

THE
TRANSDISCIPLINARY
JOURNAL

GAIiA

1 | 2020

ECOLOGICAL PERSPECTIVES FOR SCIENCE AND SOCIETY

ÖKOLOGISCHE PERSPEKTIVEN FÜR WISSENSCHAFT UND GESELLSCHAFT



- VEREINTES ZIEL KLIMANEUTRALITÄT
- POWER IN TRANSDISCIPLINARY RESEARCH
- GEMEINWOHLORIENTIERTE WISSENSCHAFT

Tracing power in transdisciplinary sustainability research: an exploration

Power is involved when researchers and practitioners work together in transdisciplinary sustainability research. Among other things, this has implications regarding who gets to decide which research questions are dealt with and which partners are involved, and may impede or foster joint knowledge production. We propose empirical questions that allow for the power dynamics to be rendered visible, thus providing a first step towards tackling them.

Livia Fritz, Franziska Meinherz

Tracing power in transdisciplinary sustainability research: an exploration


GAIA 29/1 (2020): 41–51


Abstract

While transdisciplinary (TD) sustainability research is closely tied to ideas of societal change, critical enquiries into power dynamics both within and stemming from these practices have been scant. In this article, we operationalise theories of power for an exploration of the multiple ways in which power relations pervade interactions between researchers and practitioners in these knowledge production processes. By combining theories of *power over*, *power to* and *power with*, we propose a set of empirical questions to systematically study both productive and repressive forms of power. Using empirical examples, we illustrate how the proposed approach makes it possible to trace power throughout TD processes: in 1. developing the project and framing the research problem, 2. co-producing knowledge, and 3. bringing results to fruition. The power perspective proposed here can guide the thinking of those actors involved in TD processes as well as meta-analyses by third parties. An enhanced understanding of the workings of power can help improve process design and facilitate reflexive TD practice.

Keywords

co-production, participation, power, transdisciplinary research, sustainability

Dr. Livia Fritz | +41 21 69 33803 | livia.fritz@epfl.ch |
 <https://orcid.org/0000-0001-7710-2193>

Franziska Meinherz, MSc | franziska.meinherz@epfl.ch |
 <https://orcid.org/0000-0003-2759-5510>

both: École Polytechnique Fédérale de Lausanne (EPFL) | School of Architecture, Civil and Environmental Engineering (ENAC) | Institute of Environmental Engineering (IEE) | Laboratory for Human-Environment Relations in Urban Systems (HERUS) | GR A1 465 (Bâtiment GR) | Station 2 | 1015 Lausanne | Switzerland

© 2020 L. Fritz, F. Meinherz; licensee oekom verlag. This Open Access article is published under the terms of the Creative Commons Attribution License CC BY 4.0 (<http://creativecommons.org/licenses/by/4.0>).
<https://doi.org/10.14512/gaia.29.1.9>
 Submitted March 5, 2019; revised version accepted November 2, 2019.

In the field of sustainability research, transdisciplinary (TD) knowledge production is seen as a promising approach for addressing complex problems. These problems are notably characterised by a high degree of uncertainty, inevitable trade-offs and, at times, incommensurable values (Kates 2016). Tools have been developed based on the idea that practitioners' participation and the inclusion of their expertise in TD research processes co-produces societally relevant knowledge and leverages research's ability to stimulate societal change (Schneider and Buser 2018). As a knowledge production process, the goals of TD research are primarily epistemic. However, transformational goals such as the empowerment of marginalised actors (Marshall et al. 2018) or the stimulation of societal learning (Westberg and Polk 2016) also play an important role.

Yet, actors' actual participation in TD knowledge production does not necessarily live up to these ideals, nor produce the desired outcomes. The designing of the participation process and its context are important for how actors relate to it and for the values and expertise included in/excluded from it (Bieluch et al. 2016). Concerning TD knowledge production in the field of sustainability, we argue that such processes often involve power dynamics as 1. they are comprised of social interactions between actors (researchers and practitioners), 2. are part of dominant structures and discourses in the wider academic/practice context, and 3. involve issues that are value-laden and/or contested (Avelino 2017). Recognising participation and co-production of knowledge in TD research as relational and social processes (Fritz and Binder 2018) thus requires the disclosure of the power dynamics that shape them.

The role of power in TD knowledge production and the need to understand how participation becomes entangled with power and politics in such research processes have been increasingly acknowledged (Bieluch et al. 2016, Bréthaut et al. 2019, Schmidt and Neuburger 2017). Schmidt and Neuburger (2017) found that power manifests itself in the unequal distribution of financial and time resources between researchers and practitioners. With regard to macro-societal structures, group dynamics and the dominance of certain individuals has been observed as yet another example of the role of power in TD processes (Westberg and Polk 2016). >

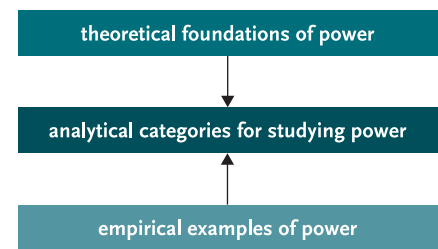
TABLE 1: Mix of deductive and inductive steps in the development of the power perspective.

DEDUCTIVE	INDUCTIVE	WHO
development of initial guiding questions from power theories		authors
categorisation of empirical situations as <i>power over</i> , <i>to</i> or <i>with</i>		workshop participants
	derivation of mechanisms from the situations mapped	workshop participants
	synthesis of empirical examples	authors
identification of sources of power and their structural contexts in the situations mapped		authors
revision of guiding questions for empirical study of power in TD		authors

Drawing on diverse knowledges has called further attention to varying degrees of credibility and authority ascribed to them within TD processes (Rosendahl et al. 2015). Despite widespread acknowledgement that power relations pervade TD processes, their role is rarely explored in detail or in a systematic way (Zingerli 2010). Analytical tools for studying power relations and their impact on research processes are necessary.

In this article, we consider how we can empirically grasp different forms of power in TD sustainability research. Our goal is to operationalise abstract theories of power to explore how power relations shape interactions between researchers and practitioners in sustainability-oriented knowledge production processes. Guided by social theories of *power over*, *power to* and *power with*, we propose a set of empirical questions that take into account repressive and productive forms of power. Using examples from TD practice, we illustrate how this approach allows us to trace power throughout TD processes in: 1. developing the project and framing the research problem, 2. co-producing knowledge, and 3. bringing results to fruition. The proposed power perspective can guide both the thinking of researchers and practitioners involved in TD processes and meta-analyses by third parties, including accompanying research. Unveiling the often tacit ways in which power affects TD processes provides a first step towards dealing with them in a constructive manner. Greater knowledge of the workings of power subsequently contributes to reflexive process design and implementation, and facilitates conscious management of (un-)desired power dynamics.

