

SCIENCE AND THE VALUES OF POPULAR MOVEMENTS*

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I want first of all to thank Prof. Richard Eldridge for the invitation to be here on this occasion. It is a great honor and a great satisfaction for me to be part of an event in honour of my friend Prof. Hugh Lacey. Among other things, Lacey is certainly the philosopher who most influenced my thinking as regards science and technology; I am indebted to him not only for ideas and approaches which I have integrated into my own views, but also for having stimulated me to take a final step on my way back to the philosophy of science, after a long period of involvement with cognitive science.

My connection with Lacey has a curious aspect which I take leave to recall here. I first met him in 1969, when he was a lecturer at the Department of Philosophy of the University of São Paulo. At the time he was the only one – or one of the very few – philosophers in Brazil who worked in the anglo-saxon tradition in the philosophy of science. I was then starting my undergraduate program of studies in philosophy, alongside the one which I was about to complete in physics. I felt very attracted to his courses, and the ones I did represented my initiation into this field. Besides the courses, I also translated his book *The language of space and time* – his first book to be published in Portuguese.

Then in 1971 I went to England to do my postgraduate studies, Lacey soon afterwards came here to Swarthmore, and we lost touch completely for almost 25 years. We met again just by chance, at a philosophical meeting in Florianópolis, Brazil, in 1995, and – it was a pleasant surprise – I discovered that our theoretical trajectories had to a certain extent run along parallel courses. We both started dealing with problems located in the mainstream of the analytic tradition in the philosophy of science, then we moved to psychology, broadly conceived – in his case, behaviorism, in mine, cognitive science. And finally, we both reached a third stage which, from one point of view

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represented a return to more general issues in the philosophy of science, but from another meant a certain break, a rupture with some aspects of the mainstream tradition. This rupture has its theoretical aspects, but it goes deeper than that, it amounts to a change in posture in relation to the object of study. I find no better word to characterize the new posture than *engagé*, meaning that the reflection about science and technology which is carried out consciously articulates the epistemological issues with the concrete problems facing humanity in this present time of crisis. It is a critical attitude, whose target is not only philosophical conceptions of science, but also the way science itself is practiced, and the social structure of which that practice is an element. The critique is thus at the same time, and in an articulated way, both epistemological and social. Implicit in the *engagé* posture is a criticism of mainstream philosophy of science, which from the new perspective is seen as suffering from a certain degree of scholasticism, as producing a literature which is undoubtedly very sophisticated and technically competent, but read only by the very specialists who produce it, being irrelevant to the scientists and the general public.

At the time we re-established contact, Lacey was already well advanced in this third stage of his trajectory, I was still in a period of transition. The way he stimulated me to take the final step was by example: he showed me by his writings that it was possible to do work in a philosophy of science which is *engagé*, without leaving behind the ideals of clarity, precision and argumentation which represent the positive side of the analytic tradition. Those two values – of rigour and of concern with the real problems of mankind, which are so highly manifested in Lacey's work, serve also, due to his influence, as guidelines for my own studies.

The theme which has been assigned to me in this event is “Science and the values of popular movements”, which is, of course, one of the central themes in Lacey's work. To give a brief outline of its significance, I will start by considering the role of popular movements within a general political perspective. Lacey belongs clearly in the camp of those who oppose the form of organization of society which prevails in almost all countries of the world today, i.e., capitalism. This position leads immediately to the acknowledgement of the necessity of radical changes in social structure, and to the question of the strategy for bringing about the desired changes. The anticapitalist stance puts Lacey side by side with the socialist tradition, but if we consider in

particular the Marxist-Leninist strand of the socialist movement, a fundamental difference comes to light, a difference concerning strategy. Marxism-Leninism adopts what Immanuel Wallerstein calls the *two-step strategy*: “first, obtain state power; second, transform the world”.¹

Lacey calls the alternative he favours the strategy, or path, of *transformation from below*, which is adopted by popular movements in Latin America. The path of transformation from below emphasises the dialectics of means and ends, and of personal and social change; it promotes the values of – and I quote – “solidarity and compassion rather than individualism; social goods balancing private property and profits; “sustainability” as subordinating the control of natural objects [...]; the well-being of all persons rather than the primacy of the market and property”², and others. The transformation aimed at is conceived as a process comprising not two, but many steps, each one being evaluated not in terms of “whether or not it is a means to a systematically articulated social objective”, but rather “in terms of its bringing about a fuller embodiment of the values articulated by the movement”³. As far as the long term objective is concerned, Lacey rejects its identification with any pre-defined form of social organization, be it capitalist or socialist, but on the other hand he does not exclude the possibility of characterizing as socialist the social structures that will come into being if the popular movements are successful in their struggles.⁴

