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The politics of risk in contemporary Portugal: tensions in the consolidation of science–policy relations

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In recent years, the political authorities in Portugal have increasingly drawn on scientific expertise in matters of public policy. Yet, this trend appears to be less a consequence of European-driven influences than an expedient to respond to difficulties in legitimising political decisions in particular around environmental or health risk. Based on two case studies (the co-incineration of hazardous industrial waste and depleted uranium in the Balkans) this article seeks to analyse the specific ways in which policy-makers are resorting to scientists and experts, as well as the tensions arising from this within the scientific community. We propose that such tensions are to be understood as a distinctive feature of a society where the growth and consolidation of the scientific system are comparatively recent developments. The positivist model of science adopted by politicians and scientists alike denotes their resilience in adhering to the current European trend to open up science-based decision-making and the struggle for identity building in the scientific community.

IN PRESENT-DAY TECHNOLOGICAL societies, risk is one of the areas where the primal role of expert systems is clearer. Living in 'risk societies' is endurable only when there is trust in the ability of scientific expertise to inform the policy measures designed to minimise risks, particularly those related to industrial and technological applications such as environmental, food or public health risks.

However, science is not free from ambiguity and critical appraisal in this context. On the one hand, despite being at the origin of the knowledge that 'certifies' risk, the margins of ignorance and indeterminacy involved in risk assessment render the uncertainties in scientific judgements especially manifest (Wynne *et al*., 2007). On the other hand, science is more and more confronted with rivalry from other rationalities reflecting different objectives and points of view (Lidskog, 2008: 71). Various instances of public controversy around environmental and public health risk have shown the contrast or even antagonism between expert assessments and social perceptions (Edelstein, 2000; Flynn and Slovic, 2000; Irwin, 1995; Wynne, 1996; Frewer and Salter, 2002). Furthermore, once the uncertainty and controversy that permeate or surround risk assessment are acknowledged by society, science ceases to be understood as a purely objective and neutral exercise. As pointed out by Martin and Richards (1995: 507):

> The old ideal of the appeal to facts and their interpretation by accredited experts has been eroded by the increasingly obvious limitations of experts and expert knowledge in resolving issues of public controversy. There is now widespread public perception that experts can and do disagree, that they are not infallible by virtue of their specialist access to some rigorous methodology that can guarantee their 'objectivity', and that their purportedly disinterested advice may be influenced by professional, economic, or political considerations.

In this connection, the various kinds and functions of scientific activity should be differentiated, as well as

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their corresponding degrees of dependence on external forces. Whereas, on one side of the spectrum, academic research tends to be freer to choose its objectives and methods, one the other side, scientific advice abides by political imperatives and time restraints, and, as a consequence, proof requirements are rendered more flexible (Jasanoff, 1990). It is not always possible for the expert to develop work based on empirical testing and probabilities (Schneider, 2000).

It is against this backdrop that this article will examine two episodes which involved the use of scientific expertise to back decision-making about environmental and public health risk in Portugal: the first one was prompted by the decision taken in the late 1990s by the Portuguese government to locate the facilities for co-incineration (incineration in the ovens of cement factories) of hazardous industrial waste at specific sites; and the second one was brought about by news, first publicised in 2000, regarding the possible contamination of Portuguese officers and soldiers in Kosovo from contact with depleted uranium-coated ammunition.

Our analysis will be carried out alongside the recognition that, in this southern European country the use of scientific advice for grounding political decision was hindered for a long time by the lack of sensitivity and willingness of governments to resort to scientists and experts. Contrary to other Western countries with an older liberal and industrial tradition, until the mid-1970s Portugal remained largely a rural economy, governed from 1926 to 1974 by an authoritarian regime which did not cherish the development of scientific research and technological innovation, and was ostensibly fearful of the free thinking associated with science (Gonçalves, 1998). However, in the past few decades, following political democratisation initiated with the 1974 revolution and Portugal's accession to the European Community (EC) in 1986, policy-makers have increasingly drawn on scientists and experts. In certain areas of public policy, the use of expert advice became mandatory through European legislation, one important example being environmental impact assessments (EIAs) required for licensing major public works or industrial projects.

Yet, our hypothesis is that, besides this European-driven trend, the significant number of instances of recourse by government to scientists and experts has been less the consequence of an actual legal obligation to inform or ground policy-making on science than an expedient to answer the mounting public awareness and controversy around particular environmental or health risks. Through the two case studies developed below we will attempt to show the ways in which the political establishment is using science to respond to increasing difficulties in legitimising political decisions, as well as the consequent tensions and contradictions both within the Portuguese scientific community, and in the relationships that exist between the politicians and scientists.