Through this exploration, we aim to build a platform for future discussions on fundamental questions such as which forms of power impede joint knowledge production and problem-solving, and which forms increase the potential for reaching epistemic and transformational goals. Such questions show that analysing power is not only of theoretical interest, but also of practical relevance for those engaging in TD research.

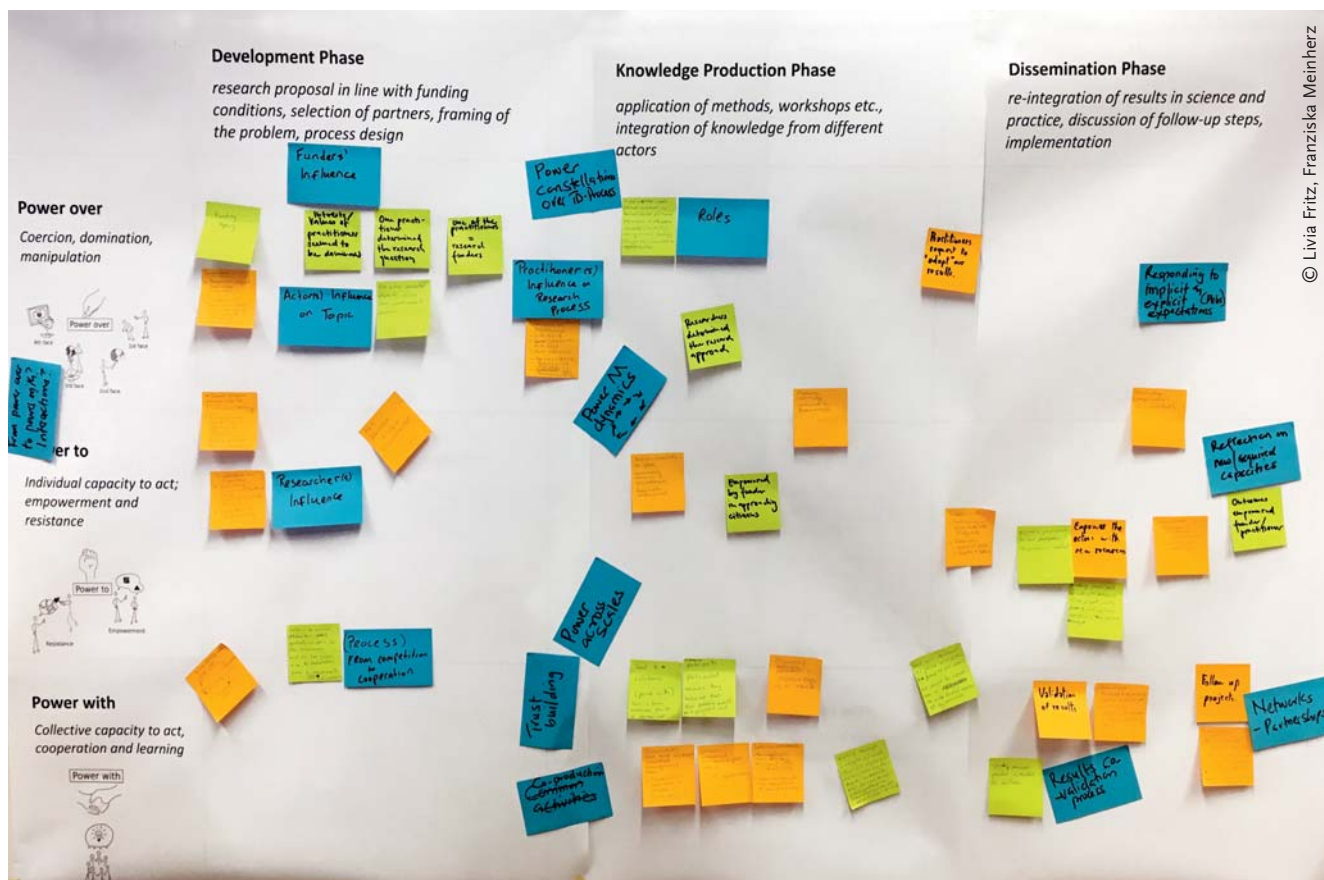
FIGURE 1: Research approach for the development of the power perspective.

Methods and material

This article combines theoretical and exploratory qualitative research (figure 1). The theoretical framework was based on a combination of existing social theories of power and TD sustainability scholarship. It was then applied and refined in an expert workshop with seven TD researchers from across Switzerland in Lausanne in November 2018. The following criteria guided the selection of participants: experience in practicing and researching transdisciplinarity, a focus on sustainability-related topics, and a variety of Swiss institutions. The participants were asked to choose one TD project in which they had been closely involved and that would be completed by the time of the workshop.¹ Guided by an earlier version of the empirical questions (table 2, p. 47), they mapped their experiences with power on a matrix that combined power forms and process phases (figure 2). Based on these real-world situations in which power unfolded, the framework's analytical categories were refined, and mechanisms and sources of power were derived (table 3, p. 48). The three-hour workshop was documented by two note-takers. The article's first author merged the notes of the two observers, discussed unclear passages with them, and combined them with flipcharts, mapping grids and her own verbatim from memory. This material provided the basis for the qualitative analysis, which synthesised deductive and inductive elements (table 1). Examples are presented in aggregated form in order to ensure anonymity and prevent traceability to individual projects.

While these examples serve to illustrate the application of the proposed power perspective, they do not allow for drawing conclusions on when and under what circumstances different manifestations of power occur. The exploratory nature of the workshop limited the extent to which the specificities and situatedness of the projects could be considered. Since only researchers took part in the workshop, the interpretation of power manifestations from practitioners' standpoints were not accounted for. In the workshop setting with a limited time frame, some forms of power were more challenging to reveal than others. Notably, discursive and invisible forms of power related to norms of "good" participation or "appropriate" science-society relations and epistemic authority and knowledge hierarchies were underexplored. The latter require further research based on a rich methodological repertoire (includ-

¹ The projects were in the fields of energy, land use, water and regional development.



