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Publication date

2019

Document Version

Final published version

Published in

Issues in Interdisciplinary Studies

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Citation for published version (APA):

Keestra, M. (2019). Imagination and Actionability: Reflections on the Future of Interdisciplinarity, Inspired by Julie Thompson Klein. *Issues in Interdisciplinary Studies*, 37(2), 110-129. https://interdisciplinarystudies.org/docs/Vol37_2019_No2/08_Vol.37_No.2_pp_110-129_Keestra.pdf

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Imagination and Actionability: Reflections on the Future of Interdisciplinarity, Inspired by Julie Thompson Klein

by

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Abstract: When introduced around 1925, interdisciplinarity, grounded in the notion of the unity of knowledge, was meant to reconnect the fragmented and specialized disciplines of academia. However, interdisciplinary research became more and more challenging as the plurality and heterogeneity of disciplinary perspectives and insights increased. Insisting on this divergence and diversity, Julie Thompson Klein has nevertheless contributed in important ways to convergence in interdisciplinarity with her work on the process of integration as interdisciplinarity's defining feature. Of course Klein is aware that the increasing inclusion of extra-academic stakeholders in *transdisciplinary* research constitutes a fundamental challenge to integrative interdisciplinarity. Along with academic contributions, experiential knowledge, interests, and norms must be recognized as valuable to the process, and stakeholder expectations of applicable results must be met. Exploring the future by extending this crucial development further, this article focuses on the actionability of knowledge as an additional criterion for effective interdisciplinarity and transdisciplinarity, as it is in Action Research. With action options for stakeholders being an important goal for such research, it is argued that joint deliberation about these options must be part of the process, aiming for reflective equilibrium. At the same time, an important role for imagination is defended, enabling adequate consideration of action options with their ramifications and implications. The future of interdisciplinarity, it is concluded, will entail an important role for the actionability criterion and for the related role of imagination of potential outcomes, much greater roles than these now have.

Keywords: action research, actionability, imagination, interdisciplinarity, Julie Thompson Klein, reflective equilibrium, transdisciplinarity

Introduction: Interdisciplinarity's Convergence and Divergence as It Approaches Its Centennial

Almost a century ago, around 1925, the concept of “the interdisciplinary” was introduced in connection with a new funding scheme by the Social Science Research Council aimed at fostering collaborations between researchers from its constituent societies. Specialization and fragmentation among academic disciplines had affected the practice of modern social scientists in such a way that it was no longer natural or attractive for them to work together with peers with a background in another social science than their own. The initiative was well received, and within 25 years’ time, interdisciplinarity had been embraced widely within the social sciences, increasing the coherence between the (sub) disciplines represented in the SSRC (Frank, 1988).¹

Nor were the social sciences the only disciplines seeking a strategy to mitigate the fracturing process in their midst. Considering the problems fragmentation presented to teaching and research in the universities another (near) quarter of a century later, the influential 1972 OECD report on interdisciplinarity presented several explanations of how interdisciplinarity could help respond to those problems, apparent in many disciplines beyond the social sciences alone, with one author emphasizing interdisciplinarity’s capability to decrease the mismatch between academic disciplines (and sub-disciplines) and the vocational practices pertaining to their fields (Heckhausen, 1972). Another author urged the embrace of interdisciplinarity as a way of bringing together the different components of the education/innovation system such that the system would be better able to respond to current challenges (Jantsch, 1972).

By 1990, looking back at 65 years of interdisciplinarity, Julie Thompson Klein concluded that, in all that time, the ambition to employ interdisciplinarity as a means to bridge differences between disciplines and fields had remained consequential together with the confidence that it could actually fulfill this role. She noted that this ambition was not just driven by an organizational impulse but was also supported by a particular concept of knowledge, an epistemology that enables linkages between different forms and domains of knowledge. In the words of her groundbreaking 1990 book, *Interdisciplinarity: History, Theory, and Practice*, “[s]till, all interdisciplinary activities are rooted in the ideas of unity and synthesis, evoking a common epistemology of convergence” (Klein, 1990, p. 11).²

¹ The SSRC was established in 1923 as an “intrinsically interdisciplinary operation” (Worcester & Sibley, 2001, p. 31). Although the term “interdisciplinary” may have appeared elsewhere before, the SSRC has been a key promotor and facilitator of explicit interdisciplinary projects (Abbott, 2001).

