The ideology of popularization and the popularization of ideology: Some issues for the History of Science

Ideologia da popularização e a popularização da ideologia: considerações para a História da Ciência

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ABSTRACT This article discusses the ways the hegemonic ideology is further consolidated through the popularization of science. The issues surrounding science popularization are intimately linked with the utopias such popularizations construct, the ideology they propagate, and in the case of molecular biology, with the issue of reductionism which appears to be so prevalent in the popular accounts of molecular biology. In such a context, reductionism is no longer a philosophical issue, but a political issue. The article, also, attempts to bring forth the differences between the rather prevalent notion of European Science and that of Science in Europe.

Key words popularisation – ideology – History of Science

RESUMO *Este artigo discute como as ideologias hegemônicas são conquistadas através da popularização científica. As questões que envolvem a popularização científica estão fortemente ligadas com as utopias construídas pela popularização, com as ideologias propagadas, e no caso da biologia molecular, com as questões reducionistas que parecem prevalecer na divulgação da biologia molecular. Neste contexto, o reducionismo não é mais uma questão filosófica, mas política. O artigo pretende ainda apontar as diferenças entre as noções de Ciência europeia e de Ciência na Europa.*

Palavras-chave *popularização – ideologia – História da Ciência*

There has already been extensive and interesting work concerning the popularization of science and, by now, the diffusionist model of popularization as a process of transferring knowledge from a source by those who "know" to an audience comprised by those who "do not know" is shown to have reached its explanatory limits. In 1994, almost twenty years ago, a seminal paper by two historians of science, Roger Cooter and Stephen Pumphrey[1] redefined the topography of the issues related to science popularization. Their work and the interventions later on by Jim Secord,[2] forced us to shift the emphasis from a diffusionist model to the view that historians should study the circulation of knowledge and the multifarious ways that such circulation brings about a sense and consciousness of what is science, what is scientific and what is scientificity. Thus, popularization has been freed from being considered a well defined, specific and restricted form of a scientific genre and its characteristics are now considered as being perpetually present in almost every form of scientific activity.

Through such works, popularization perceived as a process by which difficult things are made easy, appears to be abandoned. Nevertheless, an amazingly large number of people involved in newspapers, book writing and the media do exactly this, that is they attempt to make complicated things easy. But instead of concentrating on the cognitive aspects of what is being transmitted or on the particularities of the language through which complicated scientific knowledge is transmitted, many historians of science have been looking at the question about the ways by which society at large or a number of social groups get in touch with science. And when we refer to science, we do not only mean the content of science, but the overall culture of science, the overall mentality of what it means to be scientific.

Here, then, is an interesting challenge for us historians of science. It would be intriguing to investigate the ways the culture of science is being communicated and how this culture is being appropriated by various social groups. It does not matter whether we talk of expository science, knowledge in transit, circulation of knowledge or science popularization, it does not even matter whether we talk about the culture of science, scientific culture, science *in* culture, or science *as* culture, as long as we remember that when we discuss issues in the popularization of science we are referring to a set of social relations linking different communities with allies, audiences, publics and consumers. And it is, also, important to emphasize, that such an approach to the popularization of science, is something where members of the relatively newly emerging communities of historians of Science, like the historians of science and technology in Brazil and Greece, can bring in amazingly interesting elaborations on these themes, since the issues related to local conditions and the problems associated with the particularities of the localities play such a dominant role in examining the issues around science popularization.

Is this all? Does the admittedly complicated function of science popularization exhausts itself in trying to understand the social relations linking different scientific communities with their allies or the construction of their audiences and publics? Though this is not such a mean job at all, what I would like to do in this talk is to raise a number of questions whose nucleus revolves around a rather neglected aspect of popularization. I am referring to ideology. How can one study the "presence" of ideology in popular scientific knowledge? How is the ideology of those who circulate knowledge imprinted upon the knowledge they circulate? How does ideology affect the means of circulation, the materiality through which such a circulation is being achieved? How does this materiality interact with ideology? Are there any indications that the communication of the culture of science and its appropriation becomes part of the process of communicating and strengthening the hegemonic ideology? And, if yes, how do the various forms of knowledge in circulation fuse into (re)defining the dominant or hegemonic ideology?