© Livia Fritz, Franziska Meinherz

FIGURE 2: Analytical matrix used by workshop participants to map manifestations of *power over*, *power to*, and *power with* throughout the phases of a transdisciplinary knowledge production process: project development, knowledge co-production and dissemination of results. Source of figures *power over*, *power to*, *power with*: Fritz and Meinherz (2020). Figures reproduced with permission of University Cambridge Press through PLSClear.

ing participatory observations, analysis of project outputs, multi-sited ethnography and in-depth interviews presenting various actors' perspectives).

Seeing transdisciplinary sustainability research through a power perspective

In this section, we present the theoretical premises and derived empirical questions we propose for systematically studying power in TD sustainability research. The proposed power perspective is founded on two building blocks: conceptual elements of TD research and selected theories of power.

Conceptual elements of a generic transdisciplinary sustainability research process

Interlinked process phases: We used a process-oriented perspective and a common distinction between the three inter-linked phases of TD research: 1. the development phase (framing of the problem, choosing the appropriate sustainability approach, defining goals); 2. the knowledge production phase (applying [participatory] methods for knowledge generation), and 3. the dissemination

phase (re-integrating results in research and practice, in some cases implementing the findings) (Schneider and Buser 2018).

Diverse societal actors: Participation of and interaction between researchers and practitioners² are defining features of transdisciplinarity. TD collaborations as understood here are social and interactive processes (Fritz and Binder 2018). Interactions between researchers and practitioners can but do not necessarily take place across all phases. The intensity of these interactions oscillates throughout the process (Stauffacher et al. 2008).

² We differentiate between two types of actors: researchers and practitioners. Researcher describes a person who conducts research as their main profession and acts as a "certified expert" in her/his function (Collins and Evans 2002) in a given field. Although practitioners might have academic training, they do not conduct research as their main vocation. However, they are also experts in the specific fields. These actor groups are not homogenous entities. Researchers include scientists from the natural and social sciences, at different career stages, with diverse epistemological and ethical values. Practitioners include policy-makers, politicians, public service providers, private sector actors, third sector actors (such as NGOs) and individual citizens. Our focus here is on research-practice interactions and not the other features of transdisciplinarity, such as interdisciplinary exchanges (Schneider and Buser 2018).

Epistemic ends: TD processes, as understood in this article, are knowledge (co-)production processes; the participation of practitioners primarily serves these epistemic ends (Defila and Di Giulio 2018). In sustainability research with transformative goals, the epistemic and social/democratic ends of transdisciplinarity might co-exist and/or overlap (Lamine 2018). In this case, we are more interested in the epistemic role of participation than in its democratic function, as in the case of political decision-making processes.

Situated and interacts with context: While TD processes create their own social context (the project context), they also belong to the wider social context, of which the researchers and practitioners are part (practice and academic context; figure 3). Norms, discourses and structures in this wider context can shape power relations within a TD project. Similarly, a project or some of its actors might aim implicitly or explicitly at transforming the surrounding structures, discourses and norms, especially in TD research with transformative goals (Schneidewind et al. 2018).

In transdisciplinary research, power works in multiple ways and can be desirable and undesirable. Within-project power dynamics and power gradients in the societal context, which imbue transdisciplinary spaces, should be revealed concomitantly.

Selected theories of power³

Power is a contested concept with myriad meanings. Some theorists conceive of power as being held by actors, some powerful and others respectively powerless. In this conception, the gaining of power by some happens at the expense of others. For other theorists, power is embodied in complex relations and discourses. Here, power is fluid and accumulative – it can be shared or created by actors and their networks (Gaventa 2006). Given our aim of studying power in researcher-practitioner interactions, we will only focus on relational theories of power and follow approaches that integrate both structures and actors in the analysis of power. In this sense, manifestations of power result from the configuration of the contexts in which actors and their interactions exist and take place, as well as from actors' relative position in these contexts. The latter are shaped in part by actors' capacity to mobilise contextually relevant resources (Bourdieu 2016).

In order to grasp the diverse and complex manifestations of power, we follow Partzsch's (2015) work on power in sustainability research and base our reasoning on Allen's (1998) combination of theories of *power over*, *power to* and *power with*. We complement the latter's conceptualisation with elements that seem particularly relevant with regard to participation in knowledge production

processes and the specificities that flow from their epistemic ends. For this, we use literature on power and participation in development research and in science and technology studies.

Power over

Power over refers to power that is exerted over actors, structures and discourses, and is often distinguished in four dimensions, also referred to as "faces of power" (Partzsch 2015, p. 52).

The first face of power describes the ability of A to get B to do something that B might not do otherwise (Dahl 1957). Actors' capacity to mobilise financial and symbolic resources such as knowledge to influence a decision or process is key in this face of power (Gaventa and Cornwall 2008). The first *power over* dimension is considered fairly visible in decision-making processes.

Bachrach and Baratz (1962) redefine much of the power debate by introducing the second face of power. Here, the powerful can avoid conflict by limiting the scope of decision-making to issues that do not threaten the status quo (Hayward 2000). This dimension of *power over* is hidden, for example, when certain actors con-