Should such tensions and contradictions be understood as a distinctive feature of a society where the growth and consolidation of the scientific system are comparatively recent developments? The Portuguese scientific community has in fact undergone a rapid process of expansion and internationalisation. Membership of the EC opened important opportunities for scientific institutions to participate in cooperative research projects under the EC framework programmes for research and development (R&D), as well as to benefit from the European structural funds. One related effect of this process has been the reinforcement of universities as the predominant space for scientific research in the country to the detriment of state laboratories.

By the same token, backed by a European discourse and practice that explicitly praise the role of science in policy, politicians became progressively aware of its usefulness as a tool for decision-making. Nonetheless, this externally driven move is seemingly entering into conflict with conventional beliefs about science that remain entrenched in the post-1974 generations of politicians. In actual terms, the appeal to science to support public policy on controversial issues looks fraught with the intrinsic difficulty for the political system to admit that there is uncertainty and controversy within the sciences, and the resulting implications for risk regulation and management.

Following a description of relevant aspects of the two cases, this article will discuss in particular: the conditions under which Portuguese policy-makers resorted to science to further policy objectives; the resulting tensions within the scientific community; and the inferences that may be drawn for a better understanding of the underlying representations of science and of scientific advice against the background of European influences and the actual state of the Portuguese scientific system.

The use of science in policy: Is there a European north–south divide?

An ever-expanding stream of the literature in the social studies of science has addressed the growing use of scientific knowledge and expertise in policy-making in contemporary times. The regulation of risk has offered the background for a significant branch of this work, which focused predominantly on technologically more advanced Western countries, namely the USA, the UK, Germany, The Netherlands, as well as the EU (Vogel, 1986; Hood *et al.*, 2001). Regulatory institutions and procedures have been at the centre of these analyses.

Hood *et al*. (2001) proposed the concept of 'risk regulation regimes' to display the variation observed in the institutional rules and structures in this area. As criteria for comparing these regimes, they signalled the degree of exigency or flexibility of rules and mechanisms; the centralized or decentralized nature of regulatory structures, and their more or less integrated or fragmented character; and trust in the judgment of experts and of laymen. Other authors have focused on the regulatory or policy 'styles' of using expertise (Renn, 1995; Doern and Reed, 2001; Halffman, 2005). Halffman (2005) distinguished between the more formal and institutionalised American regulatory style with its sharp boundary between science and politics and the English regulatory style featuring rather informal contacts between regulators and regulated. Drawing on a broader comparison of styles of using scientific expertise, Renn stressed that recourse to scientific advice represents either a simple ritual or the sole means to define and justify the policies. Renn is one of the few authors who raised a possible European north–south divide in this context when he pointed out that in southern Europe scientific advice tends to be confined to a group external to the circle of policy-making to be consulted in an arbitrary manner on the basis of criteria of prestige or personal relationships (Renn, 1995: 152).

As such, the relation between decision-makers and experts has been regarded as a delegation of authority through a hypothetical contract, under which decision-makers benefit in terms of knowledge, and the experts receive monetary as well as moral benefits such as prestige or access to privileged knowledge (Guston, 2003). It has been admitted that 'the prevailing norm of science advice' may be that, to start with, the selection of the experts falls on those experts 'who are ideologically predisposed to agree' with those who request their views (Guston, 2003: 349). Frewer and Salter (2002: 144) also observe the **'**natural inclination' of the existing scientific advisory system to fall back on the style and culture of positivistic science when a problem appears complex or when the industrial lobby is active and large. Political dealings with the emergence of bovine spongiform encephalopathy (BSE) and of genetically modified organisms illustrated how scientists and their expertise were used as a political resource based on their alleged authoritative knowledge, and how they partly acquiesced in that use (Millstone and van Zwanenberg, 2001).

Yet, this mutual interest does not imply the absence of misgivings in these strategic relations. Gyerin (1995) suggested that some 'boundary work' takes place in this relationship between scientists and policy-makers. Although scientists try to protect their resources and privileges and to avoid too much interference in their autonomy, the balance that ensues is seldom stable:

> Bring science near enough so that political choices are legitimated by their perceived grounding in authoritative and objective understandings of the facts as only science provides, but not so close that choices and futures become exclusively 'technical' and beyond the grasp and thus control of non-scientists (…). An even more likely threat is the capture of science by policy-making powers – a loss of scientists' control over their research agendas and, in the limiting case, over what is represented as 'scientific' knowledge. (Gyerin, 1995: 436)

Despite this admission, a new trend is being currently documented in countries such as the US or the UK whereby the provision of expertise to aid political decision-making is becoming subject to increasingly precise rules and criteria, as well as requirements of transparency and openness. Jasanoff argues that: 'The concept of expertise (…) needs to be diversified and opened up to a wider range of views than it has been in the past' and she acknowledges that 'support for this position has been accumulating in recent years, not only in the scholarly literature but also in the reports and activities of governmental and quasi-governmental agencies.' (Jasanoff, 2003: 161).