I shall not discuss what ideology is since the point is not to sanitize the notion of ideology through an analytical discussion. On the contrary, it may be more useful to adopt an operational notion of the dominant ideology as the sum total of a particular worldview and value system shared by most in a society. Of course, when one is talking about ideology one does not look for something which is homogeneous and shared by all in a society in all its details. What is, however, characteristic of the dominant ideology is the fact that despite the various differentiations found among groups of people, there is a nucleus of values, perceptions, beliefs, explanations and mores that are shared by many.

Often we talk of a hegemonic ideology. The concept of hegemony was basically developed by Gramsci in order to underline his belief concerning the limitations of any socio-economic reductionism to explain the political character of Western Europe.[3] In his view, in a particular historical context, social stability cannot be properly understood by considering that the exclusive reason for such a stability is the social control through the various state institutions. This political stability, had to be explained by other factors, of further coercion. Therefore, hegemony brought to the fore how the so called *civil society*, with its institutions ranging from education, religion and family to the microstructures of practices of everyday life, contribute to the production of meaning and values, which direct and maintain the 'spontaneous' consent of the various strata of society. Thus "hegemony is not simply the crude defence of the dominant opinions, nor the simple manipulation of things from above. It is much more than this: it embraces the whole of our reality, all our habits and hopes; it is our own perception of reality".[4] It appears that cultural hegemony, and its acceptance and consent by a wide range of the social groups is what contributes greatly to social stability. But such a hegemony cannot be sustained unless it is continuously being formulated and reformulated through its negotiations with antagonistic ideologies. Surely

hegemonic ideologies are social constructs, they are manifestations of specific social groups which aim at maintain their dominant position in a society. Those who vie for hegemony are obliged to be continuously asserting and reasserting their ideology and to continuously devise new ways to argue convincingly about the authority of the particular ideology. And science popularization in its most general sense appears to be one of the fundamental means through which the dominant ideology is being (re)produced and assimilated.

The hypothesis I would like to explore is that scientific popularization and the various forms of knowledge in circulation are involved in the processes of continuous rearticulations of the dominant or hegemonic ideology. Let me give an example of what I mean in the case of science popularization. One of the most common aims of science popularization is to consider it as a process for narrowing the cultural gap between the elite and other social groups. By transferring knowledge across cultural and class lines, the expressed rationale of most of science popularization is to bridge gaps, to achieve egalitarianism, to convey in simple words the power of science and the many possibilities it can offer for the edification and the benefit of the masses. But this very process does not *only* transfer "objective" and "useful" knowledge. Such a process is also an attempt to imbue and instill audiences with a particular ideology, very often an ideology of neutral science which can provide answers to all kinds of problems or, worse still, that the character of the solution to many problems including social problems is exclusively scientific. The very belief that one can bring egalitarianism through popularization is, in itself, an ideological undertaking. Regarding the lack of scientific knowledge of particular social groups as expressing a cultural gap or a cultural lag with respect to that of the elites, presupposes a particular social and political agenda: that both groups, both the elites and the rest *should* share the same fundamental scientific culture, in fact, they should share the culture of the elites. Such an attitude, shared by the large majority of scientists, and science communicators is a presupposition with all kinds of political connotations. In attempting to bridge gaps among different social groups, science popularization turns out to be a process of legitimizing new power relations between the elites and other social groups and popularization turns out to be a process of political elaboration and social appropriation of the authority of science. Hence, an implicit agenda of much of popularization is that the elites and the rest will share the same knowledge *and* they will, also, share the same values about the significance of this knowledge. And such an agenda constitutes another aspect of the hegemonic ideology. Something along similar lines was convincingly argued by Steven Shapin and Barry Barnes in their article on the mechanics' institutes back in 1977. They showed that the curricula of the mechanics' institutes in 19th century Britain was a way for social control of those being educated. Though workers were taught technical skills, the aim of the educators was to make them "more docile, less troublesome, and more accepting of the structure of the emerging industrial society."[5] In other words, the people attending the mechanics' institutes courses, were not only taught technical skills, but by being taught technical skills, they were imbued with all kinds of values, values whose net effect would be to make the working class be in harmony with the dominant ideology.

