ORIGINAL ARTICLE

WILEY

From omniscient narrator to involved participants: Places and spaces "activated" in the EHEC O104:H4 crisis 2011

Verena Brinks[1] | Oliver Ibert[2,3]

[1]Geographisches Institut, Johannes Gutenberg-Universität Mainz, Mainz, Germany

[2]Leibniz Institute for Research on Society and Space (IRS), Erkner, Germany

[3]Brandenburg University of Technology Cottbus-Senftenberg, Cottbus, Germany

Correspondence
Verena Brinks, Geographisches Institut, Johannes Gutenberg-Universität Mainz, Johann-Joachim-Becher-Weg 21, Mainz 55128, Germany.
Email: verena.brinks@uni-mainz.de

Crisis management is often conceived from the position of an omniscient narrator, albeit the general consensus that crises are subjectively interpreted and experienced. The paper makes an analytical attempt to de-homogenize the notion of crisis. We argue that the perception of crises differs and present a spatial perspective on crisis to foreground the positionality of different actor groups. By referring to the EHEC outbreak 2011 in Germany, we explore two spatial configurations that seem to be of particular relevance: territories embedded in a *nested hierarchy* and *topologies* of interconnected places. State authorities think and act strongly in terms of territorial borders and along sectoral boundaries. From their point of view, the crisis tends to be threatening due to its "transboundary" character. Medical experts, in contrast, coped with the crisis in trans-local networks of colleagues. For this group, the crisis was also an opportunity to substantially enhance professional knowledge.

KEYWORDS
relational perspective, spatial and temporal unfolding of crisis, transboundary crisis

1 | INTRODUCTION

Today, there is a widely shared consensus among social scientists that "crises are [...] in the eye of the beholder" (Boin et al., 2005:138). As an analytical term, "crisis" is thus often only loosely connected to quasi-objective representations of the "real" world—for example in economic performance figures or measures to grasp societal trust in political institutions. Rather, as a social phenomenon, a crisis exists primarily as an inter-subjectively shared experience of threat and fundamental uncertainty combined with an enhanced urgency to act (Boin et al., 2005:2ff). Crises, thus have performative qualities: "If individuals (and the media) define a situation as a crisis, it is a crisis in its consequences" (Rosenthal & Kouzmin, 1997:286). Yet, not all conceptual consequences of such a socio-constructivist notion of crisis have already been drawn.

Crisis management is a knowledge domain strongly rooted in practice. Insights have typically been gained due to research and inquiry undertaken to serve clients, be it individual leaders, organizations or institutional bodies that have experienced crises. More specifically, these clients are decision makers who are in charge to solve a crisis. It is in the eye of these—very particular—beholders that the crisis becomes a crisis. Yet, the vast majority of empirical accounts that make up the field seldom reflect this implicit, mono-perspectival nature of the underlying data. Instead, the course of events is usually presented in a gesture of an omniscient narrator who looks at the course of events from nowhere and creates a unified understanding of "the" particular crisis even though recent empirical studies demonstrate that different group identities can lead to notably different perceptions of a crisis (Ma, 2019).

In this paper, we seek to foreground the conceptual consequences of Milstein's (2015:147) important insight that "there is no such thing as a crisis that simply exists 'of itself'" (see also Spector, 2019). We advance the argument that thinking about crisis should reflect the multi-positionality of actors involved. Therefore, in this paper we explore empirically the case of the EHEC O104:H4 outbreak which mainly took place in Germany in 2011 by considering the specific experiences of two equally involved, yet rather differently affected and positioned groups of actors. Firstly, the surprising outbreak of the epidemic and the severity of a much more deadly variant of the EHEC pathogen challenged the public authorities responsible for disease control. For this group of actors, it was of utmost significance to identify the carriers of the pathogen and the ways of transmission in order to regain control of an escalating situation. Secondly, the outbreak manifested itself at different hospitals across the country, to which increasing numbers of infected patients have been admitted. Here the major challenge for medical experts was to explore new ways of curing a widely unknown and much more aggressive variant of a disease under extreme time pressure. By differentiating between these groups of actors, we made fruitful use of the study by Müller-Seitz and Macpherson (2014:603) arguing that "organizations affected by the outbreak employ different ways to deal with the outbreak." We contribute a specific geographical perspective to this argument by demonstrating that crisis unfold differently in time *and* space for these different groups.