Although the path of transformation from below rejects emphatically the aim of conquering state power as a pre-condition for social change, it cannot ignore the issue altogether: after all, it does make a difference whether the popular movements act within a right wing dictatorship, or within a democracy, even if only a formal one. A case of great relevance in Latin America today is the one exemplified by Brazil, where a president – Luiz Inácio Lula da Silva – has been elected who belongs to a left-wing

1. I. Wallerstein, “A left politics for the 21st century? or, theory and praxis once again” (*New political science*, **XXII** (2), June 2000, pp.143-159). Portuguese version published in Loureiro, I., Cevalco, M.E. e Leite, J.C. (eds.), *O espírito de Porto Alegre* (São Paulo, Paz e Terra, 2002).

2. “A tecnociência e os valores do Fórum Social Mundial”, in Loureiro, I., Cevalco, M.E. e Leite, J.C. (eds.), *O espírito de Porto Alegre* (São Paulo, Paz e Terra, 2002), pp.134-5.

3. *Is science value-free?: values and scientific understanding* (London and New York, Routledge, 1999), p.39.

4. Cf. “Catholic social thought and economic systems: capitalism and socialism”, in R. Duska (ed.), *Rerum Novarum: a symposium celebrating 100 years of catholic social thought* (Lewiston, The Edwin Mellor Press, 1992), p.161.

party with strong affinities and concrete links with the popular movements. The question that raises itself in such a situation is: what should the popular movements expect from such a government, and what attitude to it should be adopted? I will come back to this point later.

Now, how does science come into this picture, in the context of Lacey's work? Perhaps the best way of providing a reply is by mentioning what he said in a recent interview⁵, namely, that the question he set himself at a certain stage in his career was: what contribution can scientific knowledge and practices provide for the popular movements in their struggle? That then is the seed question; it begets many others, a good part of which are conceptually linked with the themes of the dominant views about science in general, and in particular with the conceptions of the analytic tradition in the philosophy of science. The set of answers Lacey presents constitute a full, complex and rigorously articulated theory about science, a critical theory which diverges from the dominant views in a number of important aspects. Very briefly, it starts by positing a broader conception of science, which encompasses all forms of systematic empirical enquiry. Each form – or, in Lacey's terminology – each *approach* – is adopted because of its mutually reinforcing relations with some perspective of value. What is usually known as modern science represents only one possible approach, an approach motivated by the values attributed to the practices of control of nature characteristic of the capitalist system. There are alternatives, one of the most important of them being the *grassroots approach*, which responds not to capitalist values, but to the values of the popular movements. The reply Lacey offers to his seed question is thus: science can indeed contribute to the popular movements, but only on condition that the direction of its development is changed so as to promote the flourishing of the alternative approaches, associated with non-capitalist values.

So far in this account I have emphasised the *engagé* side of Lacey's views. Now one must pay due attention to the fact that he has spent almost all his working life in academic institutions, and, more specifically, in an intellectual environment in which the analytic tradition in the philosophy of science prevails. As a result, his thinking has also an analytic side, and both sides must be taken into account for his philosophy to be properly understood.

5. In *Teoria e debate* (São Paulo, Fundação Perseu Abramo) 14(46), 2000-2001, pp.30-36.

Many of Lacey's writings are directed primarily to his fellow academic philosophers of science, and as a consequence – at least, that is my interpretation – he tends to adopt certain modes of expression characteristic of the analytic tradition. One of those is the idealist tendency to treat all issues in abstract, a-historical terms, as if the philosophical problems existed in a universe of ideas isolated from the vicissitudes of history. Now, the *engagé* posture is such that one does not rest content with raising criticisms – as, one might say, the postmodern critique of science does – but one is also concerned that the criticisms get incorporated into social forces capable of operating real changes in the world. From that concern derives a need of always being attentive to the historical situation in each moment, which should result in a discourse not abstract, but also historically situated.