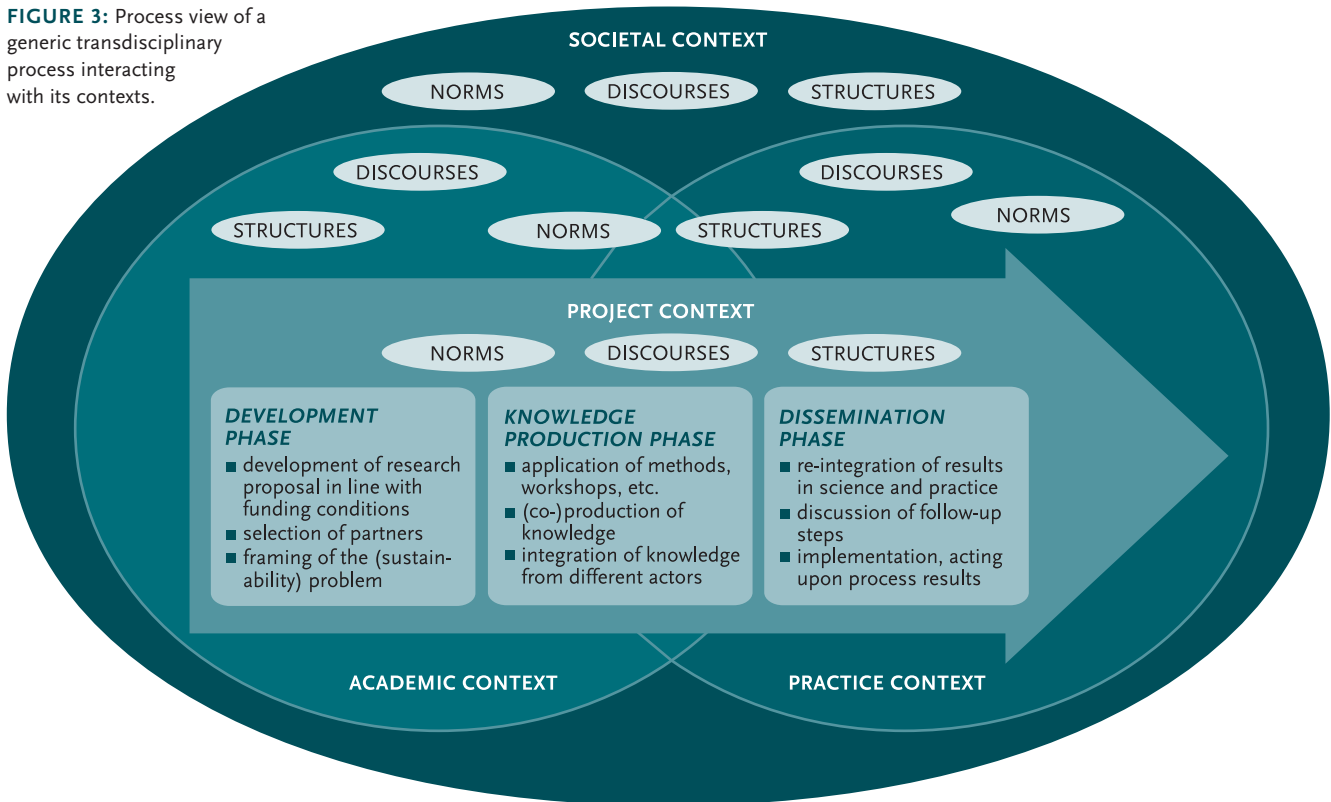
trol what goes on the agenda prior to a participatory process. It is exercised through mechanisms that exclude and delegitimise the concerns or knowledge of certain actors (Gaventa 2006). The game rules – that is, the configuration of the context in which interactions take place and actors' capacity to mobilise key resources – facilitate access to a process for established actors and complicate meaningful participation for others. Actors who are initially excluded and gain access may be required to imitate the language, behaviour or knowledge of established actors. Social positioning is a basis of power here (Gaventa and Cornwall 2008).

Lukes (1974) adds a third view on power according to which power can also be exerted if B consciously wants to do what A desires. In this case, power is wielded by means of manipulating the desires and beliefs of B (Digeser 1992). This third face concerns invisible forms of power that are exercised by covertly manipulating others to do something and/or changing what they think they want (Gaventa 2006). Knowledge and its control are crucial here for influencing people's consciousness (Gaventa and Cornwall 2008).

Following Foucault's work, interrelations between knowledge, power and politics bring us to a fourth face of *power over* (Digeser 1992). While in the first three faces As and Bs are taken for granted, the fourth face goes one step further in that subjects do not exist in a natural state. Power here means that subjectivity and individuality are historically and socially constructed (Partzsch 2015, p. 52). As Foucault (1980, p. 187) put it: "there exist relations of

³ This section is based on Fritz and Meinherz (2020). The book chapter provides an extensive review of theories of power and proposes a theoretical framework for the context of sustainability assessment.

FIGURE 3: Process view of a generic transdisciplinary process interacting with its contexts.



power which are not purely and simply a projection of the sovereign’s great power over the individual, they are rather the concrete, changing soil in which the sovereign’s power is grounded”. In our case, such an understanding of power implies that the categorisation of actors as knowledge-holders and/or epistemic authorities is not pre-determined and should not be taken as given. To understand power, the construction and effects of norms and values must be addressed. The power of an idea and/or discourse – in our case practitioners’ participation in science, for example – exists only in relation to other ideas and/or discourses (i.e., objective science). Moreover, actors tend to be seen as more legitimate when they invoke knowledge that is aligned with established ideas and discourses (Fuchs and Glaab 2011). Knowledge and power therefore mutually forge one another (Foucault 1977). What is considered reliable knowledge or even truth is shaped by various actors’ standpoints (Harding 1992) and status as “certified experts” (Collins and Evans 2002). The fourth dimension of *power over* emphasises the role of accepted truths and knowledge regarding desirable developments in stabilising and concretising certain paths of action. Within this perspective, knowledge production, thus, is not only an epistemic endeavour, but also an ontological one, an

act “of making, rather than merely depicting, what is at stake” (Passth and Rowland 2016, p. 38). Whereas in the other faces it is possible for relationships to not be mediated by power, here power is ubiquitous and cannot be obliterated.

Power to

The notion of *power to* captures the individual actors’ capacity to form and shape processes despite resistance (Haugaard 2012), and is roughly synonymous with empowerment⁴ (Allen 1998). Allen (1998, pp. 34f.) defines *power to* as “the ability of an individual actor to attain an end”. Resistance is one possible manifestation of *power to*, just as domination is a manifestation of *power over* (Allen 1998). The emphasis in this form of power lies on the individuals’ agency and their capacity to achieve their goals.

Power with

In *power with*, power appears as the capacity to collectively learn and act. Finding commonalities and developing collective strength are the core of *power with*. The notion refers to learning processes and the development of a new group or community consciousness (Partzsch 2015). *Power with* is associated with Arendt’s (1970, p. 44) view on power being “the human ability not just to act but to act in concert”. Following this interpretation, Allen (1998, p. 35) defines *power with* as “the ability of a collectivity to act together for the attainment of a common or shared end”. The emphasis in this form of power lies on the productive forces of power (Partzsch 2015).

⁴ We use the notion of empowerment simply to refer to an actor’s capacity to act. Furthermore, we concur with Cashmore (2019, p. 26) that “irrespective of the precise way in which empowerment is understood, what is central to the notion is that empowerment allows individuals or collectives to positively shape their futures”.



