How is Expert Knowledge Diffused in International Politics and What Makes It Actionable? Epistemic Infrastructure: a new Framework for Analysis[1]

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Abstract: *The central focus of this article has been expert knowledge diffusion in international politics, particularly questions such as "how does expert knowledge move from its origin position to international politics and begin to influence it?", "what decides that specific expert knowledge will diffuse within international politics and be actionable, and another expert knowledge will not?", and "how do we research expert knowledge diffusion in international politics?". Here an interdisciplinary study is presented and suggests an innovative approach to how to study expert knowledge diffusion in international politics: 1. The concept of epistemic infrastructure, where epistemic infrastructure is understood as the spatio-temporal hybrid entity with the agency which makes expert knowledge diffusion in international politics possible and which essentially structures this environment; and 2. Epistemic infrastructure as the framework for analysis, which offers a way to research the connections between science, technology, politics and society in the processes of expert knowledge diffusion in international politics.*

Keywords: ***expert knowledge, diffusion, epistemic infrastructure, international politics***

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Introduction

When in the 1960s scientists discovered micro plastics (plastic parts smaller than 0.5 mm) in the oceans and their negative impact on living organisms, they discussed the issue in laboratories. Ten years later the issue was already being discussed in academic journals and at academic conferences (Ryan 2015). During the last decade micro plastics have emerged as an issue in general journals such as National Geographic and in international environmental campaigns. After all, the issue has penetrated domestic and international political debate, which has resulted in the setting up of standards for the use of micro plastics. In 2015, for example, the EU accepted the first directive to reduce the use of micro plastics in cosmetics, arguing the deleterious effects of micro plastics based on scientific evidence (The European Commission 2019). This case shows that the results of the research discussed in a few laboratories in the 1960s spread within a few decades into the heads of the people and into the agendas of various agents globally. The story of the diffusion of expert knowledge ('EK') on micro plastics proves that EK has diffused not only from laboratory to laboratory and from university to university, but it has also spread into our daily lives, including domestic and international politics.

Observers (e.g. Nowotny et al. 2003; Ravetz 2012, 2016; Rogers 1983/2001) argue that we live in a knowledge society based on a knowledge economy, both associated with the diffusion and use of EK and innovations. In such a world the policymakers have been increasingly reliant on experts to plan and implement policies and find solutions to social and other problems. Politics (and thus policy) has turned out to be a knowledge-based activity. Governments and international organizations have established scientific advisory positions and have declared the use of science and expert knowledge to make politics (Gluckman 2014; Joint Research Center n.d.). Scholars (e.g. Adler – Poulio 2011; Antoniades 2015; Evers 2000; Haas 1992; Lazega 1992; Sending 2015) have demonstrated that EK is the key to carrying through and defending changes, the source and the instrument of power, the way to reach effectiveness and to win authority, profit or control over the dominant role in the game, and the basis for so-called informed decision.

The rise in importance of EK and its diffusion in international politics has correlated with the growth of a number of issues which we are not able to solve on a national level and without access to specialized and scientifically confirmed findings. The contemporary CVOID-crisis confirmed this argument. The production and diffusion of EK have become the international strategic processes and the key determinant of innovation. Furthermore, the potential for EK diffusion in the international environment is immense: states and companies fear that without EK they will lose their competitiveness, the diffusion of EK is supported by various development programs (e.g. by the World Bank /1998/1999) and

there are less bloc mechanisms to EK diffusion in the international environment than in internally organized ecologies.

That EK has been diffusing into and in international politics and that the diffusion of EK is a process with exceptional power and economic and social potential and effects is a fact. But it has to be said that in other respects we do not know much about the processes. The goal of the present article is to open the debate on "how expert knowledge gets from the place of its production into international politics, how EK became globally actionable, how the international political environment is settled by EK? In other word, what does matter in EK diffusion?". To find answers is especially complicated, because "the contemporary international" may be characterized as the social environment of multi-layered interactions between transnational, national and local where states have a relatively marginal position (Sending 2015) and where there are, in Burton's (1992) words, a lot of structural holes.

Previous research into EK diffusion in international politics (e.g. Sending 2015; Waisová 2018) is mainly organized as in-depth theoretically informed analyses following the socio-genesis of the particular EK and its diffusion, respectively the activities of particular agents or the impact of the structure. However, such an approach is able to give us only partial answers to the questions above. Here I aim to develop an innovative approach how to grasp and study EK diffusion in international politics and what does matter in this process.