Criticism of the conventional ways of using science in policy, allegedly based on the belief in science as 'provider of truths', and inclined to use science in the service of political goals, have led some scholars to suggest 'democratizing' both science-based decision-making, and the production of scientific knowledge itself, a requirement rendered particularly crucial in the face of higher scientific uncertainties, strong perceptions of risk, and expanding public controversies (Liberatore and Funtowicz, 2003; Renn, 2001; Nowotny, 2003; Lidskog, 2008). In a similar line, a new paradigm of science, a 'post-normal', and 'precautionary' science, concerned with the unintended effects of progress, has been envisaged in particular when 'facts are uncertain, values in dispute, stakes high and decisions urgent' (Ravetz, 2004: 349).

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Political institutions themselves, both at the EU and Member States' level, have been recognizing the difficulty in neatly separating science and politics, and the ensuing need to frame this relation through new rules and criteria such as the precautionary principle and the risk management/risk assessment division

new rules and criteria (the precautionary principle and the risk management/risk assessment division are cases in point).

Overall, most of the literature on risk regulatory systems and the policy–science interface tends to provide broad theoretical frameworks, conceptual proposals and typologies. A somewhat different path is pursued by case studies, like the ones carried out in the present article. Such studies can, we believe, offer insights into the specific dynamics of the relation between policy-making and scientific expertise that do not surface so easily in all-encompassing approaches. That is the case, for instance, with respect to tensions emerging inside the scientific community itself in the context of regulatory processes. These tensions look especially noteworthy in both the co-incineration, and the depleted uranium episodes. As a matter of fact, although the government sought the response to the public controversies in 'more' science, eventually, it was confronted with a discussion inside the scientific community, one that was echoed by the mass media, and ultimately countered the aim of government to use science as a means to sustain its decisions.

Indeed, the cases exposed a fairly unexpected move by government to reinforce the scientific basis of their decisions going beyond legal requirements, in the first case, and beyond what could normally be expected in the second case. While at a first glance the way Portuguese politicians used science to regulate the risks related to co-incineration and depleted uranium ammunition did not depart from analogous situations in other countries, a second look at the episodes denotes a friction between the experts designated by government and other scientists who intervened in the public debate on their own account. We may find here a particular feature of the science–politics interface in Portugal, perhaps related to the particular stage of growth of Portuguese scientific institutions.

A further question is the extent to which the present-day official recognition in the EU that science should no longer be expected to act as the sole and unquestioned authoritative source of information for risk regulation has been adhered to. Can the way governments tackled the risks be regarded as an indicator of a feeble sensitivity to ongoing debate on institutional reform of risk regulation in Europe?

In fact, one salient feature of the cases was the way in which politicians and scientists alike declined to admit scientific uncertainties and adhered to a 'positivist' model of science. This attitude may be due, on the one hand, to the somewhat old-fashioned belief in science typical of politicians inexperienced in dealing with it in public affairs; and, on the other hand, to a scientific community undergoing a process of identity construction.

The episodes examined below provide good illustrations of such contradictions and tensions.

Co-incineration of industrial waste and depleted uranium-coated ammunition: science and the politics of risk in action

The incineration of hazardous industrial waste started to be debated in Portugal in the mid-1980s, as part of an industrial waste management policy largely influenced by EC guidelines. The initial plan of the Portuguese government consisted in setting up a central incinerator, a project grounded on technical studies requested by the government from consultancy firms as well as from a Portuguese university. This project met with strong protest from the local population at the projected site. In 1995, a new government, formed by the Socialist Party, replaced the previous project by co-incineration of industrial waste in the existing ovens of cement factories.

In accordance with applicable legislation, an EIA study was carried out by a consortium of the cement industry that indicated four possible locations for the co-incinerators, two of which were then recommended by the evaluation commission: Souselas, near Coimbra, and Maceira, near Leiria. The announcement of the decision of the Environment Minister to locate the co-incinerators in these sites (December 1998) provoked an immediate and energetic reaction by the local populations, particularly in the Coimbra region, where dissent involved a large number of non-governmental organisations, the municipal authorities, members of parliament, and academics in what turned out to be an astonishingly broad social movement, widely publicised by the media (Matias, 2004).