The dimension of time is well explored in crisis research. Usually, a phase model is reiterated (e.g. Fink, 2002). The "acute" crisis is temporally bracketed by a primordial phase, in which warning signs have typically been ignored and necessary preparations have been deferred and the "post-crisis" phase, during which actors reflect on their experiences and seek to learn lessons from the crisis (Bundy et al., 2017; see also Müller-Seitz, 2014 for the EHEC outbreak). Even though crisis diagnoses inevitably also imply spatial specifications, such as affected areas, hot-spots, centres of control or spatial scopes and scales (Milstein, 2015), the quasi-objective way of presenting the analysis tend to downplay the spatiality of crises, let alone explore the dynamic spatio-temporality in a systematic way.

Unlike temporal dynamics, the spatial unfolding of crises has been discussed only marginally in the crisis management literature so far. In our venture to move beyond a unifying account of crisis, a spatial perspective is indispensable to identify and specify the positionality in the ways the "same" crisis is experienced by different groups of actors. Moreover, we aim at demonstrating how crisis management goes along with a localization and spatialization of crises and how "sociospatial relations" (Jessop et al., 2008) are enacted by different coping systems in crisis. In the EHEC case, the public disease control agencies experienced the crisis as representatives of public institutions, who are politically responsible for public welfare in a defined territory (Boin et al., 2005) and embedded in a multi-scalar arrangement of overlapping responsibilities and influences. Medical experts, in contrast, have immediate encounters with infected patients in critical stages of the disease in the hospital context. For them, the crisis encompasses urgent and locally situated problem-solving. At the same time, they compensate for limitations of locally available expertise by asking trusted colleagues who work in other hospitals for advice and support.

Conceptually, we draw on two distinct but—as we argue—equally relevant complexes of spatial relations regarding crises: First, place and network, and second, scale and territoriality. In the next section, we briefly introduce thoughts and concepts on the spatiality of crisis by drawing on literature from geography, social sciences and crisis management.

2 | SPATIALITY OF CRISIS

Our approach to discuss the spatiality of crisis is influenced by the "TPSN framework" developed by Jessop et al. (2008). The basic aim of the authors is to raise awareness of the multiplicity of "sociospatial relations". They suggest "Territory," "Place," Scale" and "Network" as useful analytical categories to make the abstract notion "space" operational for an empirical analysis. However, the distinction is an analytical one. In the empirically observable world, the respective dimensions most typically overlap and interact. As each of these spatial categories represents both a "structuring principle" and a "structured field" (Jessop et al., 2008:395f.), the resulting taxonomy was not created with the primary intention to separate observations, but rather to afford an exploration of the complex and dynamic interdependencies between individual spatial dimensions (Gailing et al., 2020). In order to grasp the spatiality of crises, we focus on two spatial configurations which appear to be, based on our reading of crisis literature and investigation reports of prior crisis, of particular relevance in crises: *Nested hierarchies* and *topologies* (see also Table 1).

2.1 | Nested hierarchies—territory and scale

Even though notions such as "transboundary crises" (Boin & Rhinard, 2008) highlight the increasingly interdependent nature of many crises, the territorial dimension remains an important lens and powerful spatial construct. A territory can be defined as a clearly demarcated physical–geographical area within which specific formal rules and institutional arrangements apply and claim legitimacy. Territory can "be understood as a political technology: it comprises techniques for measuring land and controlling terrain" (Elden, 2010:811). This understanding resonates well with the prevalent focus of the crisis management literature on "leadership," (e.g. Boin et al., 2005), which already implicates the existence of an inside (determined by the scope of responsibility of the leader) and an outside. For political leaders, the relationship to territory becomes most obvious, as political mandates are usually connected to some territorial entity. Hence, during negotiation about the character of a crisis, the spatial scope of the crisis and the spatial distribution of related phenomena are crucial issues.

TABLE 1 Spatial dimensions and relevant configurations in crises (own table; partly based on Jessop et al. 2008)

Dimension	Description	Relevant configuration in crises
Territory	Clearly demarcated area with specific rules, institutions and legitimacy	*Nested hierarchies*
Scale	Vertical distribution of authority along a nested hierarchy of territorial units	
Place	Specific local settings, equipped with tools and artefacts	*Topologies*
Network	Inter-relations between nodes; relationship between actors or organizations	

Territoriality affects crises in several ways. Available institutional resources and regulations usually differ across territories. The same holds for public discourses. For instance, Baekkeskov and Öberg (2017) compared media coverage on vaccination policies during the H1N1 pandemic 2009 in Sweden and Denmark. Despite similar problems in both countries, different experts' views dominated the respective public discourses and different vaccination policies were realized.