I proceed in two steps: Firstly, I do an interdisciplinary state-of-the-art review to discover what different scholars and disciplines understand as important factors and processes in EK diffusion and I debate the relevance of this knowledge for international relations. I decided for a multidisciplinary approach because EK diffusion is an issue analyzed only in a limited and specific way in International Relations and in Political Science (Gilardi 2012; Newmark 2002), and the multidisciplinary revision of diffusionist literature much better highlights a wealth of opportunities for further conceptualization and empirical investigation of the problem in International Relations. I have included findings from the sociology of science, science and technology studies, knowledge management, anthropology, and economic geography to name a few. These disciplines have been paying attention to EK diffusion for decades and the issue is already well embedded in their research traditions (see e.g. Amin – Cohendet 2004; Christakic – Fowler 2007; Grannovetter 1973; Knorr Cetina 2007; Lazega 1992; Liu – King – Baerman 2010; Rogers 1983/2001; Saxenian 2006; Steiner-Khamsi 2012; Strang 1991). Lastly, I used the knowledge from the debate on COVID and the spread of the disease.

Secondly, based on the lessons learned from the interdisciplinary state-of--the-art review I suggest an innovative approach – I called epistemic infrastructure – how to study EK diffusion in international politics. In the conceptual terms I see EPIN as a hybrid entity (or assemblage) which must be understood within the context of the relationships between structure and agency, and which

in essence is based on relationality, practices, materiality, spatiality and temporality. All this in mutual interaction give EPIN the capabilities to diffuse EK; in other words, it gives agency to EPIN. EPIN could be also applied as a framework for analysis, the way offering instruments and steps to grasp and scrutinize the process of EK diffusion. In the final part the potential, as well as weaknesses of EPIN as a concept and framework for analyses are discussed.

The starting point of the research

The revision of diffusionist literature indicates that there are several very different positions to EK diffusion: technocratic-rationalist (see Irwin – Michael 2003; Marsh – Sharman 2009), constructivist (see Gergen – Gergen 2004) and practice-oriented (e.g. Amin – Cohendet 2004; Knorr Cetina 2007; in International Relations e.g. Adler – Pouliot 2011; Bueger – Gadinger 2018; Sending 2015). Present research is inspired by the practice-centered approach. Expert knowledge is understood as an in-depth knowledge of the substance of a specific area or subject, which includes facts, information, professional codes and skills gained through specific training and education, socialization, practice, and research (not necessarily done in the laboratory) and through a theoretical and practical understanding of the subject (Eller 2017). I believe that EK diffusion and knowledgeable practices are not isolated activities; they rather result from social structures, embedded practices, technical processes, absorptive capacities of recipients, and from the institutions and forms in which they take place, develop and are maintained. Knowledge is a spatio-temporal phenomenon situated in practice, which is diffused by interactions. *Ipso facto*, I try to develop an approach which is able to include the tracing of processes, practices, relations and material forms. The main unit of analysis is nothing more than the everyday practice of expert knowledge diffusion and the process of diffusion itself. My emphasis in this article talks about knowledge as a practice and process, rather than a possession; however, it is clear that in the real world it is not possible to delineate a clear border between knowledge that is "possessed" and knowledge that is "practiced" (Cook – Brown 1999).

Diffusion is understood as a multidimensional process consisting of global, international, transnational, domestic and inter-organizational interactions which occur among many different entities. Diffusion is neither automatic nor spontaneous and is also not only a technical process based on a chain of events; it is rather a process which takes place in a network of social relations, in an environment of stable practices, institutions and pedagogical forms. Practiced knowledge is distributed because, instead of being possessed in the heads of individuals, it is collectively enacted through relations between them, and mediated by the intersubjective meanings that are invested in the artefacts they produce (Amin – Cohendet 2004: xiv).

Expert knowledge diffusion: toward a multidisciplinary conversation

The goal of this part is not, and it can never be, to widely map and review diffusionist literature, the goal is to open the door to other disciplines and find out how EK diffusion was grasped to take inspiration for international political research which is still in its infancy (for research challenges of EK diffusion in International Relations see Gilardi 2012). The question was how a multidisciplinary state-of-the-art review should be organized. Step-by-step it became clear that despite many disciplinary differences it is possible to find five uniting issues across the research: 1) research of the actors of diffusion, 2) research of the structures and environment in which diffusion takes place, 3) an analysis of the instruments and mechanisms of diffusion, 4) practice-oriented research, and 5) the debate on methodology and methods for the research of diffusion. The methodological debate is important but rather beyond the interest of this article and that is why I will not pay extensively attention to the issue. Based on this, the following review will be organized; each subchapter will always shortly introduce the issue generally and then the ideas relevant for the analysis of EK diffusion in international politics will be discussed.

The actors of diffusion

A common feature of research accounts in this area is the presence of powerful actors whose agency drives the flow of expert knowledge from one place to another. It deals with people and groups who spread knowledge through interaction. This status is dependent on their ability to act at a distance by enrolling and mobilizing other actors into a stable network on the basis of their representation (Callon 1986; Law 1987). Actor-oriented scholars pay attention to questions such as "who are the actors?", "what are their motivations?", "is their internal characteristic important for the process of diffusion?" to name a few.