Let us consider technocracy where science and its multifarious applications are considered to be the key to progress, to the alleviation of all social ills and to the solution of all social problems. Interestingly, until about the late 1960s many Marxists and non-Marxists alike, shared the same outlook about science. They both believed that science itself was a neutral enterprise but differed on the practical applications and uses of science. The neutrality of science and the belief that its ideological and political aspects are materialized only when science is applied, has been the fundamental tenet of technocracy. Such a technocratic attitude, helped underline the view that the solutions of social problems were of an exclusively technical character, promoted by technocrats who are supposed to be thinking objectively and have the proper knowledge. This view was, for many decades, shared by people who had differing views on a host of other aspects of social and political life. Thus technocracy, for many decades, has been an unchallenged hegemonic world view and science popularization was one of the main mechanisms which guaranteed the perpetuation of such a hegemony.

But by the early 1970s there were serious changes in the world. The energy crisis and the environmental crisis started to challenge technocracy. The pillar of technocracy that more science and more technology will bring more progress for all, did not sound as convincing as it sounded a decade ago. And the Vietnam War which ended in 1975 with the defeat of the USA, among many other things underlined two things. The first was the case that perhaps for

the first time in the history of humanity a military power is defeated without being able to use the ultimate weapon it processes.[6] And secondly in the United States and generally in the West scientists started to strongly criticize other scientists for their involvement in the war. Scientists ceased to be what after World War II appeared to be as a homogeneous whole. The energy crisis, the environmental problems and the Vietnam War created deep divides within the scientific communities – divides which, if anything, have been accentuating over the years. New power relations were formed, academic politics took a new turn, the funding from the Department of Defense was no longer to almost everyone independent of what kinds of problems they were investigating.

So the environmental and energy crises, and the defeat of the USA at Vietnam, brought to the public sphere new groups of scientists many of them rather critical of the way science was being practiced. The 1970s saw the formulation of new models of development, the discussion of alternative ways for progress, there was a redefinition of the moral responsibilities of the scientists and slowly a different view towards science and its possibilities was being articulated. For example, the notion of sustainable development and the notion that there are limits to growth, all have their beginnings in the 1970s. It appeared that not all scientists shared the same values, and that many scientists criticized other scientists as to their moral stand *vis-à-vis* the use of the science they practiced. There was no more consensus that science and technology was a solution to all the problems, and many people started voicing their concern that science and technology as they were practiced, were no more part of the solution to many problems but part of what created these problems. And scientists became deeply divided, since within the new framework conditioned by these new social realities, the science they were producing and practicing entered a period of a deep crisis. Its authority was shaken and its credibility doubted. And, thus, technocracy as it was historically formulated, ceased to be the unchallenged hegemonic ideology. It continues, of course, to be dominant, but its position as a hegemonic ideology is becoming progressively more and more precarious.