² Interestingly, writing in 1992 about the Swiss or continental situation, Mudroch observes that this unifying ideal is no longer embraced widely: “Unifying or radically reforming disciplines so as to attain even a limited unity of science as was proposed in the 1970s is presently not regarded as a realistic goal of interdisciplinarity” (Mudroch, 1992, p. 46).

Klein has not only observed such fundamental consensus among early theorists and practitioners of interdisciplinarity; she has also contributed herself to the coherence of the field in several influential ways, as with the co-development of a definition of interdisciplinarity that has found wide acceptance, in part because it avoids defining interdisciplinarity in a substance- or content-based way. Instead, the Klein-Newell definition focuses on the process of integration of disciplinary insights that characterizes interdisciplinarity, describing it as a means to reach a more comprehensive insight into a complex problem (Klein & Newell, 1997). An earlier version of this process-oriented definition was already included in Klein's 1990 book, where it was presented along with a description of the interdisciplinary research process.

Characteristic of this description are the articulation of the various steps of the interdisciplinary research process and its explanation of the features distinguishing it from a disciplinary research process, like the two-step determination of the interdisciplinary research problem and the fact that several steps are re-iterated (Klein, 1990, p. 193). The influence of this process description is visible in that, since its first appearance, many major authors in our field have published modified versions of this interdisciplinary research model that are being used widely in higher education and elsewhere, manifesting once more convergence and consensus among interdisciplinarians (for example Menken & Keestra, 2016; Newell, 2001; Repko & Szostak, 2017).

However, in parallel with these and other important contributions to consensus and coherence within the field of interdisciplinary studies, Klein has also insisted on the field's increasing plurality and heterogeneity. Although interdisciplinarity by its very nature has always involved some form of boundary crossing, making connections between disciplines or knowledge domains, that process was for a long time a relatively simple endeavor that did not affect the traditional disciplinary organization of knowledge nor that of the academy itself (Klein, 1996). Yet, as Klein and Newell point out in the 1997 book in which they presented their co-developed definition of interdisciplinarity and its integrative process, this traditional, rather simple and discipline-oriented system (that allowed a subsidiary role for interdisciplinarity) was already changing into a complex, non-hierarchical system, determined by complex networks of scholars and students, cross-disciplinary centers and institutions, novel forms of collaboration, and other innovative features, all of which have been making the field of interdisciplinary studies increasingly pluralist and diverse.

Creating pluralism and diversity in the field more than any other change listed by Klein and Newell in 1997 has probably been the inclusion of extra-academic participants in problem-solving projects, as this affects interdisciplinarity more fundamentally than other changes do. Indeed, the label “transdisciplinary” is being increasingly used to distinguish these projects from interdisciplinary ones that only involve scholars (Klein, 2013).³ More than merely adding another group with its discipline-specific expertise to an already diverse mix of people with disciplinary expertises, this crossing beyond the boundary of academic disciplines has proven to have far-reaching consequences. Having extra-academic stakeholders on board requires that their experiential knowledge must be taken into account along with the interests and values that they embody. Including a wider participation of stakeholders together with a more ecumenical attitude regarding the forms of insights they bring to the table has an impact upon all stages and elements of the research process. And of course it has an impact on the product of the process, as well, for such projects commonly yield more adequate responses to life-world problems than interdisciplinary projects do that are not performed in collaboration with extra-academic stakeholders (Hirsch Hadorn et al., 2008; Klein, 2004, 2019).

According to Klein, this shift towards transdisciplinary collaborations further entails an impressive list of other non-trivial changes:

- from segmentation to boundary crossing and blurring;
- from fragmentation to relationality;
- from unity to integrative process;
- from homogeneity to heterogeneity and hybridity;
- from isolation to collaboration and cooperation;
- from simplicity to complexity;
- from linearity to non-linearity;
- from universality to situated practices. (Klein, 2003 §1)

As we can learn from this list, transdisciplinarity affects not just the nature and process of interdisciplinary research, but also the relation of the research to its context and practices.