In the IR research of EK diffusion, actors were the main topic for a long time (e.g. Haas 1975 or Ruggie 1975). However, new literature is more essential since it is more sensitive to the differences between actors. Contemporary research differs between epistemic communities (Antoniades 2015; Haas 1992); advocacy coalitions and transnational advocacy networks (Weible et al 2011; Keck – Sikkink 1998); discursive coalitions (Hajer 1993); instrument constituencies (Voss and Simons 2014); and knowledge networks (Khaler 2009; Stone 2010, 2013) to name a few. Some scholars also include knowledgeable individuals. For example, Coe and Bunnel (2003) or Saxenian (1999, 2006) associate EK diffusion with the travelling of knowledgeable individuals through work and circulation in companies and business sectors. However, in IR the role of individuals has been rather ignored.

Older diffusionist literature on actors usually did not take the impact of structures and of the environment on actors into consideration and supposed that actors and their interests and qualities are prior to the process of diffusion. Newer research, however, rather in other disciplines then in IR, is much more sensitive to actors, their ecology and their existence in structures. It points out that exogenous factors and structures may impact actors and their position in the process of diffusion, and that some actors (e.g. knowledgeable networks) may have agency and may be the organizational structure at the same time (Stone 2010, 2013; Khaler 2009). This way of thinking has been inspired mainly by Actor-Network Theory, which also credits agency to non-humans (so-called *actants*) (Latour 2005), and by practice-oriented debates which credit agency to the relationality. In spite of this shift, the turn to the structure is circumspect and the thinking on the agency of the structure and of relationality is even more discreet. Scholars who set out this way (e.g. Stone 2010, 2013) understand structures with agency as intentionally emerging and working coordinated and coordinating systems whose parts share the same motivations and are aware of their own existence.

Based on all of the above and with the goal of researching EK diffusion in international politics it can be concluded that: actors matter; attention shall be paid also to individuals; actors may have very diverse characters; even non-human entities may have agency; the agent-structure problem remains, however, not as the dilemma of "who is prior" but in the question of whether "the structure may have agency" and whether "the actor may also be the structure". What is not clear and shall be thought about is the question of whether unintentionally emerging and working systems may have agency.

The research of structures and of environment

A second strand of diffusionist literature believes that the main driving force behind the diffusion process is the character and organization of the structure and relationality. In other words, the existence of connections and the relationality are prior to actors and their character, and that the diffusion process is codetermined by structures. These scholars believe that the diffusion process is not automatic and accidental, and that it is also not *only* a chain of events; it is rather a cascade process influenced by many factors, such as the quality of governance, demographics, or the absorptive capacity of the audience (Ernst – Kim 2001; Hall 1989; Hveem – Knutsen 2012). The possibility to gain EK depends rather than on the attributes of the actors, on the relations between them, their positions in the social network, on the character of the environment, on the channels of communication, and on the points of contact (Granovetter 1973).

In International Relations the research of structures and of relationality has for a long time been handicapped by the idea that there is a gap between the

worlds of politics and science, stemming from the fact that both environments have different structures and logics of rationality (Caplan 1979). This is why the transfer of EK between science and politics is complicated, even impossible (e.g. Jasanoff 2004; Wittrock – Wagner – Wollman 1991). However, contemporary observers say that science, politics and society have undergone profound changes in recent decades, when the borders between the theoretical and empirical components of knowing were weakened and EK is being produced by many actors, not only by scientists in laboratories (Evers 2000; Nowotny et al. 2003; Ravetz 2012, 2016). Policymakers have started to talk about so-called evidence-based policy, highlighting the role of science and EK in politics and the involvement of scientists in policymaking (Oliver, Lorenc – Innvaer 2014). Contemporary literature does not think about science and policy as two different communities anymore; it rather pays attention to research into exogenous factors, to the character and organization of the structure, and to the mutual relationship between science and politics.

The emphasis on the significance of structures and relationality when analyzing the diffusion process emerged in Actor-Network Theory ('ANT') and in Social-Network Analysis ('SNA'). Later, the idea expanded into other disciplines and approaches, such as into the assemblage approach (see below).

According to ANT nothing in the social and natural world exists separately, rather everything is constantly being generated and transformed by the mutual relations between actors of the network. All-important innovations and human enterprise are the function of the interactions of mutually constituting heterogeneous elements assimilated into networks (Law 1987). Networks emerge during the process of the active participation of actors and they then determine the actors' roles and functions. Actors fill networks with sense and enable them to exist and survive (Latour 2005). According to Latour (2005: 107), although we do not know how actors are connected, the connections are assumed, and we also assume that these connections transform the actors' world. Agency, knowledge and institutions are the subjects of networks, the objects of negotiations, and the products of network building. ANT "traces links and networks... and actors who do something" and traces how they assemble to reach their goal (Latour 2005: 98, 128). These activities are not understood as the product of any independent selection or decision, but rather as the product of influences of relations, linkages and networks. According to ANT, the tracing of relational linkages enables an understanding of how actors and actants enable and mediate organized activities. The practice is understood as the conglomerate of agencies, and that is also why it has to be observed and mapped as a network where circulation and activities happen.

