.

Another important aspect of this debate is related to the contemporary biological knowledge presented in the Natural History Museums and bioexhibition, and to the historical perspective of construction of knowledge disclosed through the narrative of the displays. To present Biological Sciences as a historical process, a product of changes in the scientific, political, economic, social and cultural fields is something that has to be made in a consistent, dynamic and interesting way for the public who visit the museums. In this perspective, we have to mark the fact that the current quarrels in the fields of Systematic are totally absent in the Brazilian museums when they present themes related to Natural History.

The collections and displays of the Natural History Museums can be considered certifications of the development of Natural Sciences and through them one can understand not only Natural History but also the history of Biology and the contents of these fields, in such a way relative to Systematic and Taxonomy, Ecology, Biodiversity, as aspects of contemporary Biology among others. These museums are basic institutions for the study of the scientific policies in these areas of knowledge and can thus assist in the acceptance of Science as part of the culture of the

society. For this, it must be guaranteed that the public can understand the message contained in objects.

The museums in this area must not only make its exhibitions to tell these histories of Biology, as to develop educative and cultural activities in this perspective. The public must have access to this information and, for this, the didactic character of the museums must be assumed as basic. As indicated by Girault and Guichard (2000), it is through the collections and the displays that a non-formal biological education in the museums can be developed.

Another subject related to the difficulty to present the biological phenomena in its integrity and complexity in exhibitions is the dimensions of time and space. When these phenomena are exposed, in some cases the information appear fragmented and reduced to its physical dimensions, as \_ happens with some experiments of sensorial physiology and anatomy - and the strict biological explanations appear, in texts and pictures. These difficulties seem to surpass the time and space question imposed by the specificity of the museum's exhibitions and include, also, some particular features of Biology as knowledge. Its complexity, and the totality of the phenomenon, is not easy to present, needing the use of intermediary devices - models, simulations, iconography, for its presentation and explanation.

All exhibitions have institutional commitments related to their objectives and these must be considered when analysing them, since the expositive discourse is also a commentary on the scientific discourse (Van-Präet and Poucet, 1995). However, as it was characterized in this research, the expositive discourse recontextualizes other discourses, with a proper logic, which is related to the spreading of education through media. The scientific discourse thus is relocated by the recontextualizing principle of the expositive discourse, which has its proper selective principles, which refers to the dimension of the time, the space and the objects in the museums.

In this process of recontextualization, the biological discourse is inlaid in the logic of the expositive discourse and participates in the negotiation play that occurs in the construction of the exhibition, bringing with it its histories, its structure, its contents and its procedures. However, beyond it, other discourses also enter in this game, with its features, modes, contents and structures. A selection process takes place, elements are left aside and new approaches are taken in account, with a scope different from the one of the original discourse. Depending, among other factors, on the conceptual options - politician ones as well as the institutions' historical ones -, some voices take part of this discourses negotiation with more intensity than others, thus imposing their own logic, structure, procedures and contents.

Moreover, the more the conceptual proposal is centred on the mediation with the public, the recontextualization process is more evident and more discourses can be part of the negotiation. On the other hand, the more the exhibition conception is centred on information and its transmission, the recontextualization process, with few discourses in play, will privilege one or few discourses, often prevailing the logic and the structure of the scientific discourse.

## V – Conclusion:

The present study seeks to understand the construction process of the expositive discourse based on the idea of the recontextualising redefinition of the scientific discourse takes place when it is transposed to science museums exhibitions. However, all evidences point towards the fact that scientific discourse is not the sole responsible for regulating and determining this construction. Other discourses could be an active part of this process and, according to the conception adopted in

elaborating the exhibition, these other discourses may be more or less intensely expressed in the expositive discourse.

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