In response to this public outcry, the government chose to strengthen the scientific foundation of the co-incineration project, and commissioned a new environmental study from the so-called Independent Scientific Commission for the Control and Monitoring of Co-incineration (ISC), formed by four scientists, experts in medicine, chemistry and air quality from the universities of Coimbra, Aveiro and Oporto, appointed by the University Rectors' Conference. The remaining members of the ISC were

designated by the local authorities and the Environment Ministry.[1] The qualification of this commission as 'independent' stressed its contrast with the kind of expertise which had supported the EIA under the previous formal procedure, one that has been criticised in Portugal as well as in Spain, for instance, for the biased nature of the experts' role, as well as for the ineffectiveness of stakeholders' involvement. The fact that the same entity funds both the project and the evaluation team signals the inherent conflict of interest. In Portugal, as in Spain, the number of projects stopped as a consequence of EIA procedures is practically zero (Irigalba *et al.*, 2001: 374ff).

The ISC delivered its report in May 2000. The co-incineration method was sustained on the basis of both environmental and economic justifications. A subsequent report issued by the Medical Working Party (Grupo de Trabalho Médico) also favoured the co-incineration option, arguing that no harmful effects could be expected from co-incineration for public health. Once again, these results were contested by local populations and municipal authorities, who organised an International Forum on Co-Incineration, calling upon experts to discuss alternatives to that method (Matias, 2004).

In what can be considered an exercise of counter-expertise based on lay–expert collaboration (Eden, 1998; Eden *et al.*, 2006; Hess, 2007; Irwin, 1995), in 2001 a partnership between local associations and the Hygiene and Social Medicine Institute of the University of Coimbra publicised an epidemiological study based on data collected by the regional health authorities, which showed a higher rate of respiratory and cancer pathologies in the vicinity of the cement factory in Souselas when compared to other communities in the same district. The Commission for Fighting Co-Incineration (Comissão de Luta contra a Co-Incineração), a coalition of local associations, issued another report containing data indicating that the air pollution would rise due to co-incineration.

A change of government in 2002 had the effect of redirecting the industrial waste management policy. The new government, led by the Social-Democratic Party, commissioned another study, this time from six Portuguese universities, with a view to estimating the amount of hazardous industrial waste in Portugal and assessing the best ways to treat it. According to this study, released in May 2003, the existing quantity of industrial waste did not justify the co-incineration option. Preference was given to waste retrieval, valorisation and disposal. By the same token, the ISC was dismissed.

The return to power of the Socialist Party in 2006 led to the resumption of the co-incineration project, and the reestablishment of the ISC, which was requested to issue a new report on the matter. The co-incineration of hazardous industrial waste was finally put into practice at the end of 2007, notwithstanding a series of judicial actions initiated mainly by the municipalities concerned, which have lasted until the present day.[2]

Unlike the co-incineration controversy, which continued for many years, the peak of the depleted uranium case lasted only a few months (2000–2001), though the topic occasionally reappears in the media

Two major issues arise from this brief sketch of the policy–science interface in the co-incineration case: first, confronted with the public contestation of a decision from the Minister of the Environment concerning the location of co-incinerators, based on the EIA undertaken as part of the formal procedure, the government chose to reinforce the scientific basis of its policy on the matter by resorting to 'independent' expertise; second, successive governments charged different expert groups to offer advice, and the latter turned out to be by and large in line with the governments' political goals.

Unlike the co-incineration controversy, which remained open for many years, the peak of the depleted uranium case lasted only a few months, between 2000 and 2001, though the topic occasionally reappears in the media.

In this case, the resort to science was clearly media-driven. News on the possibility of risk for military personnel in the Balkans started to appear in the international press in the summer of 2000, but was only echoed in Portugal in an article in a military magazine. At that time, a scientist working for the State Laboratory in charge of nuclear research and protection, suggested that the Ministry of Science should lead a field expedition to the Balkans to measure radioactivity. His proposal was at first disregarded, but some months later when the issue erupted fiercely in the mainstream media, he was eventually asked to lead the government-sponsored mission.

At the end of 2000, news indeed came out regarding a few cases of illness and even deaths among European troops who had served in the international peace-keeping forces in the Balkans. Exposure to depleted uranium was blamed for these occurrences, in what became known as the Balkan syndrome. Some Portuguese soldiers and policemen with signs of the disease also came forward, worried that they might be suffering from the syndrome. Under public and political pressure, the Portuguese government decided to send an expert mission to the Balkans to measure the levels of radioactivity *in loco*. It also ordered a medical survey of all military personnel who had served in the former Yugoslavia.

The early months of 2001 were marked by a multilayered controversy: debates between political actors, in which some asked for an immediate

withdrawal of Portuguese troops, a measure that was categorically dismissed by the government; disagreements between scientists regarding the procedures for assessing the alleged risk; statements and demonstrations carried out by military professional and family associations, demanding to be heard in political decision-making. As soon as the scientific mission issued its preliminary report (February 2001), which denied the existence of risk of contamination, the case was considered closed and received very little further attention from the media. As pointed out above, the current use of scientific advice in environmental policy-making in Portugal is largely attributable to the need to comply with EU law. Yet, in the co-incineration case, reliance on scientists and experts went beyond EU requirements, giving a strong indication that formal mechanisms for risk evaluation did not suffice to render the decisions socially acceptable. Similarly, in the depleted uranium case, the appeal to scientists also surpassed what might be expected since competent international organisations (namely, NATO and the World Health Organization) had already taken action to address the problem.