SNA has been evaluated (Borgatti et al 2009; Műtzel 2009) as an inter-disciplinary research program aiming to analyze and predict the structure of relations between social entities and the impact of this structure on other social

phenomena. It believes in the importance of relations between mutually influencing entities and its axiom is that structure matters. In other words, relational linkages between actors in the social structure are prior to actors' attributes, such as individual characteristic or quality (Wasserman – Faust 1994). However, the connections – as opposed to attributive data – are not the individual quality of particular agents, but the quality of the conglomerate of agents who produce the social network (Wasserman – Faust 1994). The elements that both approaches share – i.e. in the sense of the product of mutual connections, the actors' role is determined by the network, the activity is prior to the actors – and in "network vocabulary" – connections are prior to nodes, are present in all analyses of EK diffusion which prefer the importance of structures and of relationality (see Eyal 2013; Grannovetter 1973 or Liu – King – Baerman 2010).

At the end of this part I would like to mention a concept which could potentially enrich research of EK diffusion – the concept of *linked ecologies* of the American sociologist Abbott. Abbott's goal (2005) was to overcome the division between individualism and systemism and to offer a solution to the two-communities problem (science vs. politics). Abbott works from the idea that the world is composed of many different simultaneously existing ecologies and from a complex set of social relations and interactions between multiple elements that are neither fully constrained nor fully independent and which emerge and assemble around a particular issue area. Actors living in these ecologies are looking for connections, allies, resources and support across ecologies; this then produces a so-called "linkage between ecologies" (Abbott 2005: 247). The concept of ecology involves three components: actors, locations, and relations associating one with the other... the location of an ecology is not a preexisting position... it is the process of the construction of the relations between actors and locations that in fact constitutes and delimits both actors and locations. Analytically and empirically, the relational process is prior. Abbott calls the process of emerging relations across ecologies "ligation". "Ligation constitutes at one and the same time an actor, a location, and relations between them" (Abbott 2005: 248). When using Abbott's perspective to frame and analyze EK diffusion, the diffusion process would be the result of linkages between ecologies of scholars, experts, policy makers and bureaucrats (see Stone 2013).

When thinking about structures and environment, there are some uncertainties in diffusionist research and there also exists a difference between diffusionist research in IR compared to other disciplines; other disciplines usually research the diffusion process in organized and/or centralized systems such as domestic politics, companies and organizations; contemporary international politics is, in contrast, a hybrid non-centralized multi-scalar and multi-layered environment of interactions between state and non-state actors without any global principle of organization. This means that any analysis of EK diffusion in international politics has to be able to research the complex adaptive systems

that are neither perfectly ordered nor anarchic, non-hierarchic, non-centralistic (but not polycentric) and that are multi-scalar and multi-layered. In other words, "non-structures" of rhizomatic rather than of network character.

Rhizome differs from an arborescent network system with a ramified structure growing genealogically; rhizome is used to describe non-hierarchic and non-centralistic ordering, distribution and communication of facts, ideas and information. Serial and multiple models of the rhizome enable the linking of any components and lines of structures because it is not formed from divided static points or units but from mobile series of lines (Deleuze – Guattari 1980). The model of the rhizome is the reflexive category of fusion between scientific and policymaking thinking and as such it could be well used for the analysis of EK diffusion in international politics.

Based on all of the above and with the goal of researching EK diffusion in international politics it can be concluded that: structure and relationality matter, the entity can be structure and linkage as well as actor at one time and in one structure and relationality may have an agency; the agent-structure problem may be seen as the sum of interactions and practices which gives life and agency to the new entity (the conglomerate of practices and relations) and where the relations and links are prior to the actors' attributes. When analyzing structures and relations it is necessary to take into consideration the fact that the environment of international politics is rather unstructured with rhizomatic processes.

Instruments and mechanisms of diffusion

The third group within diffusionist research pays attention to the instruments and mechanisms of diffusion. As mentioned above, older literature believed that there is a gap between the world of science and the world of politics which has to be bridged. To build a bridge various "linkage techniques" should be used to transfer and utilize knowledge (Caplan 1979). This way of thinking lost its sense when it was clear that it is not possible to easily divide the world of politics and the world of science and that EK is co-produced or entirely produced in the political space (Eller 2017; Grundmann 2017). Contemporary research does not deal with science and politics as divided, it rather concentrates on particular instruments, approaches, mechanisms and strategies enabling diffusion and how new phenomena are accepted and implemented.

Diffusionist research in political science and IR paid attention mainly to the instruments and mechanisms of value, norms and policy diffusion (e.g. Checkel 2005; Gilardi 2012; Schimmelfening 2008). Scholars representing this group concentrate on states and international organizations, other actors including individuals are not taken seriously. Many studies of diffusion instruments and mechanisms are field and technically oriented, many were prepared for states and international organizations to improve their capabilities to diffuse

"something" (model of governance, technical information etc.) more effectively (World Bank 2011).