My claim is that, even in his writings in which the abstract mode of exposition is adopted, history is present in that sense in Lacey's work. In other writings this feature is even more evident, for instance, in some of his most recent articles, in which the World Social Forum plays an important role. The World Social Forum, let us recall, is part of the anti-globalization movement, about whose origins there is some controversy among the commentators, but which most of them consider to have begun with the Seattle events of 1999. Its two main mottoes are “another world is possible” and “the world is not a commodity”, which express well its anticapitalist stance, committed to significant changes in social structure, together with its internationalist character. The failure of neoliberal policies – which is becoming ever more patent – in promoting peace, in diminishing the inequalities between countries and within each country, in fostering a healthier relationship between man and nature, etc. is certainly one of the main factors for the extraordinarily vigorous development of the antiglobalization movement since its inception. One of its main components is the World Social Forum, an international gathering of NGOs, popular movements, and many other types of organization. Its first three editions took place in Porto Alegre, Brazil, in 2001, 2002 and now in 2003; the fourth is planned to happen in India, probably in the city of Mumbai.

The second edition of the Forum had a seminar on “Technoscience, ecology and capitalism” in which Lacey took part; his contribution – “Technoscience and the values of the World Social Forum” – has now been published (in Portuguese), and it is perhaps not very surprising that it includes among its themes the World Social Forum

itself. More significant is that in other two substantial articles he wrote recently⁶, the World Social Forum also figures as an important element in his considerations – which goes to show how responsive Lacey’s work is to the changing historical circumstances. Very briefly, the move that allows the World Social Forum to be integrated into the theoretical framework I have been sketching consists in identifying – with some qualifications – the values of the Forum with the values of the popular movements. Although the set of values corresponding to each expression is fundamentally the same, the change in the manner of designating them is quite important from a strategic point of view.

So far I have been only providing a sketch of Lacey’s views on the theme of science and the values of popular movements. Those views, which in essence I share, will serve now as a starting point for what I offer as my own modest contribution. For those who come from a philosophical background, the adoption of the *engagé* attitude gives rise to the need of establishing conceptual articulations between the terms of the philosophical discourse and that of the political discourse – i.e., the discourse connected with concrete decision making concerning policies, in this case, policies for science and technology. What I propose to do is a little exercise of this sort: the building of conceptual bridges between the two types of discourse.

The example of political discourse concerning science that I chose as the object of analysis is a speech delivered by Roberto Amaral, Brazil’s new minister of science and technology, on the occasion in which he took office⁷. From the point of view of the aim I have indicated, the choice is somewhat arbitrary, in the sense that other speeches or writings could illustrate equally well the points to be made. The reason that led to it has to do with another objective of the exercise, which is to make some considerations around the question that has been raised before, namely, “what should the popular movements expect from a left-wing government which comes to power via elections?”.

6. “Explanatory critique and emancipatory movements” (*Journal of critical realism* **1** (2002), pp.7-31), and “A ciência e o bem-estar humano: para uma nova maneira de estruturar a actividade científica”, in Boaventura de Sousa Santos (ed.), *Conhecimento prudente para uma vida decente: “Um discurso sobre as ciências” revisitado* (Porto, Afrontamento, 2003), pp.449-469.

7. The text of the speech is reproduced in the electronic version of the “Jornal da Ciência”, edition of the 3rd of January 2003, available at <<http://www.jornaldaciencia.org.br>>.

The dominant party in the government that took office in Brazil in the first of January this year is PT – the Workers’s Party –, which, since its foundation in 1980 has always had strong links with popular movements. The connection with the World Social Forum is also significant: one of the main reasons for the choice of Porto Alegre as the seat of its first editions lies in the fact that the government of both the city, and of the state of Rio Grande do Sul, whose capital it is, were in the hands of the PT, and they have indeed contributed significantly both with funds and with institutional support to the realization of the events.

The title of the collection in which Lacey’s paper for the second edition of the Forum has been published is “O espírito de Porto Alegre” – “The spirit of Porto Alegre”. It is borrowed from a passage of a talk given by Immanuel Wallerstein in April 2001– “A left politics for an age of transition”⁸ –, in which he posits the expansion of the spirit of Porto Alegre as the first element of the strategy for the left that he puts forward. “What is this spirit?” He defines it as follows: “It is the coming together in a non-hierarchical fashion of the world family of antisystemic movements to push for (a) intellectual clarity, (b) militant actions based on popular mobilization that can be seen as immediately useful in people’s lives, (c) attempts to argue for longer-run, more fundamental changes.”