Combining multiple forms of power and phases of transdisciplinarity

Rather than following the approaches of scholars who interpret power in either one of its forms (Haugaard 2012), the power perspective proposed in this article highlights the interrelatedness of *power over*, *power to*, and *power with*. These forms of power are analytical rather than ontological categories (Allen 1998). Combining them in one approach emphasises the fact that consensual forms of power or empowerment at the local scale are not free of macro-societal *power over* mechanisms, which shape individual actors' ability to articulate themselves and lead to the marginalisation of certain groups, discourses or knowledge within a community. Likewise, it incites us to look for ways in which *power with* (e.g., through collective action) disrupts discourses and structures that maintain *power over* (Partzsch 2015). A multidimensional approach makes it possible to scrutinise the productive aspects of power without neglecting the unproductive ones.

Based on these theoretical foundations, in table 2 we distil empirical questions⁵ for systematically studying power throughout TD sustainability research processes. While certain questions are equally relevant for all phases of a generic TD process, others are particularly important at specific points in the process. The main process phase described in table 2 provides an analytical starting point. However, it does not mean that the questions are relevant exclusively in the phase indicated.

An illustrative application of the power perspective

In this section, we schematically show how the power perspective can be applied for an empirical study of TD sustainability research. Rather than providing a comprehensive analysis of power in TD knowledge production, we will use examples discussed in the above-mentioned expert workshop to illustrate how various forms of power can manifest themselves and shape interactive processes and their results. Presenting these examples, we point to the interrelatedness of the three forms of power within a single project phase, their potential to change throughout the various project phases and their embeddedness in structural contexts at different scales. This illustration demonstrates how the empirical questions can be applied and the answers obtained systematically interpreted: for each power manifestation, we identify the mechanism by which researchers, practitioners or funders exercise power, and highlight the sources actors mobilise and the structural (project, academic, practice) context in which these sources

exist (table 3). We hope that this will provide ideas for more in-depth empirical analyses of power in TD projects. In the following, we elaborate on table 3. We structure the insights gained through the workshop along the phases of a TD knowledge production process.

Development phase

Workshop participants identified funding bodies⁶ as directly influencing the development of the TD endeavour. By determining the framework within which the research project had to fit, they wielded *power over* it, reaffirming the crucial role of the funding context and control of financial resources in shaping TD practices. Some workshop participants identified specific actor constellations, where the funder was also a practitioner involved in the project and, in this way, influenced decisions at the project's micro-level. This constellation entailed hierarchies among different practitioners. Furthermore, workshop participants stated that while project proposals had to comply with funding requirements, decisions regarding the format, timing and agenda of interactions and participant selection were taken by project actors, mostly researchers. After project approval, the researchers emancipated themselves from the constraints of funding requirements and developed *power to* act according to their research interests. In specific cases, *power to* manifested in the empowerment of researchers as legitimate actors in the practice context, as they were financially supported by renowned institutions with well-established social relations (e.g., Ministries and governmental agencies). These examples illustrate how power dynamics in one actor relationship – between researchers and the funding body here – can take different forms depending on the funding context and the process phase. This demonstrates the importance of analysing power relations as dynamically constructed in interactions.

When researchers unilaterally took the above-mentioned decisions on the terms of involvement and the research problem, the workshop participants referred to *power over* dynamics in researcher-practitioner relations. In several projects, the allocation of resources was conducive to such dynamics from the outset. When practitioners did not receive financial support, their ability to engage was circumscribed. Alternately, examples were provided in which one practitioner or a small group of practitioners strongly influenced the problem framing. As such, the interests and values of (certain) practitioners dominated the development phase. An overt exercise of *power over* was observed in a project wherein a practitioner omitted a research question from the set of possible questions. This shows how the mobilisation of *power*

5 In order to stimulate reflection, the questions are deliberately framed as open questions (vs. closed yes-or-no questions). As such, the answers must be interpreted. For instance, if the answers to the questions on *power over* reveal 1. that only one actor group takes decisions, 2. that project structures privilege some actors over others, 3. that the distribution of resources is unequal, or 4. that any other imbalances exist, *power over* is likely to be at work.

6 Initially, funding bodies were not mentioned explicitly in our theoretical approach. They were added inductively by the workshop participants. Funding bodies can include actors from academia, such as national science funds, or/and actors from practice, such as philanthropic foundations. The attribution of funding bodies to either "science" or "practice" is not always clear. Furthermore, funding contexts can be part of both the academic context and the practice context. We therefore assign funding context neither to the academic context nor the practice context.

TABLE 2: Empirical questions for multidimensional analysis of power in transdisciplinary (TD) sustainability research. Source: adapted from Fritz and Meinherz (2020).

FORM OF POWER	EMPIRICAL QUESTIONS	MAIN PROCESS PHASE
POWER OVER ...		
... is wielded over actors, structures and discourses	Which actors from research and/or practice define the problem to be assessed, the sustainability approach adopted and the research design?	development phase
... is the capacity to overtly influence the decisions and action of others (first face)	Which actors from research and/or practice decide who is or is not invited to participate and set the terms and conditions for how participants in the TD process interact? Which criteria, norms or discourses orient these decisions?	development phase
... is the capacity to set the agenda and covertly influence decisions (second face)	How are the resources required to participate in the TD process and influence decisions/processes/outputs distributed among actors from research and/or practice?	all phases
... is the capacity to shape ideas, norms and intentions (third face)	For which tasks and in which situations throughout the TD process do researchers depend on practitioners and vice versa?	all phases
... is the social constructedness of subjectivity in social and historical processes (fourth face)	In which ways do the funding conditions and other structural factors influence the set-up and evolution of the TD process?	all phases
	In which ways does the process set-up influence the capacity of actors from research and/or practice to voice their concerns and contribute their expertise?	knowledge production phase
	In which ways do epistemological values and norms of what characterises valid knowledge and appropriate science-society relations shape the boundaries of participation in the TD process?	knowledge production phase
	To what extent does the TD process and the results it produces question established discourses, institutions and practices?	dissemination phase
POWER TO ...		
... is the individual capacity to act	Which individual actors involved in the TD process achieve their goals?	all phases
	In which situations are actors from research and/or practice opposed to decisions or actions by other actors involved in the TD process?	all phases
	How does the TD process enhance the capacities of actors from research and/or practice to achieve their goals?	all phases
POWER WITH ...		
... is the capacity to collectively learn and act	What new project goals and understanding of problems emerge in the TD process?	development phase
	Which new collectives, discourses or practices emerge through the TD process?	knowledge production/ dissemination phase
	How do actors from research and/or practice build bridges across different knowledge areas and collectively learn from the TD process?	all phases

to (one actor is able to achieve his/her goals) related to exercises of *power over* in an actor's relationship to others. It also shows how, depending on an actor's standpoint, the same interaction reflects different forms of power, thus stressing their analytical, versus ontological, nature.