The delegation of authority by the politicians to the experts seemed unconditional. However, the strategy followed proved far from successful. As will be shown in the following section, such a categorical stand was contradicted by a debate among scientists which rendered clear the uncertainties and divergences that the political authorities did not recognise beforehand. This may have been a result of the unreserved trust of the government in the ISC's opinion: the decree that established the ISC clearly affirmed that the government decision on the location of the co-incinerators would depend automatically on the findings of the ISC, therefore discarding any possibility of opening the experts' viewpoints to debate or of considering non-scientifically based opinions.

In the case of the depleted uranium, instead of appointing a scientific commission, the government made use of two institutions under its direct control: the Nuclear Technology Institute (Instituto Tecnológico Nuclear), a state laboratory directly dependent upon the Ministry for Science and Technology, which was charged with the field mission, and the Military Hospital, under the Ministry for Defence, tasked with the medical survey. These choices were justified by the need to obtain answers speedily in view of the urgency of the matter and to use available resources.

The swiftness with which the political authorities responded to the perception of this health risk may have been due to the convergence of the international impact of the issue and the wish of the new Ministry for Science and Technology to raise its public profile. Ever since its establishment in 1995, this department had been struggling for a greater social and even political recognition.[3]

Yet, the question remains: What may possibly explain such a move forward in the use of science in a country whose traditional political and social culture has been more inclined to the acceptance of dogmas than to fostering scientific thought?

From the risk controversy to the debate over the scientific advisory process

Political strategies for selecting experts 'who are ideologically predisposed to agree' (Guston, 2003: 349) with policy-makers who request their advice, as noted above, have the effect of excluding scientists who might have a relevant contribution to make. In Portugal, this practice is rendered especially delicate in view of existing rivalry between universities and state laboratories and among universities themselves (Lisbon and Coimbra and between old and new universities). In a scientific system that still lacks resources and has a weak connection to the social and economic fabric (Gonçalves, 2000), competition for material and symbolic rewards brought about by political assignments tends to be fiercer.

Both cases provide evidence on how turmoil-ridden was the role played by scientists in risk evaluation. Besides colliding with the perceptions of affected populations and being entangled in political and partisan debate, the choice of that method for assessing the risks caused disagreement within the scientific community itself. A closer inspection of the features and dynamics of this disagreement displays a confrontation between, on the one hand, the positions of 'official' scientists,[4] that is to say, the members of the ISC and of the Medical Working Group appointed by government to give their advice, (in the co-incineration case), and the scientists working for the Nuclear Technology Institute and the Military Hospital (in the depleted uranium case), and, on the other hand, those of the 'non-official' scientists who took part in the debates on their own initiative, mainly through the mass media or in public forums convened by political parties, civil society organisations or, in the depleted uranium case, the families of those affected by the diseases. Strikingly, rather than focus on the impact of the risks on the environment or public health, the central focus of discussion among the scientists were the processes through which scientific advice was (or should be) provided and who should be called to provide such scientific advice.

A focal point of the controversy indeed lay in the nature of the task that the ISC was asked to perform, namely the kind of 'science' it was expected to produce. By distinguishing 'true science' from 'non-science' and by refusing to acknowledge the specific features of its advisory role, including the uncertainty involved, the ISC's chairman rejected as invalid the opinions and standpoints of the opponents of co-incineration.[5]

In reality, the ISC performed no field work but based its reports mainly on the existing literature. In the words of one of the most outspoken 'non-official' researchers in this debate:

> ISC's scientists misread or misinterpreted the studies in which their opinion was based and made an arrogant defence of their position. None can call upon his own knowledge to make a statement over that issue. The sole knowledge they may have is from using other people's references. (interview with Delgado Domingos, May 2003)

This kind of comment did not prevent the head of the ISC from insisting that only its positions possessed the required reliability:

> All other scientists would have to invoke recent data to prove their points of view. Barely anyone presented any evidence. It was the ISC ... that could submit evidence from situations that none of the opponents has managed to find on co-incineration. (…) None of us has experience in this matter. And yet it is the commission that has more experience. (interview with Sebastião Formosinho, May 2003)

We can find similar traits in the depleted uranium affair: the rejection by 'official' experts of the judgements issued by dissenting researchers, dismissed as lacking in scientific authority; and the shift of the controversy surrounding the evaluation of the risk towards a debate on the nature and conditions of the advisory practice.