The extensive science popularization undertaken since the 1950s had another important aim: the formulation and legitimation of an utopia. And utopias are heavily ideological entities. In the fifties and the sixties it was the utopia of a world of cheap and limitless energy for all. A hegemonic ideology implies some kind of an utopia, and an utopia is closely identified with a hegemonic ideology. Science popularization appears to be absolutely pivotal in this process in a peculiarly reciprocal relationship: Historically at least, science popularization has been articulating the characteristics of utopias which, in turn, are used to further legitimize ideological trends, and as these trends become entrenched in society, the utopias become even more dominant and they need further the help of science popularization etc. Hence, science popularization, utopias, hegemonic ideologies seem to be intractably associated with each other. The ideology of technocracy so closely associated with the post Second World War hegemonic ideology and the utopia of a world with endless supplies of cheap energy, needed to be continuously revamped, needed to be continuously legitimized through a host of specific success stories. And by the early 1970s there were fewer and fewer success stories to come by. The various crises of the 1970s brought about the need for another dominant paradigm in science. In cultural terms physics and the atom could no longer command the necessary credibility in order to continue to have the authority which was so necessary for the dominant ideology. What was so systematically constructed since the end of WWII, was in urgent need of change. Slowly biology and the gene replaced physics and the atom.

Let me mention a word of caution before I continue: When one is dealing with these issues one has to be doubly careful: there is no conspiracy theory. Nor are the people who popularize science part of a big plot to lead us all to a hideous world. It is simply a matter of vying for hegemony, of legitimizing ideologies, and the role of science in all this. And what I am trying to point out, is that both science itself as well as its popularization are being practiced in societies where there is a continuous struggle for hegemony, and that both science and popularization cannot be considered to be isolated from such contentions for hegemony.

The new hegemonic paradigm, the movement away from physics and the atom into biology and the gene, was accompanied with the attempts to associate with it a new utopia: it is the utopia of a world without diseases, of a world with plenty of food for everyone. Let us attempt to probe into some characteristics of what many popularizes call the "miracles" of molecular biology. Almost every day in almost every media we come across small or big successes

of molecular biology. Whether it is new cures for cancer, or the discovery of the gene for obesity or for jealousy, we are continuously reminded that most of our problems will be understood and solved through the triumphs of molecular biology. But what has been the net effect of popularization or the circulation of knowledge about molecular biology? It appears that the popular "understanding" of the issues involved in modern biological research has been the conviction of a reductionist view that everything is in the genes. What has been successfully communicated is not the complicated microscopical processes, but the overall attitude that whatever is going to happen to us has been somehow codified in the genes. Or that if it is not, then it is conceivable that genes can be properly manipulated to give the wished for result. Never mind, that biologists and other scientists have been telling us at every opportunity that biological research has, in fact, undermined such reductionism. Molecular biologists have been telling us that every finding about a particular gene has to be assessed in the context of all the other genes. And the researchers in biology have been stressing all along the dangers of reductionism. But the public perception of biological research is heavily anchored in reductionism. And such reductionism has been the net outcome of the popularisation attempts. Reductionism far from being a methodological or even a philosophical category, has, over the years, become an ideological category, it has become part of an ideology which, emphasizes that the problems one is facing have been in the genes all along. One is jealous, one is obese, one is antisocial, one will have all kinds of deceases, because everything is in the genes. Thus, reductionism is no longer a technical issue, something which shows a sloppy methodology or naive philosophy. If over the years, reductionism has become an ideological category, then the processes of popularization which place emphasis on the significance of reductionism, have themselves acquire a rather intense ideological character.

There is, of course, a kind of methodological counterargument. If most writers could write better, if there was a concerted effort in educating people on these matters, if people's education was such that these relatively complicated matters could form the proper background for the popular texts etc., things would have been dramatically better and reductionism would not be so dominant in the public perception of molecular biology. This is not a counterargument, since it relegates us to a hypothetical situation. We are interested in understanding the present and the present has the characteristics I tried to describe. The point is not to understand what would have happened under different conditions, but to understand what is actually happening. It is indeed the case that there are many bad writers who have incomplete understanding of what they are writing about, and many newspaper articles and many television programmes whose bottom line is that they want to impress with the pictures they show rather than convey information which could be further processed. The question of the relation of ideology to science popularization cannot be relegated to the technical insufficiencies of writers or editors, but to the very processes of science popularization which comprise part of the complex processes of rearticulating the hegemonic ideology.