Territorial accounts are closely related to a scalar perspective. As in the eyes of local authorities, a crisis *ends* at the territorial borders, transboundary crises frequently call for superordinated territorial entities to jump in, for example for national emergency programs or even internationally coordinated interventions. Scalar thinking is thus implied in highly controversial questions about centralization and decentralization of coordination in crisis management. Particularly, the notion of "upscaling" is a prominent term in crisis literature denoting a shift of decision-making competencies and authority from subordinate to superordinate bodies (Boin et al., 2005). The effectiveness of upscaling is, however, not uncontested. While a certain degree of centralization is regarded as necessary for crisis coordination across different units, local actors—whose authority is temporarily restricted when decision-making is upscaled—usually know their respective field and (organizational) procedures best (Boin et al., 2005:58). Of course, territory and scale apply primarily for public institutions. However, private organizations (such as companies) often mirror these categories from the administrative sphere.

2.2 | Topologies—network and place

In a relational understanding, space is nothing that exists independently from actors and relationships. Rather, space is regarded as a product and a condition of interaction (Massey, 2005:9). The relational view on space resonates well with Jessop et al. (2008) conception of networked spaces, in which nodes create a spatial pattern of potential relations, some of which are actualized by ties while others remain latent. Space, in a relational sense, is represented by the empty areas between these nodes. It only exists because of the relationships (or their absence). Central categories to analyse relational spaces are the dualistic terms proximity and distance that denote a gradual measure to assess the degree of difference encapsulated in

a relation. At the same time, networked spaces are multiplex phenomena, in which different layers of qualities co-exist. Relationships encompass various overlapping—and mutually influencing—dimensions of similarity and dissimilarity. Boschma (2005) distinguishes five proximity dimensions (physical, organizational, cognitive, social and institutional proximity). From this perspective, different forms of proximity and distance may substitute, complement or reinforce each other (Brinks & Ibert, 2020b; Ibert & Müller, 2015). In crisis management, similar ideas have been used to analyze the probability to learn from solutions found to solve one crisis in another context. Nohrstedt and Weible (2010) argue that "political proximity," in the sense of the degree of similarity in the institutional set-up of different spatial entities hit by crisis, can explain why sometimes solutions can be transferred from one context into the other and sometimes not.

In the network dimension, the space between the nodes remains rather empty. Its quality is a relational effect in the sense that it depends on the qualities ascribed to the nodes and the effects that result from inter-relations between nodes. In the literature on communities of practice (Wenger, 1998) and epistemic communities (Haas, 1992), however, the relational properties are enriched with additional information related to what Jessop et al. (2008) denote as "place." Communities can be defined as collectives of people sharing the same practice. Hence, like networks, communities have rich relational qualities, denoting for instance the relationship between core members and peripheral ones, experienced masters and apprentices and the like. At the same time, the respective practices are situated in a particular local setting in which the community members find artefacts and tools that enable them to perform their practice (Wenger, 1998). Hence, practices enact a complex geography resembling an archipelago of places that are related to the respective practice.

The emerging relational spaces can be summarized under the heading "topology" in the sense widely used in Science and Technology Studies (Mol & Law, 1994). Topological thinking puts emphasis on those elements that constitute categories such as near and far (Murdoch, 1998). In other words, what used to be nodes in networked space, is here additionally qualified as a place with particular qualities and specific properties. Due to the inseparability of practice and local context, these nodes anchor relations in the physical space. Moreover, the specifics of places arise from their diverse

relations to other places. Hence, as Rose and Wylie (2006:475) point out, "topology conceives space and spatial relations primarily in terms of connective properties rather than distance and position."

Topological thinking suggests to investigate crises by simultaneously conceiving them as multi-local, yet networked phenomena. Each crisis generates its own topology. Some places, such as command and control centres, are designed with a clear purpose to fulfil predefined functions in crisis management. Other places might emerge surprisingly (Wombacher et al., 2018).