Joining together those considerations, and with reference to our theme, we can now put our question thus: concerning science and technology, how much of the spirit of Porto Alegre is manifested in the directives of Lula’s government?

With that query in mind, let us now turn to the minister’s speech. First of all, it must be noted that besides including passages of a ceremonial nature, the speech has – at least by philosophical standards – a somewhat loose structure, lacking a sustained line of reasoning. My procedure will consist in discussing some brief passages, concluding later with a general commentary. To give an indication of the tone of the analysis, I must say that the answer to our query that will emerge is not very encouraging.

The first passage to be considered reads:

... in the course of history ... scientific technology and knowledge, in combination, are at the heart of the process by which the peoples are continuously rearranged in a hierarchy: in

8. “A left politics for an age of transition” – talk at Socialist Scholars Conference, New York City, April 13, 2001. Text available at <<http://fbc.binghamton.edu>>.

sum, science and technology, i.e., knowledge, politically used, dominates the ranking of peoples.

One of Lacey's main concerns in his recent work is with the thesis that science is value-free, which he analyses into three components, the theses of impartiality, neutrality and autonomy. The answer he proposes to the question "is science neutral?" is very complex. He allows that neutrality be maintained as an ideal for science, but that on the basis of a significant redefinition of the concept; as regards the really existing science of today, there is no doubt he considers it to be quite devoid of neutrality – a view also clearly present in the spirit of Porto Alegre.

The terms 'neutral' and 'neutrality' do not figure in the minister's speech. It is obvious, however, that the thesis of neutrality is presupposed by that perspective in which peoples or countries are ranked according to their state of scientific and technological development. It is only by assessing that state with a unidimensional yardstick, or, in other words, by attributing to modern science and technology the status of universal values – which is just another way of expressing the thesis of neutrality – that the ranking in question makes sense.

The neutrality attributed to science goes even deeper than that, since it rules out the possibility of alternative routes of development. The minister is quite explicit about that; in his words:

We will not be the first [to achieve higher positions in the ranking] because we will be following the trail opened by other travellers, like the United States and China in the 19th and 20th c., which were then peripheral countries.

Let us now consider this other passage:

Basic research, done [in Brazil] almost exclusively in universities and public institutions, is at the moment going through a good phase ... so much so that we have managed to escape the embarrassing situation in which we found ourselves some years ago, when the volume of works published in first class scientific journals was below that of Iran and Irak. Today, it amounts to 9,000 original publications per year in

international indexed journals, which corresponds to the 17th place in the whole world. This figure, although promising, represents only 1.3 percent of the world total, and leaves us behind South Korea, Sweden, Holland and Australia. Sweden, for instance, with a population of 8.8 million inhabitants, published in 2002 nearly 14,000 works.

Now, as one can see, the mode of assessing the state of scientific development which is postulated is essentially quantitative. Such an approach would be clearly shocking if applied to other domains, for instance, if one said that a country is twice as good in painting than another, on account of producing twice as many pictures per year – without regard for the quality of the pictures. The situation concerning scientific papers is of course not identical to that of painting, but still, the assessment in purely quantitative terms is sufficiently at odds with our intuitions concerning creative productions of the human mind to require an explanation.

In capitalism, commodities are entities which have this property, that no matter how great the number of types, distinguished from one another by their qualities, there is always one single quantitative measure of worth for each commodity, the monetary value. The explanation suggested by this remark is that the adoption of the quantitative mode of assessment for scientific productions, and the fact that it comes to be seen as something reasonable, are due to the process of commodification to which science is subjected in capitalism. Other consequences of that process are that the direction and rhythm of the development of science and technology comes to be determined by market forces, instead of by democratic deliberation based on the real needs of mankind, and, at a more abstract level, that it fosters an alienated conception of knowledge: instead of something which is part of the being of individuals, institutions and countries, it comes to be seen as something external, as a sort of substance which is secreted by research organs and can then be treated as a property – as it is characteristic of commodities.

Now, although the concept of commodification does not figure explicitly in the minister's speech, if the proposed interpretation is accepted, one can say that it is implicitly present there. It appears quite explicitly, on the other hand, in philosophical critiques of really existing science, which associate its commodification with the perverse aspects of its applications. In Lacey's critique, and those of other participants of the World Social Forum who dealt with issues of agriculture, one finds a strong

emphasis on the analysis of the commodification of seeds, and in the Forum as a whole the theme also figures in the treatment of many other domains of social life, where the commodification of education, health, culture, etc. is criticized. The motto “the world is not a commodity” does indeed represent one of the most widely shared positions in the World Social Forum, and thus corresponds to one of the main facets of the spirit of Porto Alegre. The absence of any criticism of the commodification of science in the minister’s speech is thus another indication of how far is his spirit from the spirit of Porto Alegre.