In the field of instruments and mechanisms, good inspiration for research is offered by the sociology of education, by organizational studies, and by economic geography. Of particular interest is research on the role of individuals and education in EK diffusion. When considering the role of individuals, their life journeys (education and jobs) and personal relationships will be of interest. As shown by Henry and Pinch (2000) or by Saxenian (1999, 2006) one of the main mechanisms to diffuse knowledge across the market is the regular movement of staff between firms (so-called brain circulation). When considering the role of education, Axelrode's (1976) reflection on "cognitive maps" introduce the issue well: he argues that education and professional training are the key formative forces of our vison of the world and assist or limit our ability to accept new ideas or norms. Other scholars (Steiner-Khamsi 2012) add that education significantly influences our preferences, behavior and values; however, not only inter-personally, but also during our life-long professional career. Education and remaining at a particular school help to form like-minded generational groups in which members often maintain relations through decades. Education has the potential to influence the development of a shared vision of social development and elites use education to consolidate its power (Steiner-Khamsi 2012). The most effective way to get a particular EK into politics is to set up education and employ scientists and experts with particular training and educational culture, i.e. with a particular vision of the world in government and bureaucracy. Furthermore, education is no longer a national project. Educational curricula, as well as schools, function globally even when some international organizations (e.g. the United Nations) establish their own universities.

Another view of education as the instrument of EK diffusion is offered by organizational studies. As noticed by Ernst and Kim (2001), powerful producers and entrepreneurs of knowledge on the international market are so-called flagship companies. They set up global production networks through which EK is transferred to local contractors. To better fulfil the flagship companies' demands including the acceptance of new EK, local contractors have to improve their capabilities and absorptive capacity. To make the process easier and faster, the flagships assist to nodes (local contractors) in the network. This approach could be productive when analyzing international politics. Some agents in IR play the role of flagship, other agents play the role of node in the network, and flagships distribute or assist to gain and absorb new knowledge to the nodes. The debate on flagships is based on the idea that diffusion is not a coincidental, spontaneous and automatic process, when – in words of the World Bank (1998/1999) "knowledge is like light"; knowledge diffusion is rather managed and, by a sum of incentives, a supported process.

Another innovative and enriching idea for the analysis of EK diffusion has been offered by knowledge management. Representatives of this new discipline (see e.g. Schwartz ed. 2005) share the idea that knowledge may be managed and is a way to control and master diffusion instruments and to improve the capabilities for EK diffusion to get EK to the right place at the right time. Management of knowledge would enable an increase in the effectiveness of activities and operations, a decrease in costs, and an increase in profits. However, knowledge management as a discipline and an approach to EK goes beyond the analysis of the instruments and mechanisms of diffusion; it considers the instruments and mechanisms more or less recast as practices.

Based on all of the above and with the goal of researching EK diffusion in international politics, it can be concluded that: EK is diffused through diverse flows of people, information, texts and commodities, i.e. human and non-human actants, and that materiality matters, diffusion needs at least weak and soft links; despite the fact that diffusion may be a coincidental, spontaneous and uncoordinated process it is more often a well-deliberated and strategically managed process stimulated by incentives using various techniques of communication and dissemination.

Practice-centered set of perspectives

The fourth group of diffusionist literature does not comprise a single coherent perspective; however, the linking moment is an interest in practices which are understood as doing in a historical and social context which gives meaning to what we do (Wenger 1998: 47). Practice-knowledge nexus emerged in sociology and in economic geography; however, it penetrated IR as well. Practice approaches focus on how groups perform their practical activities in world politics to renew and reproduce social order. Practice-oriented scholars speak about "knowing", rather than about "knowledge", which is itself understood as living through their agents (not necessarily human) and the practices they enact. Indeed, a practical order of meaning produces agency, that is the capacity to act and become an actor, and subject positions, that is the possible spectrum of available actions in the first place. Such an understanding can be understood as a "distributed" form of agency, since agency is not a property of individuals but the effect of practice and relationality (Bueger 2015; Latour 2005). Knowing is interpreted by practice-oriented scholars as the element of the production of new – often hybrid – entities which have the potential to structure politics (Allan 2018).

Practice-oriented studies in IR are so far rather rare; they have been interested in what practices and by whom EK is produced and diffused in international politics, which new entities and of which character have emerged in the process of EK diffusion and what effects they have on international politics

(Adler – Pouliot 2011; Bueger 2015; Sending 2015). Taking into consideration the spare diffusionist practice-oriented research in IR, it is better to look into the diffusionist practice-oriented research of other disciplines for inspiration.