3 | RESEARCH DESIGN

The paper builds upon the 2011 EHEC O104:H4 epidemic. The food-borne outbreak of a specific strain of *Escherichia coli* (*E. coli*) is assessed as the world's largest with regard to the number of patients developing a particularly dangerous HUS (haemolytic-uraemic syndrome) affecting the kidneys (BfR, 2011:9). Between May and July 2011 3.842 infections in Germany were reported to the Robert Koch Institute (RKI; the national institute responsible for disease prevention and surveillance) including 855 HUS patients. The epidemic caused 53 deaths in Germany (RKI, 2011). The large and initially increasing number of infections, accompanied by "unexpected epidemiological, microbiological and clinical features" (Kielstein, 2011:2723) created a sense of urgency at different levels and areas of responsibility. Particularly, the "infection vehicle" (BVL, 2011; German in original) and its way of distribution needed to be identified rapidly in order to prevent further spread of the epidemic.

Initially, we aimed at reconstructing the EHEC outbreak by analyzing documents published by public authorities, politically responsible for coping with the outbreak (see Appendix 1). From this material, we extracted references to territories (e.g. municipalities, counties, federal and national states, macro-regions like the EU), scales (from local to supranational), networks (nodes connected by relationships) and places (functional places and involved localities). Oftentimes these references were only implicit in the reports. Some spatial references could only be unveiled via triangulation between different sources, in other cases triangulation was used to verify information.

When immersing deeper into the case, we soon recognized the existence of other sorts of documents that emerged from the crisis experience, particularly academic papers from the medical and microbiological field which were published rapidly during or shortly after the outbreak. The presence of such a radically different type of documents strengthened our argument of overcoming the "omniscient narrator" perspective on crisis. However, while we do have a comprehensive overview about all official reports on the EHEC crisis, the sample of academic papers from the medical scene examined in this study only represent an unsystematic selection of the overall publication activity without any claim of completeness. We downloaded papers by medical professionals we knew about through our research and using search engines. We collected the date of submission (where applicable) and the date of publication and some further information on the author(s) (institution, profession) in a table and marked temporal and spatial indications made in these documents. To better grasp the crisis actions of the medical community, we also included public media reports such as hospital newsletters and press releases.

Though document analysis is an established approach in crisis research, we should be aware of some limitations of our study. First, we did not include potential further groups of actors whose crisis geography of the outbreak might once again differ. Certainly, there were further actors affected by the outbreak. For instance, Müller-Seitz and Macpherson (2014) identified "opposition parties and NGOs" as a further relevant group. Thus, we do not provide a complete picture of every potential crisis geography (which would be an impossible task though). Moreover, we were not interested in exploring the manifold subjective experiences made during crisis. To advance our argument, it was sufficient to identify relevant groups who have a shared crisis experience and to concentrate on the systematic differences in the ways these groups socially construct the crisis. Second, documents about crisis are always ex post re-constructions which provide valuable data but never allow to replicate a crisis as an immediate experience made by involved participants. Yet, the documents encompass manifold spatial references and revealed sufficient information on the different ways, different groups of participants view at the unfolding crisis.

4 | CRISIS GEOGRAPHIES OF THE EHEC OUTBREAK 2011

In this section, we analyze the unfolding of the EHEC crisis from the perspective of two overlapping coping structures that have been in charge to find a proper response to the escalating EHEC outbreak. The first group encompasses the official bodies responsible for health protection and disease control. This setting of actors is primarily concerned with preventing a further spread of the epidemic. Therefore, participants seek to identify the carriers of the pathogens and to understand the situations in which people got infected. This group encompasses employees from health and consumer protection authorities, politicians but also epidemiologists and researchers. These actors work in organizations at different scales, usually at the national, federal states (*Bundesländer*) or local level. The second group encompasses medical experts who are confronted in their daily practice with the fast-growing number of infected patients, some of whom in mortal agony. This group encounters the epidemic mostly in local hospitals. Moreover, these practitioners often activate contacts to other specialists who provide complementary knowledge, for example on therapeutic options. Even though individual differences within these groups in terms of crisis assessment certainly exist, we conceive these groups according to the community of practice approach (Wenger, 1998) as social settings of collective learning within which different subjects share the same professional practice and on this basis develop similar interpretations and similar ways of making sense of the crisis.