It has been demonstrated that divisions within the scientific community are connected to the scientists' disciplinary and institutional, social and even philosophical background (Millstone and van Zwanenberg, 2001, 101; Sarewitz, 2004). These preferences and prejudices affect how scientists assess evidence with their tendency to give greater weight to evidence that is near to hand, with 'nearness' being experienced physically, socially, and epistemologically. The cases analyzed offer evidence which partly corroborates this standpoint. So, for instance, those scientists who countered the opinions of the ISC were to a significant extent guided by proximity with the sources of risk (that was the case of Coimbra University professors who intervened in the debate). Yet, the ISC's president was himself a professor at this university, which may be an indicator that predisposition to agree with 'principals' together with prestige factors prevailed over geographical proximity.

In the depleted uranium affair the dissenting experts were for the most part university professors who, besides their work in nuclear research, had been involved in the past in the movement against the setting up of nuclear power plants in Portugal. In this instance, ideological or philosophical preconceptions came to the fore.

Yet, beyond such somewhat normal features of the cases, the current tension between the roles of universities and state laboratories as advisors of policy-makers surfaced. In the co-incineration case, governments, one after the other, selected researchers from the university as their advisors. One explanation for this option might be the fact that pertinent knowledge in chemistry, public health, and other relevant fields, was available in the university rather than in existing state laboratories. However, besides competence, it was the independence of the university that was invoked as the central argument used to propel the social legitimacy of expertise. In contrast, the Minister for Science and Technology responded to the signs of a Balkan syndrome in Portuguese soldiers and policemen by requesting the support of a state laboratory, the Nuclear Technology Institute, rather than of experts from the university. In so doing, the expert mission sent to Kosovo saw its mandate restricted to issues under its competency, namely detecting radioactivity in the local environment. Thus, both the evaluation of the risk of developing diseases as a result of uranium exposure and other non-radiological risks (the toxicity of uranium) were not included in its terms of reference.

What might account for this different strategy for selecting the experts? A first explanation might be the policy followed by the Ministry of Science and Technology of rehabilitating the state laboratories, which had lost their privileged position inherited from the political regime reversed by the 1974 revolution and were severely affected by structural problems such as: being oversized, having aged human and material resources, ill-defined missions, and scant social and scientific reputation. The depleted uranium episode offered an excellent opportunity to demonstrate publicly the relevance of maintaining non-university scientific institutions under the tutelage of the state.

However, the choice of a state laboratory for assessing this risk came under heavy criticism from 'counter-experts', mainly university professors. The mission's report, denying the existence of risk, was interpreted by the critics as evidence of their yielding to political power. The contesting scientists raised doubts not only about the lack of independence of the expert mission to the Balkans, but also about the prior knowledge of the results and their political reading:

> With a mission performed by a laboratory that depends directly from the Ministry of Science, which has some incentive to filter the data, I have serious misgivings that if they would have found an alarming situation they would reveal it. (Delgado Domingos, in *Público*, 20 April 2001)

> 'Nuclear physicists went to Kosovo with orders to detect only radiation and it was already known what results they would bring', argued the president of the National Association of Public Health Doctors. (*Público*, 13 January 2001)

Additionally, soothing statements by politicians and 'official' scientists were attributed not to the

findings of scientific work but to underlying economic and political interests:

> Recognising a connection [between uranium and the syndrome] would have had devastating economical and political consequences. In merely economic terms, the compensations that would have to be paid to former servicemen in Iraq, Bosnia and Kosovo would amount to many millions of dollars. For this reason, it is unthinkable that a state part of NATO would recognise a cause–effect relationship between depleted uranium and the diseases it causes, even though existing data points to that direction. (Delgado Domingos, in *Público*, 20 April 2001)

Scientific debate thus surpassed the level of technical disagreement, reaching the stage of the morals and ethics of science. As noted by Nelkin (1995), scientific controversies often take on a right/wrong dimension. In reality, statements uttered by the 'non-official' scientists made no pretence of hiding their political and ethical stances on the use of depleted uranium weapons:

> In my personal opinion, the use of depleted uranium weapons is a crime against mankind, because these weapons of mass destruction condemn future generations to a miserable life, if not certain death, in a blatant violation of the Geneva Convention and of several UN Security Council resolutions passed in the last five years. (José António Salcedo, in *Público*, 18 January 2001)

Though some of the experts of the official mission shared this ethical position, they separated it from the scientific assessment of risk:

> Should they [the projectiles] be there? I also don't think so. But they will not make this area more insalubrious or dangerous to live in. (interview with Fernando Carvalho, July 2003)