In the development phase, workshop participants identified trust building among the actors involved as an indication of *power with*. Regarding early trust building, workshop participants found path-dependencies of power relations: projects that were dominated by only a few actors at the early stages were thought to be less likely to develop towards *power with* at later stages. Still, oscillations of different forms of power were described: while the overall project design may be shaped by researchers unilaterally, responsibilities for designing and conducting workshops may

be shared between researchers and practitioners, while yet other steps may be dominated by practitioners' preferences.

Knowledge production phase

Workshop participants detected researchers' *power over* modes of interaction and the timing of participatory knowledge production steps. Their *power over* the structuring and implementing of the process was reinforced in situations of unequal allocation of financial resources, for example, when practitioners did not have support structures and lacked time resources to establish and form the process. Workshop participants found practitioners to wield *power over* the process on the basis of their position and social relations in the practice context. Researchers depended on the latter's participation for gaining access to the field, facilitating data



TABLE 3: Examples of manifestations of power. The examples are taken from transdisciplinary (TD) case studies that were discussed at the expert workshop (p. 42). For each power manifestation, the mechanism by which researchers (R), practitioners (P), or funding bodies (F) exercise power are identified.

	FORM	MANIFESTATION OF POWER	ACTOR	MECHANISM
DEVELOPMENT PHASE	<i>power over</i>	funding conditions shaped the design of the project and allocation of resources	F	resource allocation
		researchers determined formats, timing, agenda of interactions and selected participants	R	planning + agenda setting
		practitioners influenced the definition of the research problem and question	P	planning + agenda setting
	<i>power to</i>	only researchers received funding, providing them the means to shape the process	R, F	resource allocation
		taking project decisions, researchers “freed” from funding structures	R	planning + agenda setting
		researchers were legitimised by funding body to approach practitioners	R	empowerment
<i>power with</i>	trust built as basis for further collaboration	R, P	trust building	
	joint initiation of project based on previous collaboration	R, P	joint action	
KNOWLEDGE PRODUCTION PHASE	<i>power over</i>	researchers determined methods used for TD activities and knowledge integration	R	planning + agenda setting
		unequal distribution of resources reduced practitioners’ capacity to actively shape the process	R	resource allocation, knowledge constellation
		practitioners granted researchers access to the field; researchers depended on the support of practitioners	P	actor composition
		hierarchies outside TD process were transferred into the TD space and distorted group dynamics	P	actor composition
	<i>power to</i>	empowerment of practitioners through awareness raised	P	learning processes
		solutions developed legitimised researchers as experts in the field	R	empowerment
<i>power with</i>	co-production of results, co-creation of management/action plans, visions, scenarios	R, P	joint action	
	practitioners developed capacities to act jointly despite different standpoints	P	joint action	
DISSEMINATION PHASE	<i>power over</i>	knowledge compilation by researchers only	R	agenda setting
		funding body and practitioners shaped dissemination and publication requirements	F, P	agenda setting
	<i>power to</i>	enhanced capacities to act on the basis of process results	P	empowerment
		researchers were endorsed by practitioners as valuable partners	R	trust building
	<i>power with</i>	co-validation of results	R, P	joint action
		joint development of follow-up projects	R, P	joint action
		development of networks and partnerships	R, P	trust building
		implementation of findings, acting upon the knowledge-co-produced	P	joint action

collection and being recognised as valuable partners by other actors in the field. *Power over* also shaped interactions among practitioners. In participatory events such as scenario workshops, group dynamics were distorted when the presence of actors, who were powerful outside the TD space (albeit unintentionally), intimidated other actors or subtly influenced their behaviour in the participatory setting. In one case, the presence of a mayor impeded administrative representatives from voicing visions and thoughts on development strategies. In a second workshop in another municipality (part of the same project using the same methods), a different actor constellation (no high-ranking political representatives) resulted in dynamics of mutual learning (*power with*). This observation points to the importance of considering the situatedness of TD processes and interactions between the project and practice context in the analysis of power.

The experts’ descriptions of *power to* in the knowledge production phase refer to the empowerment of participating farmers, whose awareness of a soil degradation problem was raised

through TD encounters, which allowed them to build capacities for acting in their interest. *Power with* manifested when results were jointly created. Workshop participants narrated such experience of *power with* regarding the co-development of a natural resource management plan.⁷ For such steps, researchers depended on practitioners and vice versa. Workshop participants noticed similar manifestations of power in the co-creation of visions, scenarios and strategies. As a result of these processes, the practitioners felt that “their” topic gained traction and caught the attention of new actors. Additionally, they developed the capacities to act jointly despite diverging standpoints, that is, they accumulated *power with*. These examples illustrate the interrelatedness of forms of power and how the interpretation of power manifestations is

⁷ In the example discussed this concerned a watershed management plan, which the researchers were initially in the lead to develop, but could do so only in a co-design process with local practitioners who implemented the plan.

Both the sources actors mobilise and the structural (project, academic, or practice) context in which these sources exist are highlighted.

STRUCTURAL CONTEXT	SOURCE OF POWER
funding context	capacity to mobilise financial resources
project/process; academic context	capacity to mobilise financial resources + knowledge
project/process; practice context	capacity to mobilise financial resources, social relations, knowledge
funding context; project/process	capacity to mobilise financial resources
project/process	building capacity to mobilise knowledge and experience
practice context	building capacity to mobilise social relations and status
project/process	jointly building various resources that can be mobilised together
project/process	drawing on jointly built experiences + understandings
project/process	capacity to mobilise social status, knowledge + experience
project/process	capacity to mobilise financial resources, knowledge + experience
practice context	capacity to mobilise social relations
project/process; practice context	capacity to mobilise social relations + status
project/process; practice context	building capacity to mobilise knowledge + experience
practice context	building capacity to mobilise social status
project/process	jointly building knowledge, understanding + experience
practice context	capacity to mobilise jointly built understanding + knowledge
project/process; academic context	capacity to mobilise experience and knowledge
funding + practice context	capacity to mobilise financial resources + extant norms
practice context	building capacity to mobilise knowledge + experience
practice context	building capacity to mobilise social relations
project/process	drawing on jointly built knowledge + experience
academic + practice context	drawing on jointly built experiences + social relations
academic + practice context	drawing on jointly built social relations
practice context	drawing on jointly built knowledge + experiences

tied to the scale of analysis: what is perceived as *power with* within the TD space (micro-scale) can lead to *power over* other actors who were not involved in the process in the practical context (macro-scale). Depending on the structural context and actor constellations within it, it is conceivable that the same mechanism can contribute to changes in power structures (*power over*) by offering alternative problem framings, options or evidence as a basis for decision-making.

