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INTRODUCTION

Navigating scientific routes to risk assessment: a tortuous path

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Risk is currently one of the most used, abused and analysed word to describe specific facts, some events and, in some cases, the whole social reality (Luhmann 1991; Beck 1992). The increasing centrality assumed by risk in daily practices and discourses and scientific investigations has obviously evolved in space and time (Renn 2008a, 2008b). For a long time, risk analysis has been dominated by engineering perspectives and by a ‘culture of emergency’ largely ignoring the human geography and the health conditions of involved populations. In the past decade, an increasing number of researchers have begun to reconsider risk analysis, as well as the connections between mapping, circulating information and power relationships. Risk has moved from a static geographic frame to a mobile one, and risk and space are to be recognised as mutually related (November 2008). Time framing also acquired great importance in the observation, modelling and forecasting of risk situations. Additionally, the emergence of the use of geographic information systems (GIS) – and more recently of other technologies like agent-based modelling (Kagaya et al. 2005) – offered new tools for reconsidering perception and cognitive representations of risk, simulation of accidents, mobility and exposure of a population. To restrict such a large field of research, we would introduce a brief discussion on how different approaches to industrial and environmental risks (earthquakes, floods, soil pollution and water supply) are developed in some case studies.

In this special issue, by offering case studies and reflections from France, Gambia, Hungary and Italy, we want to focus on the operationalisation of risk analysis, the way this category is constructed, through which relations and which spatialities it is forged. Firstly, the double characterisation of risk, both as an institutional task (e.g. in emergency risk management) and as a dedicated body of methodologies and conceptualisations (risk assessment), generates a potential conflict over the selection of information sources and the weight to assign to different outcomes. Secondly, there is the need to integrate environmental and social information within various scales of analysis and build mixed methods. Thirdly, we need to interrogate the question of how risk analysis is problematised by social scientists, and how unfolding self-reflexive discourses and mixed methods provide a better understanding of risk position than in the past.

The double role of institutional and social (mainly scientific) task has directed many analyses toward risk perception and its determinants. The distribution of different levels of risk concern for single hazards allows the construction of risk perception ‘profiles’ as showed by Signorino in his article. Gender, education and socio-economic vulnerability matter in increasing concerns in relation to environmental and health risks and knowledge of the adequate safety measures to be taken in case of an earthquake (see Beck et al. this issue; Signorino this issue). In Signorino’s work also another consideration emerges, that the results imply that, within a similar level of general alarm and different risk perception profiles, two populations that share an identical economic ‘development’ model (centred on the growth of a heavy contaminating industry) have the same risk perception as far as environment, health and industrial hazards are concerned. But, areas of risk seem to be more precisely delineated by people who are less worried about risk (Bonnet et al. this issue). Furthermore, in the context of Flanquart’s case study in Dunkirk (France), there is a split between the weighing of industrial risks by the authorities on the one hand, and a far more calm view from the population on the other (Flanquart this issue). This gap raises questions about the idea, which has become widespread since the work of Beck (1992), that we are living in a society which is increasingly adverse to risks. It also shows how difficult it is to manage a space in which authorities and population do not have the same perception of what the risks are and how to deal with them. In this case, this gap constitutes a brake to the efficiency of public policies regarding risk, as the two players (usually highly diversified) have difficulties to understand each other position. A co-construction of risk assessment (through participatory methods, for example; Gaillard and Maceda 2009), of risk reduction policies or of emergency measures may help more efficient decision-making practices. Flanquart considers that Beck’s idea cannot be applied in his case study. Risk sensitivity depends on various factors including the landscape dimension and the visibility of industrial components (Bonnet et al. this issue). Through landscape analysis, the relation between risk and aesthetic, introducing a sensitive facet of risk, is also questioned. In one case (Bonnet et al. this issue), industrial landscape is ‘not appreciated nor unpopular’. In Flanquart’s study, aesthetic of the Dunkirk area seems to be more important than the danger related to the petrochemical plants. If cognitive representation is usually