In our days, perhaps one of the most intriguing challenges is the inherent impossibility to unambiguously identify what constitute the popular scientific writings. I would like to consider the relationship of ideology to science popularization in a particular category of writings. These are writings which appear in professional journals, but they are not necessarily addressed only to the members of the particular community compared to the other, more specialized, articles in these journals. In many journals in addition to the specialized articles which are addressed to particular communities, there are, also, a specific kind of articles which have a long history of addressing themselves to a large heterogeneous scientific audiences. Editorials, policy articles, review articles, news articles in journals like the *Bulletin of Atomic Scientists*, *Nature*, *Science* and *Scientific American* are examples of such articles. Surely these are not popular writings in the traditional sense of the word, nevertheless they do play a role similar to that of science popularization: they present the state of affairs of particular disciplines, they express worries and criticisms of excesses attempting to veer things back to "where they should be", and, mostly, by narrating successes, they reiterate that despite problems "things are basically OK.".

Let me give an example from the publications of James Fowler and his collaborators. James Fowler who is well known for his theory of (social) networks is currently Professor of Medical Genetics in the School of Medicine and Professor of Political Science in the Division of Social Sciences at the University of California at San Diego. He, together with his collaborator Nicholas Christakis, were in the list of top 100 global thinkers of the magazine *Foreign Policy*.[7]

In an article in the *Americal Political Science Review* titled Genetic variation in political participation, the authors consider the problem of how one decides what to vote. They claim that their study shows that "a significant proportion of the variation in voting turnout can be accounted for by genes" claiming that these findings suggest for the first time that "humans exhibit genetic variation in their tendency to participate in political activities.". They mention that it appears unlikely that there may be a voting gene", nevertheless they emphasize that, in combination with environmental factors, there may be a "set of genes whose expression regulates political participation.".[8] In another article at the *Journal of Politics* with the title "Two genes predict voter turnout" the authors claim to have shown that "individuals with a polymorphism of the MAOA gene are significantly more likely to have voted in the 2004 presidential election."[9] Significantly in their essay in *Science*, appearing in the column called Perspectives and titled Biology, politics, and the emerging science of human nature, the authors attempt to synthesize what appeared to be the disparate aims of brain research and political science. The authors claim that "these separate fields of inquiry are subject to inherent limitations that may only be resolved through collaboration across disciplines. We describe recent advances and argue that biologists and political scientists must work together to advance a new science of human nature.".[10]

In the cases I presented, and a host of equivalent ones which spring from articles in learned or professional journals, the writers have an undoubted expertise about they are writing about. They write clearly and they write well. The aims of these articles are similar to the aims of science popularization: to communicate new developments and to present new agendas. The "end result" of such articles is, also, very much similar to what a host of articles of science popularization achieve: to forge allegiances, to create audiences, to push research agendas, to intervene in academic politics. In other words, such articles are part of the means for the contention for ideological dominance as to the character of social problems and the kind of science which will provide answers. While many scholars stress the absolutely crucial role of environment in its most general sense in our everyday lives, a reductionist approach which explains not only diseases and psychological traits, but also social and political behavior, becomes a particularly strong counterargument to those who insist on the role of the environment. And this counterargument draws its strength, from the authority of molecular biology. Of course, many of these scientists who try to legitimize such an approach are quick to point out the non-negligible role of the environment. The public perception, though, but what is being communicated makes such a reference to environment rather opaque – and when one is talking about the kinds of articles I attempt to analyze, it is this net effect which is the decisive factor in the public perception of what is at stake.

The argument about the relationship of science popularization and hegemonic ideology is not only confined to such cases as above. One can trace such a relationship in more politically explicit aspects as well.

In much the same manner as the cases I discussed above, there is an analogous case to be noted recently in Europe. The issue is the much contested notion of European science. Europe is presently in the throes of its most dramatic transformations since the end of the Second World War – there are new political realignments and a strong contention for political and ideological hegemony. Interestingly, the notion of European science is playing a rather prominent role in all this.