Dissemination phase

With regard to bringing results to fruition, workshop participants recalled situations in which researchers asserted *power over* knowledge compilation, mostly via the

writing of publications. In doing so, the researchers partly responded to the implicit or explicit expectations of funders and practitioners who, to varying degrees, wielded *power over* dissemination practices or requested that dissemination formats be adapted so as to increase their usability. Likewise, workshop participants found project evaluation norms and academic reward structures to shape dissemination strategies. Again, this illustrates how one actor – the researchers here – can be in a position to exert *power over* others – the practitioners – and simultaneously be subjected to exercises of *power over* by others, in this case the funding bodies. It further demonstrates how different faces of *power over* can interact – in this case, its first face

through explicit requirements by funders and its discursive fourth face through established norms regarding knowledge dissemination.

Workshop participants experienced situations of *power to* when practitioners were empowered with new knowledge resources that enhanced the legitimacy of certain actions, for example, policy measures. *Power to* also unfolded when participants developed the capacity to use methods for co-producing knowledge in their day-to-day business. Likewise, *power to* manifested in the empowerment of researchers by practitioners, who informally endorsed them as valuable partners and invited them to other activities in the practice context. *Power with* was discerned in processes of co-validation of results and when co-created plans and visions were acted upon. The development of networks, long-term partnerships and follow-up projects were another indication of *power with* stemming from the TD process. These examples point to interrelations between *power to* and *power with*. Collective learning in the TD space (*power with*) can enhance individual actors’ capacities to achieve their goals in the practice context (*power to*).

Concluding remarks and outlook

We set out to provide a platform for debating on and confronting power in TD sustainability research. We argued that enquiries into the normative goals of balancing power relations and transforming an unsustainable status quo, which are often implicit in TD sustainability research, are as necessary as the elucidation of power relations within TD processes. The power perspective we propose has the potential to uncover how different forms of power come to be, depending on the constellation and characteristics of actors, the layout of the process and the configuration of the wider context. As the examples suggest, in TD projects, power works in multiple ways and can be both desirable and undesirable. The latter implies a normative judgment, which depends on the objectives set and the observer’s standpoint. From our schematic application of the power perspective, we



conclude that some aspects require particular attention in future analyses of power in TD research:

- **Considering scale:** Different forms of power overlap. Determining which form of power is at work depends on the scale of analysis considered and the standpoint. What is perceived as *power with* in the frame of the project can entail *power over* in the wider societal context or *power to* from the perspective of an individual actor.
- **Considering situatedness:** Analysing power requires considering TD spaces' embeddedness within the wider socio-political context and predominant science-society relations. Power constellations within TD processes vary according to hierarchies and structures in the practice context as well as the funding and academic context. Likewise, power constellations within TD processes can affect their capacity to shape the wider context.
- **Considering dynamics:** An analysis of power must consider how power relations can evolve throughout TD processes and identify possible path dependencies. Considering dynamics also suggests accounting for histories of research-practice collaborations prior to the project of interest.

In addressing the aspects outlined in this article, future research should be attentive to practitioners' experiences of power. While their perceptions are largely absent in the scholarly debate, understanding them is critical when it comes to acting on the TD process and its results. A solid empirical basis on the workings of

power will allow TD researchers and practitioners to design and conduct participatory elements in a way that stimulates forms of power, which are productive regarding the goals of participation and minimise unproductive ones. The empirical questions proposed allow for rendering power dynamics visible and thus provide a first step towards tackling them. While some mobilisations of power can be restrained by careful design and choice of methods, others are elusive and require continuous reflection and transparency. By stressing the diverse manifestations of power, we hope to entice TD sustainability scholars to share their experiences of both productive and repressive forms of power, thus contributing to building an empirical knowledge base on the workings of power in TD research.

The authors thank all the participants of the expert workshop for sharing their experiences of power in TD research, as well as Susan Mühlemeier and Thorsten Schilling for their organisational support. This research is part of the project *Civil Society and Research for Sustainable Development: Demanding and Fostering Transdisciplinarity*, funded by the Ministry for Science and Culture of Lower Saxony, Germany. F. M. acknowledges funding by *Swiss Mobilier Chair for Urban Ecology and Sustainable Living*. We thank three anonymous reviewers for their constructive and valuable comments.

References

- Allen, A. 1998. Rethinking power. *Hypatia* 13/1: 21–40.
Arendt, H. 1970. *On violence*. Boston: Houghton Mifflin Harcourt.


GAIA Masters Student Paper Award

The international journal **GAIA – Ecological Perspectives for Science and Society** invites Masters students to participate in the **2021 GAIA Masters Student Paper Award**.

Masters students are encouraged to submit their results from research-based courses or from Masters theses in the field of **transdisciplinary environmental and sustainability science**.


Submission guidelines and more information:
www.oekom.de/zeitschriften/gaia/student-paper-award
 Deadline for submission: **October 19, 2020**.

The winner will be selected by an international jury and will be granted a **prize money of EUR 1,500** endowed by the Selbach Umwelt Stiftung and Dialogik gGmbH, as well as a **free one-year subscription to GAIA**, including free online access. The winner may also be encouraged to **submit his or her paper for publication in GAIA**.