In the case of technology, the legal apparatus responsible for its commodification is the system of patents. In line with its anti-commodification stance, many voices have been raised in the meetings of the World Social Forum against the patent system, some more radical, advocating profound changes or even the abolition of the system, some moderate, directed at what may be described as the abuses of the system, such as the patenting of forms of life, like genes, or life-saving drugs, and at the fact that it is unfairly favourable to the dominant countries in detriment of the peripheral ones. Again, in this matter the minister’s position is not very encouraging. It is true that in a brief passage one does find an expression of criticism, when he says:

We need the collaboration of the legislative power ...We want to discuss with it the law of industrial property [i.e., of patents], whose terms have been forced upon the country, and do not serve the national interests.

But a much greater emphasis is put on the need for Brazil to increase the number of patents she obtains. Here again, one finds the quantitative mode of assessment serving as a criterion for an unidimensional hierarchy of countries:

As regards applied science, however, the situation for us is shameful, since we occupy the 43th place in a ranking established by the United Nations, below Panama and Costa Rica. To understand rapidly such a situation, it is sufficient to recall that South Korea has obtained 3,472 patents in the United States, in 2002, while we did not get above the insignificant number of 113 patents ... Besides increasing the funds for investments, the state needs also to promote the registration of patents.

Still on the matter of patents, one may also notice a significant omission in the minister's speech, namely, the lack of any reference to the case of anti-HIV drugs, in which Brazil, together with India have obtained a significant victory in the WTO discussions.

As it is known, one aspect of the neoliberal policies for science and technology consists in favouring researches whose practical applications are a clearly defined possibility in the short run. Against this attitude, one argument which is often resorted to is the one which – inspired by the well-known anecdote having Faraday as the protagonist – one may call “the newborn baby argument”. The argument's gist is that any research in pure science, no matter how removed from the practical side of human life it may appear, sooner or later does give rise to useful applications. Neoliberals are not impressed with this claim; and in fact what they demand of any research is not just explicitly indicated applications, but rentable ones – applications which can generate profits for private enterprise. That policy clearly favours applied research to the disadvantage of basic research, and the natural sciences to the disadvantage of social sciences and the humanities, and have indeed been resented by people working in those domains.

In Brazil, that tendency manifested itself very strongly in the last decade, particularly during the tenure of the previous minister for science and technology, Ronaldo Sardenberg. Sardenberg's positions also included the aspects we have identified as regards the new minister, i.e., the conception of science as neutral, the uncritical endorsement of the process of commodification of scientific knowledge, the quantitative approach, etc. Thus, one may ask, isn't there any difference between the technoscientific policies of the old and the new governments? Is it just more of the same?

To that question, it is fortunate for the opponents of neoliberalism that a negative answer can be given. There are in fact a few dimensions in which the new minister differs from his predecessor, and one of them concerns the issues of applicability that have been mentioned. In the minister's speech, one finds defenses both of basic research, and of the human sciences – the former very emphatic, the latter somewhat muted, expressed in just one short sentence.⁹

9. “... in the last few years, the managers of S&T in our country [have favoured] the channeling of resources to the area of applied research, part of which subtracted from resources and funds which were

One view which has been traditionally very strong in Brazil, and other peripheral countries, popular especially with left-wing scientists, is the developmentalist one. It involves a very positive assessment of science and technology, viewed as being essentially progressive forces, and as indispensable levers for the promotion of economic development. The underlying conception of development is the modernizing one, which takes the “advanced” countries as a model, and values above all economic growth, industrialization and high technology. To sum up my remarks about the speech in question, I would say that on the whole it is an expression of the traditional developmentalist position – an interpretation which is coherent with the minister’s biography –, with some traces of neoliberalism, but still with some differences in relation to the full-fledged neoliberal position. From the point of view of the anti-globalization movement, it is thus not as bad as the positions of the previous minister, but unfortunately still very far from the spirit of Porto Alegre.