Similarly to what had happened in the co-incineration case, 'official' experts responded to the critics by raising reservations about the latter's scientific authority, and summoning the endorsement of peers both national and international, as well as of the World Health Organization. Disapproving statements were also interpreted by the 'official' scientists as being stirred by non-scientific motivations: the wish to be in the spotlight, the rivalry between universities and the laboratories of the state, and even political affiliations. Referring to one of the most active critics, the then director of the Nuclear Technology Institute later asserted:

> He had no access to the data, he knew nothing (…) he has no knowledge of the results, he has nothing, he's making inferences, he's inferring we're not competent (…) He mixed everything up. Technically he didn't demonstrate anything. (Interview with José Carvalho Soares, May 2003)

In our view, the exclusive selection of the experts by government, combined with the lack of suitable structures for a plural and transparent exchange on the scientific foundations of public decisions, generated distrust and the rejection of the advisory procedure as unsound within the scientific community itself. This difficulty was accentuated by the tendency of experts called upon by governments to deny scientific uncertainties and their systematic rejection of the validity or relevance of critical stances. That attitude may be interpreted as an indicator of the on-going struggle of Portuguese scientists to affirm the relevance of their role.

As a consequence, the aim of the political authorities to seek scientific support for their goals failed to a large extent. Eventually, the controversies were closed not through scientific argumentation but by political decision.

The political closure of the scientific controversies

Disagreement and controversy is a natural condition of the scientific debate, though consensus making is also a natural process in scientific negotiations. Differently, the process of government requires that decisions be made even in the absence of a consensus on problems or on solutions. Therefore, politicians cannot rely on an autonomously produced consensus or closure among scientific experts (Guston, 2003: 349ff; Orestes, 2004).

In the cases we have studied, government delegated the evaluation of risk on experts selected on the basis of various sets of criteria: in the co-incineration case, the government valued competence and independence, in response to the public doubts about the EIA process; in the depleted uranium case, pragmatic considerations led the Ministry of Science to rely on know-how available in state laboratories. Nevertheless, such options recalling the 'bilateral monopoly' referred to by Guston (2003) did not achieve the underlying goal of closing the controversies. Quite the opposite, they paved the way for a controversy internal to the scientific community, one that largely developed through the mass media.

As has been pointed out, in risk regulation or management, scientific expertise is supported by a sponsor who wants a particular result, a particular epistemic outcome, and the researchers know in advance what that outcome is, producing an explicit conflict of interest, which undermines the integrity of the research being performed. Thus, scientific proof is rarely what is at stake in a contested environmental or health issue (Orestes, 2004: 381).

In reality, the unfolding of the cases confirmed that the disputes among the experts were firmly embedded in the political context. In the co-incineration case, the discourse of both the members of the ISC and of other scientists who intervened in the debate combined references to science and to extra-scientific considerations (political, economical and social). Scientists did not refrain from issuing value judgements on the economic conditions and the political choices concerned, also giving in to pragmatic considerations.

The successive sways that marked the recourse to scientific expertise as changes in governments occurred appear in this light as an additional indicator of the dilution of the science–policy frontier, as well as of the purely instrumental nature of the role of 'official' expertise. Analyses of equivalent situations in Spain show a similar tendency for the Spanish authorities to respond to risk controversies in a technocratic mode, whereby technical efficiency is equated with political adequacy (Cerezo *et al.*, 1998).

In the case of the depleted uranium, the report of the field mission to Kosovo established that no radioactive contamination was found and denied any epidemiological surge of diseases. Despite the critiques by the 'non-official' scientists, the government accepted the experts' report unconditionally, and used it to legitimate its earlier decision of keeping the troops in the area. Governmental and military officials then blamed the media and the opposition for amplifying the risk and generating emotional and irrational reactions in the public, a common rhetorical device in risk situations (Wynne, 1996; Kunreuther and Slovic, 2001).

It could be assumed that since this case vanished from the media, its closure had been accomplished. Nevertheless, foreign scientific reports that came to light a few years later, one from the Royal Society (2001, 2002), another from the UN Environmental Programme (2003), demonstrated the existence of both environmental and health risks in the region. Since these reports received scant media attention in Portugal, their release did not rekindle the controversy. In addition, the media sporadically reported that Portuguese Balkan veterans had fallen ill and blamed their illness on depleted uranium, which means that the reassurance brought by science has not been trusted unreservedly by the public. The issue also resurfaced briefly in 2004, when the possibility that Portuguese policemen in Iraq might be exposed to depleted uranium was raised. However, this news has also not been followed by any reopening of the debate.

Entangled in politically biased positions and lacking scientifically consensual answers, the controversies among experts in risk settings tend as a matter of fact to end through political closure. As shown by the two episodes analysed, despite efforts to confine the risk assessment within the science's sphere, and under the control of the experts appointed by the authorities, the scientific debate was strongly connected to the social and political controversies.