The practice-oriented research outside IR produced several observations and concepts with the potential to enrich IR research; in particular the idea of communities of practice, of global microstructures, and of an assemblage approach. The concept of communities of practice has been mentioned before when talking about actors. Some scholars (e.g. the founding father of the approach, Wenger /1998/) consider communities of practice as not only actors who do something, but also – in new terms – an assemblage of entities. *An assemblage* is a new actor emerging in the process of connections and links, emerging and working based on the existence of particular practices. Wenger (1998) argues that knowledge diffusion is based on learning through the everyday practice of groups of employees within organizations, i.e. a community of practice is a setting for social-interactive learning. Communities of practice work as multiple, lateral, horizontal communications, collaborations, solidarities and support. They have three key dimensions – mutual engagement, joint enterprise and shared repertoire, which tend to take shape through routines and repeated interaction rather than actively designed or implemented in a top-down sense. Even if Wenger used the concept of community of practice to consider environments inside internally organized entities, the concept may be applied to international politics as well.

The inspiration for IR also produces the concept of global microstructures. "Global microstructure" is defined as a small group of specialized, highly professional and efficient individuals with a specific structure and culture, localized only in several places (unusually in one office), using and connected by modern communication tools and having global influence in a specific issue area at all levels. Global microstructure is "a form of connectivity and coordination that combines global reach with microstructural mechanisms that instantiate self-organizing principles and patterns". In other words, "global microstructures are structures of connectivity and integration that are global in scope but microsociological in character" (Knorr-Cetina 2003, 2005; Knorr Cetina – Bruegger 2002). They have four characteristics: 1) the mechanisms and institutional structures involved suggest a reversal of the historical trend toward formal rationalized structures and do not work based on formal authority, complex hierarchy, rationalized procedures or deep institutional structures; 2) despite not being a highly rationalized system they are effective based on the systematic and reflexive use of systems of amplification and augmentation; 3) they are not simply networks, but consist of channels and even self-reproducing mechanisms or practices, using mechanisms such as media that points away from relational connectivity, and tend to be flat rather than hierarchically organized systems while the same time being highly textured systems which in fact contradict the

assumptions of network structures (Knorr Cetina 2003); and 4) they exhibit temporal complexity. Even when, traditionally in statism, seized IR may ignore the existence and global influence of microstructures, a more detailed look at several issues in international politics such as development agenda or EK diffusion indicates that the idea of global microstructures could be highly relevant for IR scholars.

Different, but also interesting, is approach of several economic geographers to the problem of EK diffusion. These scholars (e.g. Amin – Cohendet 2004; Prince 2010, 2016) argue that we live in a world in which material "stuff" makes up places and such stuff is always in motion, being assembled and reassembled in changing configurations. Attention is paid to the organizational or trans--organizational settings and forms of relational proximity, materiality, scalarity and spatiality. Learning and innovation are the results of the practice and agency of relations between people. These scholars have – similarly to Knorr-Cetina – promoted microspace accounts of diffusion which they see as an interactive and socially embedded process and developed relational views of space produced through social practice. Representatives of this stream started to test new approaches to and concepts of research diffusion, e.g. the assemblage approach.

Thinking in assemblage terms seems to have great potential for EK diffusion research in IR. The assemblage approach is used to grasp dynamic, unstructured, non-centralized and non-hierarchic, in other words, rhizomatic entities (Deleuze – Guattari 2004) as well as being a way to analytically grasp new forms of interweaving between science, technology, society, people, politics, discourse and objects (Irwin – Michael 2003). Assemblage is used to describe a collection of heterogeneous and in fact autonomous elements (human beings, organizations, as well as material factors or even ideas) not necessarily localized, which at the same time work together and their joint existence has a specific effect and shows characteristics which the separately existing parts do not have (Acuto – Curtis 2014: 3). This approach emphasizes the historical coincidences of connections between parts of the assemblage, their discovery, mapping and power effects and pays attention to practices which are the essence of collectively organized assemblage. In sum an assemblage describes a new material, collective, and discursive relationships (Collier – Ong 2005). The next step when considering assemblages was done by Collier and Ong (2005), who introduced global assemblages, or assemblages with a global reach respectively. They argue (2005: 12) that "in relationship to 'the global', the assemblage is not a 'locality' to which broader forces are counterposed... An assemblage is the product of multiple determinations that are not reducible to a single logic". They are actual configurations through which global forms gain significance.

Based on all of the above and with the goal of researching EK diffusion in international politics, it can be concluded that: communication instruments which are able to overcome the spatiality and proximity problem matter, and

it is necessary to pay attention to how both material and immaterial entities are produced, mediated, and transformed through the practices of humans and other "dynamic hybrids", including non-humans (actants), and thus all need to be considered as mediators and outcomes of socio-cultural/material relationships. It should be also stressed that despite the fact that IR works traditionally with a macroperspective, microstructures matter as well. As a way to solve the problem and to be able to grasp the "contemporary international", an assemblage approach could be used; it opens the door to a rhizomatic way of thinking and is able to include individuals as well as macrolevels.