more appropriate to the issue of risk (Cauvin 1984) as perceived risk is moderated by external factors like, among others, communication processes (Morgan et al. 2001), the use of 'perception' instead is then clearly justified because more appropriated as it appeals to the sense of sight. Aesthetic also introduces a positive dimension of risk, through beauty considerations, that brings in issues that remains to be explored in finer detail in risk assessment (Wardman 2006). Surprisingly, the relationship between risk perception and vulnerability is not questioned. Does it mean that it is now completely assumed that both are related? In that case, to go further, researchers should take some risks: risk perception should be more often not only studied for itself but also be integrated into risk assessment. Researchers should then propose decision tools that would take into account the whole complexity of risk. This would allow social scientists to adequately assume their wish – which is not new and has been circulating for several years – to take into account cognitive dimension in risk studies (Burton and Kates 1964).

The papers of this special issue reveal the fact that they were part of research activities that had to face the implementation of complex investigations, including among others: environmental measures, descriptive epidemiology, analytical studies, social surveys, GIS modelling and theoretical formalisation. Mixed methodologies or multi-methodologies (Mingers and Brocklesby 1997), usually associated with pragmatic assumptions, deal with mixing quantitative and qualitative methods in parallel or quantifying qualitative data (with GIS). In the first case, these methods allow tackling the complexity of risk perception, defining its outlines and identifying its determinants on a representative numerous sample. It then allows generalizing some results at the scale of the studied area. In the second case, GIS allow representing simultaneously qualitative data for several people from a common social group (Bonnet et al. this issue; Beck et al. this issue). This large variety of themes addresses somehow a few common questions. All the works are indirectly motivated by tackling the question: 'how complex investigations can be built and managed?' This question leads to a consideration on how much risk has become an organizational social device composed by a variable set of relations governed by the state or private interests, a device often resisted and transformed by local inhabitants. According to Flanquart, dangers are transformed into socially constructed risks – that is negative events which are known, more or less predictable – and potentially leading to human and/or material damage. If all authors agree with Douglas (1992) and constructivists (Jasanoff 1998), that risk is not objective but a socially constructed phenomenon, Flanquart goes further and considers that a danger is determined as risk by the individuals and institutions if it has been scientifically identified and measured. The role of social scientists researchers is also questioned by Saitta, with a critical analysis of his team's work on risk perception. Saitta in his article (this issue) explicitly builds a critical approach on risk studies, because they are considered partial, both with regard to their object of their analyses, and the extension of the societies they observe. The operationalisation of risk has largely envisaged as an investigation on the future and historical human activities are hardly ever considered. Risk should not be seen as an independent variable, because its perception is rather the consequence of a certain structure of the economic and political organisation of the communities investigated, in Sicily in his case. So, research on risk should enlarge the spectrum of its interests, and borrow tools and concepts from other disciplines, in particular history. According to Saitta, history supports research of sites at risk, especially when there is the need to confront apparent contradictions expressed by the population. Engel-Di Mauro goes even further in suggesting world-scale interconnections and historical processes impinging on the appearance of current hazards. Two cases, in Gambia and Hungary, demonstrate that localised hazards, entailing long-term deleterious consequences, cannot be fully explained or confronted without addressing historical and multiple-scale social processes (Engel-Di Mauro this issue). These social processes can be explored through different methodologies which appear to be complementary. Surveys seem to be a common tool for all authors, whatever their discipline (geography, economy and sociology), but they propose different interesting perspectives on them. The surveyed population can be refined thanks to the use of spatio-temporal data, e.g. extracted from household surveys (see Beck et al. this issue). Bonnet et al. (this issue) deal with mental maps, which allow them to introduce the spatial dimension of risk perception through its spatial representation. Indeed, the construction of the scale of analysis from individuals to social groups is at the heart of the multiple definitions of risk. A place and its society is affected by what happens in other places, the type of relations a place has with other places (e.g. colonial and economic dependence) and to how such interconnections (see Engel-Di Mauro this issue). The complexity of all these interrelationships can make it very awkward to see through the details and world-scale processes behind localised hazards are not always readily traceable. Space is not only discussed through the construction of samples and through the representation of survey results (Bonnet et al. this issue; Beck et al. this issue), but it also intervenes to explain the construction of contradictory attitudes toward risk (see Saitta's example on contested water use in Gela). Moreover, concerning methodological prospects, the