Conclusion

Democratisation and the legal and political repercussions of participation in the EC undeniably account for the changing politics of risk, as well the politics of science in Portugal. Legal imperatives, in particular, the duty to subject public works and major industrial projects to a preliminary EIA render the use of scientific advice mandatory under certain circumstances. Yet, more than that, the social mobilisation around environmental and public health risks (as evidenced by the local reaction to the announcement by government of the locations for the co-incinerators, and by the movement of the families of soldiers and policemen allegedly contaminated by depleted uranium), furthered by the freedom of the mass media, account to a considerable extent for the authorities' new eagerness to seek in scientific expertise the authoritative basis for public action.

In reality, the episodes that we have analysed revealed a remarkably strong reliance by the Portuguese authorities on scientists and experts. This call looked quite straightforward, with the authorities basing their decisions fully on the viewpoints of officially appointed scientific experts and scientific committees. However, the other side of the coin was that it entailed the denial of scientific uncertainties and controversies inherent to the assessment of the risks, as well as the dismissal as irrelevant or invalid of the stances not only of social groups which had a stake in the issues, but also of renowned scientists.

In both cases, by defining risk issues as strictly scientific, the political authorities seemingly attempted to neutralise political conflict and debate. But by not clearly separating scientific opinion from

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political decision, they ultimately substantiated their opponents' contention of an instrumental use of science, to the detriment of both the scientists' independence and the public interest.

Moreover, since the use of scientific advice was widely covered by the media, uncertainties inherent in the risk assessment became crystal-clear to public opinion. Public awareness was enhanced by the visible disagreements within the scientific community concerning both the nature and gravity of the threats, and what the right procedures should be for achieving an objective assessment. Thus, the public perception of risk could not but be amplified when faced with rhetoric from 'official' experts based on obsolete notions of truth, certainty and proof.

The debates within the Portuguese scientific community made apparent the tension between a 'positivist' model of science and the current need to adapt it to the complex and dynamic character of the problems that science is today asked to solve, as well as to the expectations of a more open and informed society that strives to defend values such as environmental and health quality that are threatened by economic and political dynamics.

As noted above, the relation between science and policy-making in Portugal was historically adverse to cooperation. This tradition shaped the political and administrative culture. However, in the last two decades or so, in parallel with the expansion and strengthening of the university system, a growing reliance on expert advice by government and public administration has been witnessed. This novel relationship has been seen to be highly ambivalent. In fact, whereas in regulatory contexts the Portuguese government tends to draw more and more on universities to inform public action, invoking their independence from power as a way to strengthen the weight of the advice, at times the government turns to state laboratories for pragmatic reasons. The conspicuous friction between 'official' and 'non-official' experts signalled the current rivalry between these two subsystems within the Portuguese scientific system.

Furthermore, by rejecting as invalid the views of other scientists as well as other sources of knowledge, the government displayed a representation of science that looked outdated. Likewise, the Portuguese authorities' dealings with science evidenced a lack of awareness of the current trend in the EU scientific advisory system relying on an explicit recognition of uncertainties in science and the need to open up science-based decision-making processes.

Such a difficulty in admitting uncertainty and controversy appears to be an expression of an idiosyncrasy of a political system which, despite legal and political change, retains some remnants of a deep-rooted authoritarian culture. Therefore, rules and practices being promoted at the EU level aiming at demarcating and protecting science and scientific expertise from political interference are still waiting to see the light in Portugal.

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Notes

1. Comissão Científica Independente de Controlo e Acompanhamento da Co-Incineração. See Decree Law 120/99, and Decree Law 121/99 (promulgated 16 April 1999).
2. The most recent of these procedures, still under way at the moment of this writing, purports to counter the decision by the Minister of the Environment to exonerate the cement factories from undertaking a new EIA before the administrative licensing of co-incineration.
3. This effort is noticeable in the steep increase in the funding for the scientific system (fellowships, grants, subsidies to R&D units), as well as in a systematic strategy of publishing reports, holding public sessions regarding science and technology evaluation and policy, organising meetings with the scientific community, issuing new legislation, and promoting public understanding of science initiatives.
4. The European Commission's *Report of the Working Group Democratising Expertise and Establishing Scientific Reference Systems* (2001) distinguishes between three kinds of experts: official experts, appointed by governments; industry experts, appointed by the private sector; and counter-experts, chosen by non-governmental organisations or self-appointed.
5. The ambiguity as to the nature of the task assigned to the 'official' scientists was also reflected in a disagreement concerning the ethical standards which should guide both the ISC and its critics and that resulted in a lawsuit against one of the opposing scientists.

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