Of course, these two worlds are not separated from each other. For example, some of the involved institutions belong to both spheres (e.g. RKI is both, part of the public health system and an important player in medical sciences) and most of the actors share in common a professional background in medicine, microbiology, epidemiology or related fields.

4.1 | Public health and consumer protection authorities: Creating and crossing boundaries

For public health authorities, the beginning of the acute crisis can be dated to 19 May 2011. This was the day when the national RKI was summoned by health authorities in Hamburg due to an unusual accumulation of HUS infections (RKI, 2011:5). To uncover the fomites, the RKI reconstructed the course of events that led to the epidemic and reported about one known case of HUS-disease before the 23 May 2011 that "could not be recognized as exceptional due to the undetermined serotype at that time" (RKI, 2011:14).[1] By considering exposure time, it was estimated that most patients came in contact with the pathogen between 12 and 14 May 2011 (RKI, 2011:14). The reconstructed peak of disease onset was reached on 22 May, shortly after the RKI was activated (RKI, 2011:14). An analysis of food chains unveiled that seeds connected to the outbreak in Germany and France could be traced back to "lot # 48088" departed from the harbour of Damietta on 24 November 2009, passing places such as Antwerp and Rotterdam (EFSA, 2011: 11f.). After the initially unknown EHEC strain was identified, the investigation unveiled that the strain has been isolated for the first time in Germany already back in 2001 and was also documented in a patient in Korea in 2005 (EFSA, 2011:6).

Interestingly, even though infection rates decreased steadily from late May, the RKI upheld the crisis mode for some weeks. Eventually, on 26 July 2011, the RKI (2011) declared that the EHEC outbreak has already ended on 5 July 2011. Subsequently, the crisis has been reappraised and major efforts have been undertaken to collect data. Official reports analysing the EHEC outbreak from different angles have been published in the aftermath (see Appendix 1). Of course, ex post reconstruction represents a usual approach of drawing conclusions from extraordinary events (Boin et al., 2018), ideally in order to learn from them (e.g. Deverell & Stiglund, 2015). What is less often made explicit, however, is the observation that the enhanced desire for "sensemaking" (Weick, 1988) during crisis goes along with a frequent real-time, flexible readjustment of the timeframe of the whole crisis (e.g. to prepone the end of the crisis for three weeks).

4.1.1 | Nested hierarchies

For understanding coping mechanisms of the German "public health service",[2] the territorial dimension is a key spatial category. The RKI's scope of responsibility in terms of disease surveillance relates to the national territory of Germany. Local health authorities report data on notifiable diseases to the RKI regularly. This way, RKI specialists produced a spatial mapping of the EHEC-related HUS outbreak representing the spatial diffusion of the epidemic across Germany (see RKI, 2011:8). The national territory is sub-divided into sub-territories, the administrative districts. The spatially unequal dispersal of the disease translates into two categories of sub-territories: "areas more affected" and "areas less affected" (RKI, 2011:8).

Within the German multi-level administrative system, the states (*Bundesländer*) and municipalities have strong competencies with respect to disease control. Therefore, during the EHEC outbreak a general overview of the spatial diffusion could only be achieved with a coordinated effort of continuous, de-central reporting across different sectoral (e.g. health authorities and consumer protection authorities) and territorial units (e.g. regional health departments and RKI) to a central agency (see LAVES/NLGA, 2011:6). In order to facilitate inter-organizational and inter-territorial coordination, a national "task force" was established on 3 June 2011 aiming to identify the outbreak-triggering food.

Interestingly, the day the task force was launched, local authorities of Lower Saxony already imposed a production stop of suspicious sprouts at a specific vegetable farm (LAVES/NLGA, 2011:7). Subsequent investigations supported the hypothesis (though never finally proved) that contaminated sprout seeds most plausibly caused the epidemic (BVL, 2011; EFSA, 2011). The European Food Safety Authority (EFSA) participated in the German task force. However, only after an outbreak of the same EHEC strain was reported in France on 24 June that could not be traced back to a prior stay by one of the patients in Germany, an own European task force was established (BVL, 2011:16; EFSA, 2011). As long as the epidemic continued to escalate, the gathering and bundling of information were centralized at the (national and European) task force level. However, authorities to take action have not been upscaled but remained at the respective sub-national levels (for more details see Berthod et al., 2014).

