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On Epistemic Dissonance: Contesting the Transdisciplinary Disaster Risk Reduction Education, Research, and Practices

Pavel Raška *

Department of Geography, Faculty of Science, J. E. Purkyně University, Ústí nad Labem, Czechia

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INTRODUCTION

Over the last century, the ever-present challenges facing disaster risk reduction (DRR) have driven several paradigmatic shifts in disaster risk research, lacking adequate bridging between research focused on a biophysical understanding of natural hazard mechanisms, and research focused on societal root causes of disasters. Over the last two decades, a transdisciplinary approach to research and practices has been widely advocated as an appropriate mode of acknowledging and reconciling multiple feedbacks between societal developments, Earth's dynamics, and resulting disasters (e.g., Lang et al., 2012; Matsuura and Razak, 2019; Bendito, 2020).

To list just a few of these efforts, "Transdisciplinary Education for Disaster Risk Reduction" was an official side event at the UN World Conference on Disaster Risk Reduction in Sendai in 2015, and the largest European funding scheme, Horizon 2020, launched a call in 2018 for "Large-scale demonstrators on nature-based solutions for hydro-meteorological risk reduction", that should be transdisciplinary, among other attributes. Most recently, the Organization for Economic Co-operation and Development has approved a report on addressing societal challenges using transdisciplinary research, largely motivated by another current disaster—the Covid-19 pandemic (OECD, 2020).

These efforts have been supported by conceptual developments in transdisciplinarity. Aside from its frequent use as a vague alternative for other disciplinary entanglements, such as inter- and multi-disciplinarity, transdisciplinarity *sensu stricto* denotes an approach in which two or more disciplines collaborate on the basis of generalised axiomatics, thus calling for a generalised epistemology (Jantsch, 1972). In recent developments, the term has also increasingly gained a connotation for involving local communities of non-academics in knowledge production (Rigolot, 2020), thus mobilizing various knowledge systems in order to gain credibility and legitimacy (Cash et al., 2003). This challenges the essential gap that is created by boundaries being constantly delineated between the scientific approaches, and the civic epistemologies of the communities and decision-makers. Using the 2012 L'Aquila earthquake, Donovan and Oppenheimer (2016) have shown, for example, how the neglect of social approaches resulted in a limited framing of the scientific advice in DRR. It has been argued that the transdisciplinary approach is suitable for ". . .*problems that are complex and multidimensional, particularly problems (. . .) that involve an interface of human and natural systems* . . . " (Wickson et al., 2006). Indeed, DRR research and practice fulfils all these challenges.

Importantly, the above-mentioned efforts to achieve transdisciplinary approaches have gradually contributed to reducing epistemic injustice, which denotes the dominance of certain scientific approaches or groups of people based on distorting others' capacity to understand and know the world (Grasswick, 2017). Currently, the DRR community can hardly complain of a global scarcity of publication platforms in which to present their research, regardless of its scope and approach.

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***Correspondence:**
Pavel Raška
pavel.raska@ujep.cz

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Nonetheless, a critical assessment would reveal that these platforms often serve as occasional crossroads on independent thematic avenues pursued by researchers. In disaster risk management (DRM) practices, on the other hand, an increasing number of developmental projects have been launched, consisting of experts from various disciplines. Yet again, the proclaimed transdisciplinarity often proves to be an illusion, as current organisations and funding vehicles continue to evince reluctance to fund and perform transdisciplinary research and practice (McLeish and Strang, 2016). Notably, Malamud and Petley (2009) pointed out that some geoscientists perceive a lack of evidence supporting the efficacy of approaches employed by social scientists in DRR. This urges a fair and self-critical evaluation of how we conduct and assess our work as a DRR community. In the following lines, I argue that at least some of these shortfalls in research and practice can be explained by what I call epistemic dissonance, a term derived from theories of epistemic injustice and cognitive dissonance.

EPISTEMIC DISSONANCE: CONCEPT AND NARRATIVES

Epistemic dissonance refers to cognitive and behavioural inconveniences resulting from situations in which scientists and practitioners are expected to accept and act upon information obtained by untrusted epistemologies. The basis for such epistemological clashes lies in differential perceptions of uncertainties peculiar to each discipline involved. I will illustrate below some representative perceptions of uncertainties with examples from historical research in DRR, with the presumption that such studies clearly accept the need for axiomatics based both in natural sciences (e.g., seismology, geomorphology, and hydrology), and social sciences and humanities (e.g., memory studies, cultural history, historical sociology). However selective the use of historical disaster research as an example might be, it is also supported by its critical contribution to central concepts revolving around DRR, such as traditional ecological knowledge, adaptation, and resilience. For the following reasoning, I will unconventionally, and perhaps quite impertinently, use examples from anonymous reviews of studies published in a couple of first-tier journals that present themselves as open to the perspectives of various disciplines, and that pursue sustainable developmental goals (indicating at least some notion of transdisciplinarity)[1].