use of focus groups (Krueger 1994) seem to be spreading and three papers mention them as a basis to construct questionnaires and, more generally, to better capture the complexity of risk perception, as highlighted by Saitta. The development of 'mixed' methodologies, crossing qualitative, quantitative, spatial data, methods and analysis, is an important factor to be mentioned, for their complementarity would benefit to the understanding of the multiple facets of risk perception, in this case.

The landscape of risk in social research is too broad to be covered in this short introductory essay. We would like to highlight some important trends and themes in recent research. First, there is a consolidated shift toward multidisciplinary approaches with mixed methods that critically engage with the previous way of conducting risk analysis. On this point, the authors of this special issue have different suggestions and they oscillate between an historical critical perspective and a more sophisticated refinement of sociological and geographical approaches.

Secondly, also due to the possible choices to construct proper scale of analysis, there is a recognised problematisation of the objective distinction between proximity and distance (Bickerstaff and Simmons 2009). All case studies presented in this issue have problems in sharing simple relationship based on proximity and distance. The distance to risk can be either metric/objective (Euclidian or geographic, depending how topography and urban morphology is taken into account), affective/subjective (linked, among others, to profession) or temporal (considering a more or less recent experience of accident and the temporal context in which the study takes place). In this issue, several studies make use of GIS and surveys to measure distance and proximity.

The definitions of risk, danger and vulnerability are not only socially constructed but also multi-scalar over various dimensions. According to Saitta in this issue, risk is so multi-scalar and complex that it cannot be extracted from its local context. Each place at risk is specific and should be considered as unique. This means that solutions found for one locality are probably inapplicable to another facing similar hazard, what constitutes a strong questioning of cross-cultural approaches of risk. Risk governance as the process of collecting, analysing and communicating risk information and the decisions to manage risk to produce sustainable changes can be considered as a governmentality issue or the establishment of a dependence pattern. On top of this issue 'there is no such thing as a singular Nature around which a policy of "sustainability" can be constructed. Rather, there are a multitude of natures and a multitude of existing or possible socio-natural relations' (Swyngedouw 2006). It is, then, evident there is no commonly accepted definition for the term risk and an impossible routinisation of its assessment (Renn 1998). As Foucault's had argued in his biopower/biopolitics conception, it is fundamental the way to structure and integrate scientific knowledge, in our case on industrial and environmental risk, and those who have access to this knowledge and the way actors can exercise their own power based on this knowledge and on more structured knowledge structures (e.g. laws and regulations). In many cases is not only the analysis, the monitor of the current situation that matters, but the working of whole system of vigilance. Vigilance is a kind of apparatus to monitor the precursor of catastrophic incidents, and departs from the premise that the social is immediately knowable, complicating the role of expertise as well as value of fixed disease lists (Weir and Mykhalovskiy 2010). The role of science in general can highlight the subtle border between protection and surveillance that is incontrovertibly related to risk. If risk remains a complex object, from now on it should be considered as a whole which integrate social and physical, spatial and temporal, cognitive and management dimensions. Further studies on risk should as much as possible consider it in that way, through its multiple dimensions (Loewenstein et al. 2001), and also take into account the complexity of risk situations, not only by studying one risk at a time but several (in particular their potential interactions), including in risk perception studies (Glatron and Beck 2008).

In sum, the papers presented showcases the shifting meaning of risk in research from a routinely operationalised set of tools (mostly from hard sciences) into mixed, reflexive, critical work that lead us to rethink our approaches on risk assessment.

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