In a 1995 White Paper on the question of unemployment and on the ways young people can gain as many skills before finishing high school, the European Union proposed that History of Science and Technology be included in the school curricula. It was no doubt a good recommendation but for the wrong reasons.[11] The White paper suggested that by learning the History of Science, and especially the History of Technology, young people will acquire knowledge of a variety of skills and techniques and will become aware of the boundlessness, as it were, of human inventiveness. The recommendation of the report, however, is embedded in one of those interesting mental summersaults that the bureaucrats in Brussels are so fond of performing. It was noted that science had been a European phenomenon, that modern science has been born in Europe and that it should be taken as our common European heritage and, hence, all schoolchildren should become aware of the history of European Science.

Here is one of those instances where there is such a dramatic dichotomy between the bureaucracy's goals and the aims of an academic pursuit. Never mind that historians of science have been trying to articulate local differentiations

and trying to bring to surface the deviations from the view that holds the scientific enterprise to be an all inclusive homogeneous practice. European integration as planned in Brussels needs ''European'' notions and the construct of European science will be continuously seeking legitimation. We find such a construction of European science in the kinds of articles I have been looking at, in the introductory passages in the Framework Programs which are the research programs of the European Union and in many science policy papers. Recently an article published in *Science* is titled From "Science in Europe" to "European Science"". It cannot be more explicit in its aim which is to argue for such a transition.[12]

The point I want to make, is that political agendas are being formulated in terms of scientific entities or concepts that appear neutral in order to lend legitimacy to the politics involved. The highly problematic notion of European science appears sufficiently innocent yet it codifies specific power relations, and, thus, it becomes a rather effective means of reconfiguring the hegemonic ideology.

It is one thing to consider the word "European" to denote a geographical reference and it is a dramatically different choice to give to the word "European" a cultural reference. In fact, the legitimation of the concept of European Science has been one of the aims of all those who have been formulating the hugely funded European research projects. Long gone are the days when the concept of science in Europe was considered to be sufficiently self explanatory. The attempts at political unification of Europe have blatantly failed, and what was envisaged as political unity degenerated into turning Europe to a mere economic entity. And since political unity cannot be achieved within the context of such strong nationalistic discourses as those in Europe today, what is being sought, is new ways to give further legitimacy to the failed political strategy. Since political union is rather impossible, the emphasis is to propagandize at all levels the one thing that most of social groups will accept as unproblematic and will not react against: that there is a European Science. The notion of European Science looms large and it is being continuously reconstructed and rearticulated. Now European Science is no longer science in Europe, it is no longer science situated geographically in Europe, but it is the science *of* Europe. And, thus, the notion of European Science being under continuous negotiations and reconfigurations, is vying for dominance, is part of the struggle for becoming the means for the contention of a hegemonic ideology. Of course, such a notion was nurtured for many decades by many historians of science to unfold the success story of science, and to construct a narrative of how this European Science migrated to other places like China and Latin America. But the emphasis on European Science as a quasi political category, overshadows the serious inhomogeneities very much present in the development of the sciences in Europe since the 17th century.

There are, in a way, two kinds of ideologies involved in the process of popularization: One is the ideology expressed by the very act of popularization, by the enterprise to popularize itself. The second kind is the ideology imbedded in what is being popularized, in the kind of science that is being popularized, in the appropriate discourse used for the popularization of science. And I wanted to emphasize that though the first kind, that which is expressed by the act of popularization is rather clearly manifested and easily discernible, the second one, which has to do with the content of what is being popularized is usually opaque and almost always neglected. Of course, the hegemonic ideology does not involve a static and unchanging set of values. It needs continuous revamping since a particular ideology needs to be reinforced in order to be lasting. Popularization, or rather the ideology of popularization, is one such means. And, thus, the popularization of ideology, affects in turn the ideology of popularization.

Notas e referências bibliográficas

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