Let us now come back to the question of the attitude of the popular movements to a left-wing government like the one that has been elected in Brazil. One possibility for the negative assessment that has been presented, if it can be extended to other areas of government action, is the one of being interpreted as a sign that no progress has been made, that in relation to the previous neoliberal phase we are having just more of the same. Along that line, one could – in a mood of despair or resignation – come to the conclusion that there is indeed no alternative, that another world, after all, is not possible.

But that would be a mistake. The involvement in the electoral campaign and its success has naturally aroused much enthusiasm in the left, including the activists and sympathizers of the popular movements. This enthusiasm, however, has an unwelcome side-effect in that it tends to make one forget one of the founding principles of the popular movements, namely, the rejection of the two-step strategy. According to the two-step strategy, the conquest of state power is the means for effecting social transformation. It is thus a contradiction to reject it, and at the same time to have great hopes about the possibilities of an elected left-wing government. Wallerstein expresses

earlier conceded to basic research. This option is completely misconceived, it ignores that scientists working in applied domains are formed in postgraduate courses whose excellence is exactly due to the qualification of the lecturers dedicated full time to basic research ...”.

very well what I am trying to say. I have already mentioned a talk – given by him before Lula's election – in which he proposes a strategy for the left whose first point is the expansion of the spirit of Porto Alegre. The second point has to do with elections, and it prescribes a *defensive* electoral tactics, which he characterizes as follows:

If the world left engages in loosely-structured, extra-parliamentary militant tactics, this immediately raises the question of our attitude towards electoral processes. Scylla and Charybdis are thinking they're crucial and thinking they're irrelevant. Electoral victories will not transform the world; but they cannot be neglected.

... electoral tactics [is] a purely pragmatic matter. Once we don't think of obtaining state power as a mode of transforming the world, they are always a matter of the lesser evil, and the decision of what is the lesser evil has to be made case by case and moment by moment. [...] Since state elections are a pragmatic matter, it is crucial to create alliances [...], aiming for the 51% that counts pragmatically. But no dancing in the streets, when we win! Victory is merely a defensive tactic.

Well, perhaps some dancing may be allowed as the victory is proclaimed; after that, a more sober attitude is needed: one should guard against framing excessive expectations, never forgetting that the timing of the changes in social structure according to the popular movements' strategy is only secondarily affected by the timing of electoral victories and defeats.

Apart from this general principle, there is another aspect of the present situation in Brazil which tends to lower the expectations that may be reasonably entertained as regards the new government, and this is the terrible state in which the previous government has left the country. This plight – in which many other peripheral countries find themselves as the result of the application of neoliberal policies – is commonly, and with good reasons, likened to a trap: a macroeconomic vicious circle of high debt, which exacts a great proportion of the national wealth for the payment of the interest, in detriment of investments and expenditures in social services, which in turn reduces the possibility for the principal of the debt to be payed off. The country is submitted to the dictatorship of the markets and the international financial institutions to such an extent

that – I would say – one cannot even *think* about alternatives to the orthodox recipes that they impose. It is clear that any challenge to the dictates of those powers would encounter a vigorous opposition, and could only be successful if backed by strong popular support. That support can only exist if the alternative policies result from a process of public, democratic debate. This rules out the possibility of those policies being devised in secret by the government. And if the discussion is public, it will be known by the financial markets, which have the power to react to the mere consideration – let alone the implementation – of a deviant strategy with punishment in the form of an attack to the currency, a cut in credit lines, etc. The sad fate of Argentina is quite vivid in the minds of the Brazilians as a reminder of what may happen in case of trouble.

Those considerations, however, do not give the full picture. If they did, one could come to the conclusion – Wallerstein's Charybdis – that it does not make any difference whether the political forces in power are neoliberal or left-wing. And the fact is that, leaving aside the macroeconomic level, there are many areas in which the government action seems much more promising, and many ministries and other high offices are headed by people known to incorporate much more of the spirit of Porto Alegre than the minister for science and technology, and those of the economic area. The minister for the environment, Marina Silva, is a good example. Another significant difference is that even in areas where the government's action has so far been somewhat disappointing, one feels that the guidelines have not yet been definitively fixed, that there is room for constructive criticisms to have a positive impact.

Concerning science and technology, for those who are not comfortable with the policies of the new minister, and also want to have an influence in the right direction, part of the task consists in the formulation of viable alternatives – the more carefully worked out and well-founded the better. Lacey's writings – and with this remark I conclude – can be a great help for all those engaged in that enterprise; to my mind, it provides the best available theoretical foundations for a progressive reform in scientific and technological practices.