gemeinnützige Gesellschaft für Kommunikations- und Kooperationsforschung mbH





- Avelino, F. 2017. Power in sustainability transitions: Analysing power and (dis)empowerment in transformative change towards sustainability. *Environmental Policy and Governance* 27/6: 505–520.
- Bachrach, P., M. Baratz. 1962. Two faces of power. *American Political Science Review* 56/4: 947–952.
- Bieluch, K. H., K. P. Bell, M. F. Teisl, L. A. Lindenfeld, J. Leahy, L. Silka. 2016. Transdisciplinary research partnerships in sustainability science: An examination of stakeholder participation preferences. *Sustainability Science* 12/1: 87–104.
- Bourdieu, P. 2016. *La distinction: critique sociale du jugement*. Paris: Minuit.
- Bréthaut, C., L. Gallagher, J. Dalton, J. Allouche. 2019. Power dynamics and integration in the water-energy-food nexus: Learning lessons for transdisciplinary research in Cambodia. *Environmental Science and Policy* 94: 153–162.
- Cashmore, M. 2019. Governing radical societal change. In: *The politics of urban sustainability transitions: Knowledge, power and governance*. Edited by J. Jensen, M. Cashmore, P. Späth. New York: Routledge. 17–32.
- Collins, H. M., R. Evans. 2002. The third wave of science studies: Studies of expertise and experience. *Social Studies of Science* 32/2: 235–296.
- Dahl, R. A. 1957. The concept of power. *Behavioral Science* 2/3: 201–215.
- Defila, R., A. Di Giulio. 2018. Eine Reflexion über Legitimation, Partizipation und Intervention im Kontext transdisziplinärer Forschung. In: *Interventionsforschung*. Vol. 3. Edited by M. Ukowitz, R. Hübner. Wiesbaden: Springer. 85–108.
- Digester, P. 1992. The fourth face of power. *Journal of Politics* 54/4: 977–1007.
- Foucault, M. 1977. *Discipline and punish: The birth of the prison*. New York: Vintage Books.
- Foucault, M. 1980. *The history of sexuality*. Vol. 1. Trans. Robert Hurley. New York: Random House.
- Fritz, L., C. R. Binder. 2018. Participation as relational space: A critical approach to analysing participation in sustainability research. *Sustainability* 10/8: 2853–2882.
- Fritz, L., F. Meinherz. 2020. The politics of participatory sustainability assessments: An analysis of power. In: *Sustainability assessment in urban systems*. Edited by C. R. Binder, E. Massaro, R. Wyss. Cambridge: Cambridge University Press. 87–122.
- Fuchs, D., K. Glaab. 2011. Material power and normative conflict in global and local agrifood governance: The lessons of “Golden Rice” in India. *Food Policy* 36/6: 729–735.
- Gaventa, J. 2006. Finding the spaces for change: A power analysis. *IDS Bulletin* 37/6: 23–33.
- Gaventa, J., A. Cornwall. 2008. Power and knowledge. In: *The SAGE handbook of action research: Participative inquiry and practice*. Edited by P. Reason, H. Bradbury. Los Angeles: Sage. 172–189.
- Harding, S. 1992. Rethinking standpoint epistemology: What is “strong objectivity?”. *Centennial Review* 36/3: 437–470.
- Haugaard, M. 2012. Rethinking the four dimensions of power: Domination and empowerment. *Journal of Political Power* 5/1: 33–54.
- Hayward, C. R. 2000. *De-facing power*. Cambridge: Cambridge University Press.
- Kates, R. W. 2016. Sustainability science. In: *International encyclopedia of geography: People, the earth, environment and technology*. Edited by American Association of Geographers. Hoboken: Wiley. 1–4.
- Lamine, C. 2018. Transdisciplinarity in research about agrifood systems transitions: A pragmatist approach to processes of attachment. *Sustainability* 10/4: 1241–1259.
- Lukes, S. 1974. *Power: A radical view*. London: Macmillan.
- Marshall, F., J. Dolley, R. Priya. 2018. Transdisciplinary research as transformative space making for sustainability: Enhancing pro-poor transformative agency in periurban contexts. *Ecology and Society* 23/3: Art. 8. DOI: 10.5751/ES-10249-230308.
- Partzsch, L. 2015. Kein Wandel ohne Macht – Nachhaltigkeitsforschung braucht ein mehrdimensionales Machtverständnis. *GAIA* 24/1: 48–56.
- Passoth, J.-H., N. J. Rowland. 2016. Modeling the state: An actor-network approach. In: *Knowing governance: The epistemic construction of political order*. Edited by J.-P. Voß, R. Freeman. London: Palgrave Macmillan. 37–61.
- Rosendahl, J., M. A. Zanella, S. Rist, J. Weigelt. 2015. Scientists’ situated knowledge: Strong objectivity in transdisciplinarity. *Futures* 65: 17–27.
- Schmidt, L., M. Neuburger. 2017. Trapped between privileges and precariousness: Tracing transdisciplinary research in a postcolonial setting. *Futures* 93: 54–67.
- Schneider, F., T. Buser. 2018. Promising degrees of stakeholder interaction in research for sustainable development. *Sustainability Science* 13/1: 129–142.
- Schneidewind, U., K. Augenstein, F. Stelzer, M. Wanner. 2018. Structure matters: Real-world laboratories as a new type of large-scale research infrastructure. A framework inspired by Ciddens’ structuration theory. *GAIA* 27/S1: 12–17.
- Stauffacher, M., T. Flüeler, P. Krütli, R. W. Scholz. 2008. Analytic and dynamic approach to collaboration: A transdisciplinary case study on sustainable landscape development in a Swiss prealpine region. *Systemic Practice and Action Research* 21/6: 409–422.
- Westberg, L., M. Polk. 2016. The role of learning in transdisciplinary research: Moving from a normative concept to an analytical tool through a practice-based approach. *Sustainability Science* 11/3: 385–397.
- Zingerli, C. 2010. A sociology of international research partnerships for sustainable development. *European Journal of Development Research* 22/2: 217–233.



Livia Fritz

Studies in development studies and political science at the University of Vienna, Austria, and the Institut d'études politiques de Paris, France; doctoral studies at Ludwig-Maximilians-Universität Munich, Germany, and École Polytechnique Fédérale de Lausanne (EPFL), Switzerland. Currently postdoctoral researcher at the Laboratory for Human-Environment Relations

in Urban System (HERUS) at EPFL. Research interests: interlinkages between research, policy-making and societal change in the field of sustainability, discourses and practices of participation of diverse societal actors in knowledge production, science policy.



Franziska Meinherz

Studies in sociology, economics and system dynamics at the universities of Geneva, Switzerland, Boston, United States, Bergen, Norway, as well as the New University of Lisbon, Portugal, and Radboud University, The Netherlands. Currently doing a PhD at the Laboratory for Human-Environment Relations in Urban Systems (HERUS) at École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, and lecturer of an interdisciplinary class

on applied experimental urbanism. Research interests: dynamics of everyday practices, urban commuter mobility, urban experimentation, dynamics of sustainability discourses.