Epistemic infrastructure: a new Framework for Analysis

How is it possible that EK which came into existence in one place is going global among academics, NGOs, policymakers and bureaucrats at national and international level, and how is it possible that particular EK has been able to transform the agenda and structure of international politics? From the debate above it seems clear that agency and structure, relationality, practices and materiality play important roles in the process of EK diffusion. This means that the questions need to trace how actors, structures, relations and practices work together and interact in the process of EK diffusion. In other words, we need to trace the mutual interactions between heterogeneous material and societal practices. To grasp, analyze and explain the process I suggest using a so-called epistemic infrastructure. "Epistemic" in this case means "emerging, existing and developing around particular expert knowledge". The term "infrastructure" is more complicated.

Most people, when hearing about "infrastructure", probably imagine transport infrastructure such as a network of streets, highways, ports and airports. However, "infrastructure" is not only a network of material objects, it is also something which enables something to work – for example, to trade. Infrastructure may be seen as an assemblage of objects, actors and the regular relations between them, and of practices, all of which produces an ecology and the conditions for particular activities and the operation "of something else". In this specific case, I use the term "infrastructure" to suggest that EK should not be considered in the context of an anarchic, placeless "space flow", but rather in terms of situated social relations.

To better explain the argument, the metaphor of a playground may be used: to say that "something" is a playground, you have to have the projection of a playground (i.e. to know what it is), there has to be a space where swings and slides are located, and there have to be children *regularly playing* there. Those with children already know that there are better and worse playgrounds, playgrounds for babies, as well as teenagers; the differences are based on the equipment in the playground. In other words, the equipment in the playground

and the person who makes the decision pre-determine whether children will like the playground, which children will go there, and what they will do there. Some playgrounds are surrounded by a fence, some are not. The borders of a playground – despite a fence – may be flexible when children extend a game beyond the fence (e.g. playing hide-and-seek). The metaphor of a playground demonstrates that it is simply a configuration of several – even imagined – material objects and actors and the relations between them, and of practices carried out within a particular ecology, which produce the "infrastructure" and give it sense. An infrastructure is a relational issue going beyond one event and emerging rhizomatically from intentionally emerging entities in a particular time and space (Star – Ruhleder 1994).

EPIN is emerging as the linkage between ideas, their authors, those who would like to diffuse, use and promote EK and particular social systems where EK is diffused. An EPIN is an adaptable instrument and an ecology where the potential of social relations is mobilized and used to initiate and diffuse EK and change respectively. Similarly to the fact that the localization of a playground and its equipment pre-determine who and what games will be played in a particular space, EPIN and those and that which create and form it and the relational linkages within an EPIN influence who will receive EK and how the EK will be consumed and handled. In the world of science, which "is so large that personal acquaintance no longer dominates in professional relations... and where impact is the name of the game" (Ravetz 2016), EPIN enables and mobilizes epistemic power and participation, and creates a space in which physical distance does not play a significant role, and relations and connections are based on mental proximity. EPIN enables the communication, management, integration, sorting and control of EK flow across disciplines and social systems. EPIN emerge as an assemblage, either intentionally or spontaneously, but from intentionally established parts.

An epistemic infrastructure is, metaphorically, a playground without a fence; a dynamic, unstructured, non-centralized and non-hierarchical space. It is an assemblage of material and non-material objects (organizations, laboratories, norms, etc.), actors (including individuals), relational links between them cumulating around specific EK, and practices which emerge in this socio-material ecology, all giving sense to the EPIN. Specific expert knowledge configures and gives sense to a particular EPIN; however, without the EPIN the EK has a low potential to diffuse. EPIN makes EK actionable. A particular EPIN and particular expert knowledge are interdependent entities in the making. EPIN borders are not clearly predetermined, it develops and perishes organically, i.e. it exists as long as it is relevant.

An EPIN is, in a nutshell, a temporal global assemblage of temporal non--global assemblages emerging and existing across diverse and mutually distinct social environments connected by multi-layered rhizomatically evolving inter-

actions and material manifestations. In other words, EPIN is the complexity of socio-material relationality endowed by agency and working through its own existence and practices which evolve within it. To research EPIN means to trace the rhizomatic growth, temporality, scalarity, spatiality, relationality, structure and actors, including knowledgeable individuals, at microscopical level. EPIN research includes: who creates relational links and practices and what quality they have; how relations and practice work, how they are mediated and shared in time and space; who is part of the network, what role the actors have in the diffusionist process and what role they have in EPIN. The analysis also traces individuals, their circulation across important jobs in international politics, their personal linkages and connections between the institutions they represent, the materiality of EK diffusion, such as new documents, bodies, projects etc., and the implementation of new practices which contain and use specific EK. But how to research rhizomatic structures is already beyond this article (more see e.g. Baker – McGuirk 2017; Deleuze – Guattari 1987, Desmond 2014 or Latour 2005).

Conclusion: Why epistemic infrastructure and why does it matter?