4.1.2 | Topologies

In order to identify the infection vehicle, the detection of affected *places* became a distinct crisis management strategy of official agencies: Patients have been surveyed about their previously consumed foods. Of particular interest was the identification of places where more than one person infected with EHEC has eaten in the recent past (determined by the incubation time) in order to identify potential "exposure sites" (RKI, 2011:23). Thus, delivered foods at certain restaurants, canteens, hotels and highway restaurants came into the focus of food inspections. Departing from these exposure sites, places belonging to the food delivery chain appeared on the radar of crisis management. Eventually, a sprout producer ("establishment A"; EFSA, 2011:6) has been identified as a possible place of origin of the epidemic, as it turned out to be a joint node in delivery networks connecting several exposure

sites (LAVES/NLGA, 2011:7). This location then was intensively investigated in all its material compounds (e.g. a well on the farm site attracted attention by the inspectors and became suspected to have hosted the pathogen), personnel and germ load (LAVES/NLGA, 2011: 30ff.).

4.2 | Medical experts: Similarity and connections of places

At the time, the RKI was firstly informed about unusual accumulation of EHEC/HUS diseases, medical professionals in hospitals at several places in Germany have already been confronted with treatment of EHEC-associated HUS (Harendza, 2011:687; RKI, 2011). However, only after several patients with similar serious symptoms arrived at hospitals, an "unusual situation" (Harendza, 2011:687) has been recognized. Even after the number of newly infected patients has declined, the exceptional situation for hospitals remained due to hospitalization time of partly several weeks (Loos et al., 2012:754f).

Publications of academic articles reflecting the experiences made during the epidemic already started directly after (partly even during) the crisis, targeting professional communities of, for instance, nephrologists. Moreover, in the light of the urgency, the *New England Journal of Medicine* decided to publish an academic paper indicating successful treatment of EHEC-associated HUS with a specific pharmaceutical earlier (on 25 May) than initially planned. Shortly after publication, the report was sent to nephrologists in Germany (press release University Hospital Heidelberg, 2011; Auschra et al., 2014:116). This gave them the opportunity to prescribe the respective medical compound as an off-label use to patients for whom all existing officially registered therapeutical options did not work (press release DGfN 10 May 2011). Furthermore, a central on-line HUS registry was launched on 27 May 2011, the english version followed on 1 June (Kielstein et al., 2011:2,724) collecting data received from 84 hospitals across Germany, the Netherlands and Sweden (Kielstein et al., 2012:3808f.). The registry was established with the intention to collect as much valuable data as possible to be analyzed and published in the aftermath of the outbreak (Berthod et al., 2014:403). Thus, post-crisis time was already anticipated in some actions during the outbreak.

4.2.1 | Nested hierarchies

On the side of medical experts, the role of territoriality was noticeably different. First and foremost, medical experts were confronted with the EHEC epidemic at their respective hospitals. However, some were confronted with none or only a few infections while only very few have been heavily affected. Hence, at a local level, there is an uneven geography of more and less affected hospitals. Within the most affected areas, formalized coping structures have been implemented at the local level. The University Hospital Hamburg-Eppendorf, for instance, one of the local hubs of EHEC infections,

established a crisis unit meeting 25 times during the outbreak (UKE, 2011:11). National or supranational bodies did not intervene directly. According to Berthod et al. (2014:401), the formal barriers regulating the exchange of staff among hospitals located in different territories were put aside in favour for a more flexible allocation of medical staff.

4.2.2 | Topologies

Even though the urgent crisis management took place in a fragmented manner at the local level within the most affected areas, these locally situated actors were not isolated in their struggle. Rather, they activated professional contacts to other experts in order to mobilize support and additional expertize. The rapid distribution of an academic paper on successful medical treatment of HUS within an international community of medical professionals demonstrates the trans-local character of crisis management.

These examples illustrate the underlying topological spaces, connecting places of professional medical practice across larger physical distances. Territorial boundaries and scalar hierarchies play a subordinate role in these practices. In the case of the international registry or staff exchange, territorial boundaries were crossed in order to centralize information and reallocate scarce resources to those places where they were most urgently needed. While the HUS registry represents a significant centralization of information, it does not resemble an upscaling in the sense of shifting authorities from subordinate to superordinate levels. Rather, The German Society of Nephrology (DGfN), who launched the registry, positioned itself as a central node in a multi-local network and became a junction for information and recommendation. In the case of the off-label treatment, the extraordinary conditions of the crisis opened up possibilities to cure patients that otherwise would have been condemned to die. At the same time, it creates an opportunity for medical experts to collect experiences with an experimental therapy under challenging conditions.