Historical disaster research has diverged into at least two main directions devoted to 1) building parameterised historical catalogues and time series of natural hazards and disaster events, along with their social impacts, and 2) reconstructing single- or multi-case historical events in terms of their roots, impacts, and societal adaptive mechanisms (e.g., Schenk, 2007; Raška et al., 2014; Adamson et al., 2018). Notably, it is the first direction which builds on relatively weaker interdisciplinary collaborations that generally receive widespread acceptance across the DRR community, and become used for evidence-based policymaking. This is despite parametrised catalogues and time series of historical events all essentially require selection and generalisation of data for the sake of quantitative consistency, while partly neglecting contextual information about past and current discourses framing the original purpose, and present-day understanding of these data. My personal experience from discussions with historians is that these simplifications would be considered by many to be major flaws in the research. Neglecting the notion that geoscience terms and approaches employed in DRR are no more than one cultural and renegotiable representation of the world we live in (Palsson et al., 2013) may result in significant simplifications. Typically, these involve approaches where the data are collected from local communities and classified according to pre-established categories complying with researchers' experience and selected analytic methods. Such approaches pose a major barrier to the practical goals of DRR, because they neglect ways in which the world is experienced and evidenced by communities themselves, and therefore limit the acceptance and effectiveness of DRR interventions. Such a notion fundamentally calls for socialising the materiality of natural hazards. This claim can be reflected by searching for new ways of sensing and evidencing natural hazards and their impacts, while reconfiguring relations between researchers and local communities (e.g., Klimeš et al., 2019).

Perhaps even stronger reluctance to reconcile different perspectives can be seen in examples from the second branch of historical disaster research. First, there is the broadly accepted view that some kind of reality exists independently of our perception. As one reviewer claimed: "*when studying historical sources* (. . .) *it is always difficult to separate clearly the "facts" from the "interpretations*"." This distinction is drawn from principles maintained and secured in many science disciplines, stating that first we observe and collect facts, which are only then subject to interpretations. In historical research, the facts are, however, construed either by the writer (e.g. the chronicler and his funder) and by the historian approaching the data. Any enquiry is therefore situational. This does not negate the claim that historical methods are "*governed by inter-subjectively acceptable rules of inquiry*" (Iggers 1975: p. 5). Whether "*. . .there is always the possibility that we use the historical findings that match our "mental model*"", as another reviewer noted, is not a question aimed specifically at historians. For how different is this questioning from that which can be addressed to other scientists who are 'forced' to accept a selection based on recently formulated research problems, accepted theories, and their personal research experience (e.g., when segmenting terrain into landforms, choosing a location for geophysical profiling, or interpreting cause and effect of Earth's dynamics).

[1]Since all papers, for which I received the cited reviews, have been published, this exercise is by no means to criticize editorial policy. I am also aware that critical comments raised by reviewers may have been based on actual flaws in the reviewed papers. For this reason, I did my best to select and comment only on examples that point to institutionalized cross-discipline differences in perspective regarding uncertainties in data and interpretations. Also, I admit that the evidence is one-sided as it comes mainly from historical disaster research submitted to what may be called nature-based science journals.

Even after accepting the historical approaches, some would argue that "*it is interesting to see how pieces of information have been put together, but the final advancement is limited . . .* ". Although historical cases are always contextual and reflective, historians attempt to draw more general causal inferences from their research. While the predictive efficacy of such inferences may remain low, historical enquiry often provides explanatory conceptualisations that go beyond the knowledge of contingent relations observed in large-replication studies. The last objection is perhaps most peculiar among the different ways of coping with uncertainties across disciplines. It was simply stated with the question of one reviewer, "*Why are the authors giving approximate measurements?*". Explicitly acknowledged approximate measurements are simply historiographical appreciation of the uncertainties inherent in statistical measures applied in other disciplines. Such statistical calculations are not always possible with documentary data, since data triangulation and quantitative assessments are hindered by frequent paraphrasing and contextually differential meanings of similar statements (in text or figures). The particular ways of evidencing and presenting the uncertainties manifest themselves as yet another attribute of different epistemologies and thus as possible roots of epistemic dissonance. Contradictory to the above apology of historical research, we should also admit that historians may sometimes be too keen to address criticism by exacerbating the constructivist stance regarding the nature of the data and relativism in their interpretation (Tosh, 2006 for discussion). Mirroring the above in claim for geoscience research, we may assert that bringing the disciplines into a viable dialogue would necessitate materialising what the humanities consider purely social, thereby accepting that much of the social is conditioned by material worlds (Clark and Yusoff, 2017) and, in turn, produces new materiality.

DISCUSSION: A WAY FORWARD

The epistemic dissonance briefly illustrated in the previous section is strikingly persistent in disciplines due to cognitive lock-ins. Among researchers pursuing extended careers in their fields of expertise, disruptive thinking, allowing a breach of such a lock-in is only occasionally adopted in later career stages. This holds also for a large part of the DRR community, which, on the one hand, pursues multi-faceted problem-oriented research, but does so by bringing together researchers recruited from different fields of expertise, as diverse as geomorphology and psychology. Helpful methodological apparatus and examples are at hand, however. They range from science-based critical realist perspectives in social studies and humanities, critical physical geography (Lane, 2017) and STEAM approach (Ludlow and Travis, 2019), toward intervention-aimed Participatory Action Research (Meyer et al., 2020), all enabling the crossing of the ontological nature-human divide, and their respective epistemic perspectives. What is needed? Revisiting the above referred transdisciplinary education for disaster risk reduction event, I argue that we should go beyond illustrating good practices in local partnerships between universities and communities. Members of the DRR community face no lesser challenge than to take responsibility for promoting multi-epistemic education from the lowest levels of education within and outside of DRR programmes. This may require stepping outside of comfort zones since it has been shown in educational research that personal epistemology (or epistemic beliefs) of teachers is formative of the teaching approaches and of the expected teaching outcomes (Lunn et al., 2015). More variegated teaching outcomes could be supported by focusing on the learning processes instead of its goals (Bang and Medin, 2010), by joint teaching programmes, and by place-based learning—however mediated by cultural diversity of teachers and students. Fostering understandings and justifications for diverse epistemic perspectives would, in turn, enable students and practitioners to develop axiomatics that may enhance effectiveness of the integrative disaster risk reduction and management.

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PR is sole author of this paper, being responsible for design and writing of the contribution.

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