The central focus of this article has been expert knowledge diffusion in international politics, particularly questions such as "how expert knowledge gets from the place of its production into international politics, how EK became globally actionable, how the international political environment is settled by EK, and what does matter in EK diffusion?". I believe that the key to learning about, analyzing and understanding EK diffusion in international politics is so-called epistemic infrastructure and uncovering its structure and inner workings. EPIN has been constructed here initially as a concept and later as a framework for analysis. However, it must be said that EPIN should be considered an entirely constructed analytical tool and that the concept of EPIN is analytic and metaphorical rather than ontological.

I have defined EPIN as a non-accidental, dynamic, rhizomatic, spatio-temporal unlimited hybrid entity emerging as an assemblage of artefacts, physical phenomena, actors, relations and practices cumulating around specific expert knowledge with the goal of using and promoting it. EPIN gives power and energy to EK and has the potential to structure reality, as well as the international political landscape. EK lives through EPIN and the practices, technical processes, institutions and pedagogical forms that take place within; however, at the same time EK configures the EPIN – without EK there would be no EPIN. Within the EPIN, within the process of EK diffusion and within its practices there are new emerging "objects" which afterwards structure, develop and maintain practices and the EK. An EPIN, its character and inner moving forces influence who receives EK and what is done with it. The concept of EPIN

enables the capture and understanding of the societal essence of EK diffusion and the fact that EK diffusion needs channels as well as an institutional, material and financial background. EPIN enables the explanation of why specific expert knowledge (and not other) becomes influential within a policy field. It also enables the bringing together of the micro- and macro-sociologial sides of the field, and to connect the research of the structure and actors, as well as of the diffusion process which contains "diffusion practices".

A general statement of the EPIN existence is not sufficient for the understanding of its emergence, inner character, workings and role within the process of EK diffusion in international politics. To make more general conclusions on EK diffusion in international politics, we need to trace, analyze and compare more of these processes and EPINs respectively. To do this, it is necessary to deal with the second research question: how do we research the process of EK diffusion in international politics?

EPIN needs not to be only a concept; it could be used as a framework for analysis. To use EPIN as a framework for analysis it needs to be able to reflect the rhizomatic and dynamic character of EK diffusion in international politics, the special characteristics of its ordering, and the internal diversity and dynamics of the processes and interactions which take place within the process of diffusion. We trace "the flow" of the specific EK through the international space and track the path to the place and time where the EK emerged. We trace actors including individuals and what they do with the EK and who and what has accumulated around it, who mediates the EK in time and space and how; we trace the material signs of the EK, such as documents or reports to name a few; we trace the relations and practices containing the particular EK and how they work; and we trace the emergence of an institutional background and channels of communication of the specific EK. When tracing the trajectory of EK diffusion, a pragmatic combination of instruments such as topology, Social Network Analysis and historical qualitative study has to be used.

The critical point to research EK diffusion and use EPIN as the framework for analysis, it is necessary to stress that to trace the tracks, actors and processes in a multi-scalar, unlimited, non-hierarchical and dynamic environment is difficult and the risk of losing the track is high; however, it is possible to minimize the risks of a "false track" by utilizing two strategies: the first strategy involves the step-by-step tracing of several paths, or of several rhizomes when concurrently including sufficiently long periods and sufficiently wide spaces; the second strategy involves the choice of two different events which clearly demonstrates the existence and actionability of the EK in international politics, both events being in different places and at different times, but both somehow connected and consequently emerging. The tracing of tracks and rhizomes will therefore proceed clearly – the researcher will observe the mutual creation and interdependence of both events and attempt to uncover their mutual connections, be

these actors, their relations, practices or any other phenomena. An additional important and helpful instrument when analyzing rhizomatic processes is topology and visualization (e.g. heuristic sketches or conceptual diagrams). This helps in keeping on the right path and also enables the discovery of unexpected connections.

To sum up, the diffusion of expert knowledge in international politics may be explained by epistemic infrastructure. EPIN is interpretative, reflexive, pragmatic and profoundly empirical. It is a concept and may be used as a framework for analysis. The systematic study of different EK based on EPIN as a framework for analysis would provide sufficient comparable empirical evidence necessary to evaluate, explain, understand and theorize EK diffusion in international politics.

Notes

1. While in the interstate environment the production and diffusion of EK is managed, regulated, evaluated and financed by government; there is no authority which would systematically and globally do the same in international politics.

2. Structural holes are places where links between nodes are missing or these links are so weak that the flow of information between actors from the different sides of the structural hole is impossible.

3. The author of the concept, K. Knorr Cetina (2003, 2005), analyzed several big investment banks and showed that a small group of financial market experts sitting in only a few offices is able to set up the rules for and influence the workings of a global financial market.

4. The term "epistemic infrastructure" has been used by several sociologists, but in a different way and limitedly (Knorr Cetina 2007; Evers 2000).

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