Similar and inter-related places form the nodes in a network of practice (Brown & Duguid, 2001). The respective hospitals were located in different municipalities, yet the involved medical professionals were confronted with the same severe courses of EHEC/HUS infections. These places share similar characteristics. They are equipped with similar instruments and tools, are subjected to similar rules and guidelines and are utilized by medical staff belonging to the same professional communities (nurses, doctors, etc.). Another illustrative example of crisis topologies refers to laboratories. When the epidemic started, the specific EHEC strain was unknown. It was identified as shiga-toxin-producing *E. coli* O104:H4 on 25 May in two laboratories in Germany. A reference strain has been sent to other (similar) laboratories such as the WHO laboratory for *E. coli* in Copenhagen (RKI, 2011:26). Laboratories were of particular importance since the detection of a pathogen requires highly specialized equipment. Thus, the conclusion "that it is very likely that the respective patients belong to one epidemiological event" (RKI,

2011:25) could only be derived due to the existence of few very specifically equipped places.

5 | DISCUSSION AND CONCLUSION

We set out to de-homogenize the notion of crisis. For this purpose, we analyzed the unfolding of the EHEC outbreak in 2011 with a particular focus on the measures undertaken to respond to the crisis. Instead of accepting the view of an "omniscient narrator" who looks at the course of crisis from nowhere, we suggest a spatial approach that focuses on involved participants and highlights the position of the respective actors who experience urgency, threat and uncertainty. We compared the perspectives on the EHEC outbreak in Germany in 2011 of two groups, state authorities responsible for public health and medical experts confronted with patients infected with a widely unknown and aggressive disease.

Of course, our findings are only based on one example, the EHEC O104:H4 outbreak and our analysis is restricted to the German context only. While our findings are transferrable to other epidemics (we found similar tendencies in the current corona crisis; Brinks & Ibert, 2020a), it is less clear if they also apply to crises driven by other types of events. Our findings might reflect particularities of the German institutional framework that can be shortly characterized as being strongly federal and delegates much political agency to the local level. Most probably, empirical findings from other states would differ in many details. Yet our main result that state actors attribute great value to "territories" and "scales" would also hold true in a centralistic state in which power is strongly concentrated at the national level. Furthermore, we were unable to consider alternative geographies enacted by other involved groups, like for instance, NGOs (Müller-Seitz & Macpherson, 2014). However, we think that our analysis encompasses sufficiently different perceptions to substantiate our main argument of a de-homogenized, spatially situated and thus diverse experience of crisis.

In our analysis, we explored two spatial configurations that seem to be of particular relevance in crisis: territories embedded in a *nested hierarchy* and *topologies* of interconnected places. They represent analytical perspectives on crisis, not empirical observations. In principle, they can be applied to both groups of crisis respondents. As our analysis shows, both patterns mattered for both groups of actors, though with different prominence and in different ways.

From the viewpoint of public healthcare institutions, the spatially uneven distribution of affected areas poses significant challenges. As part of the state authorities, this group has to think and act strongly in terms of territorial borders and along sectoral boundaries. From their point of view, the crisis tends to be "transboundary" (Boin & Rhinard, 2008), or more to the point, the escalating events cause uncertainty and create a sense of urgency precisely because they reach beyond territorial borders and transgress the boundaries of sectoral silos. Moreover, public health authorities tend to highlight the threatening aspects of crisis. In their crisis response, health authorities reacted through rescaling. This can be done by upscaling, that is delegating responsibility upwardly to create larger sub-territories that cover wider parts of the escalating events (e.g. declaring a national emergency). Or it can be done by downscaling, that is delegating responsibility to the local level in order to benefit from more profound knowledge and to allow for different actions adapted to specific local contexts.

From the perspective of medical experts, in contrast, the crisis created (or "activated") a trans-local network of medical professionals. Medical experts experience crisis in their daily, locally situated practice. In the respective hospitals, they are immersed in threatening situations of enhanced uncertainty (unknown pathogen) and urgency (aggressive and live-threatening course of disease). In response to these local stresses, medical experts seek for help in their professional communities. By asking leading colleagues for advice, they activate key sites of the crisis outside their immediate local context. Such trans-local collaboration has been described as spatially widely stretched "networks of practice" (Brown & Duguid, 2001). In comparison with the public health authorities, the professional community of medical experts seems to have much stronger routines to deal with emergency and a more pronounced sense for the opportunities (e.g. to collect valuable data for future research, to experiment with new pharmaceuticals) inherent in crisis.

It becomes obvious that the respective practices are strongly linked to spatial constructs: public authorities strive to spatially demarcate a crisis in order to regain control and coordinate action, while expert communities do the opposite. They expand the spatial scope of the crisis by tapping into multi-local settings of related practices. Against this background, we argue, this particular positionality of actors should be made explicit in the social scientific research on crisis. The predominant gesture of analyzing crises from an omniscient narrator's perspective creates an impression that it is possible to look at the course of events from nowhere. We in contrast claim that crisis is always experienced by involved participants who are located somewhere. Crisis perceptions differ depending on the position of participants, and a spatial perspective is particularly helpful to foreground this context dependency and positionality of crisis-related knowledge.

The TPSN framework serves as a fruitful starting point for analyzing the spatial unfolding of crisis from the perspective of the involved participants and provides much potential for developing a systematic spatial perspective on crises. In follow-up research, we were able to also apply TPSN to the current corona crisis and observed similar spatial "enactments" (Weick, 1988) and an even more plural diversity of involvement and perspectives of experiencing crisis: The emergence of topologies of interconnected places (such as supermarkets pioneering safety measures and thereby transforming into nodal points of critical infrastructures), expert communities generating and circulating knowledge on SARS-CoV-2 and COVID-19 in trans-national networks, public authorities negotiating the appropriate scale of crisis coordination and reinforcing territorial boundaries (e.g. border closing as a response strategy) (for more details see Brinks & Ibert, 2020a).

Our findings suggest that the transboundary character of crisis (Boin & Rhinard, 2008) is perhaps not such a universal feature of recent crisis dynamics as often proclaimed. Instead, it seems strongly rooted in the particular perception of state actors, who are bound to territories, integrated in nested hierarchies and used to think along the boundaries of sectoral resorts. For state actors, the transboundary character of crisis is perceived as a serious problem. It suggests that future crises will be more difficult to handle because they are transboundary. However, the prominent sense for boundary transgression and respective alarmistic connotations are almost absent in medical expert's account of crisis who seem to have more robust routines to deal with emergencies and also more flexible practices to collaborate across territorial borders. By referring to early responses to the Corona outbreak in the Netherlands, Moorkamp et al. (2020) go one step further. They see the ability to embrace multiple and divergent crisis perceptions that prevail in transboundary crises as a key approach to increase organizational and societal adaptability. According to them, in the face of a still escalating situation, it can be advantageous to continuously adapt strategic priorities to newly emerging situations or to establish multi-functional units that seek to integrate diverse perceptions of the same crisis.

The spatial perspective on crisis also has some practical implications. A key insight of our study has been that not only perceptions, but also the repertoires to respond to crisis differ between groups of participants. These differences are rooted in the respective practices but can also be described with respect to the spatial reach and regime. Public crisis management, for instance, is deeply bound to territorial boundaries. For public state actors, it is therefore much easier to reinforce border regimes than to cooperate with other state constituencies across borders. Within a national state territory upscaling might be a viable option, but at the international level, the institutional basis for upscaling might be absent. At the same time, response strategies that are adapted to different regional conditions are difficult to pursue for state authorities who tend to create uniform rules for all parts of the territory. The response to crisis, in other words, does not only depend on the geographical distribution of crucial events, but first and foremost reflects the spatial limitations and possibilities of the organizations and actors who experience crisis. It is thus not the nature of the crisis that determines the strategy, but rather the available strategies that determine crisis perception.

ACKNOWLEDGEMENTS

DATA AVAILABILITY STATEMENT

The findings are based on published documents as data sources which have been cited. Data sharing is not applicable for this article.

ENDNOTES

[1] Literal quotes stem from the English version of the report by the RKI while further references to the RKI relate to the German version which was used for analysis.

[2] The public health service (Öffentlicher Gesundheitsdienst) includes all local, regional and federal organisations and institutes concerned with issues of public health (e.g. health departments, health ministries, scientific government institutes for public health).

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APPENDIX 1

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