³As much as Klein has helped to establish the field of interdisciplinary studies, she has also played an important role in this crucial and challenging expansion of it towards transdisciplinarity, even though she modestly contrasts her own “descriptive approach” with “prescriptive” approaches in an interview in this journal (Lotrecchiano & Hess, 2019). Yet she has obviously done more than just describing the boundary crossing involved in transdisciplinarity’s emergence, according to the introduction of the first journal issue completely devoted to it, where she is named among “those who have largely contributed in diffusing and refining this concept [of transdisciplinarity] in recent decades” (Lawrence & Després, 2004, p. 398).

Offering an analysis of the state of the field of interdisciplinarity in the 2013 volume of *Issues in Interdisciplinary Studies*, Newell comes to a similar conclusion regarding the crucial role of transdisciplinarity for the field. He spells out how transdisciplinarity challenges interdisciplinarity to reposition itself:

Specifically, transdisciplinarity pushes us to rethink the exclusive reliance of interdisciplinarity on disciplines, the focus of interdisciplinarity on understanding over application, the locus of interdisciplinary activity in the academy instead of the real world, and the conception of interdisciplinarity as intellectual inquiry rather than political or social activity. (Newell, 2013, p. 36)

Given Klein and Newell's agreement that the inclusion of extra-academic stakeholders in otherwise interdisciplinary projects is having such a fundamental impact upon many features of interdisciplinarity, it is probable that the implications for interdisciplinarity of this form of boundary crossing have not yet fully come to the fore.⁴ Hence my attempt below to reflect upon what those implications could be, inspired by the insights above and by a more philosophical take on the challenge of considering the future of a phenomenon as a way of considering its nature and potentiality.

Considering Interdisciplinarity's Future

Authors as diverse as Aristotle, Hegel, Marx, and Nietzsche have insisted that we come to know a phenomenon's nature most comprehensively when it has developed itself fully. Whether a seed, baby, or revolution, its potential is only visible once it has grown, matured, or institutionalized. This implies, though, that the future might confront us with an unexpected and surprising actuality of a phenomenon, as when the seed grows into another plant than expected, the child demonstrates surprising talents, and terror comes to dominate the aftermath of a revolution, for example.

More radical than such observations, though, is the reflection on the disciplinary future of philosophy offered by Martin Heidegger in his lecture

⁴ In his introduction to the *Oxford Handbook of Interdisciplinarity* Frodeman raises and answers the question: "What, then, is the problem that interdisciplinarity seeks to solve? I suggest it is one of politics, democracy, and technocracy. Interdisciplinarity is the bridge between academic sophists and the rest of society" (Frodeman, 2017, p. 7). Avoiding the term "transdisciplinary" here creates the risk that the reader overlooks the fundamental implications that bridging to the "rest of society" can have, for example when extra-academic participants are involved in problem solving projects. Such an implication could be that knowledge is no longer produced for its own sake but only for the sake of a sustainable future, as Frodeman argues elsewhere (Frodeman, 2014).

on “Das Ende der Philosophie und die Aufgabe des Denkens” – on the end of philosophy and the task of thinking. According to him, philosophy has completed its flawed course by accommodating itself to and positioning itself within the sciences, exhausting the limited possibilities stemming from the way it was conceived in Greek antiquity. Claiming that we are now observing the end of philosophy, understood as a form of “technical-scientific rationalization,” he suggests that we must reconceive the task of thinking in a fundamental way (Heidegger, 2007 [1964]). Employing the joint exercise of analysis and critique, Heidegger’s arguments serve to demonstrate that, contrary to the belief of many that modern philosophy has fully developed its potential from its ancient beginnings, we should recognize that philosophy has in fact failed to realize its most important task. When we return to philosophy’s pre-Socratic beginning, he argues, we can uncover ways of accounting for reality and truth that are fundamentally different from those with which later philosophers have performed this task. Indeed, radically different forms of thought emerge from such considerations, forcing us to reconsider our current understanding of philosophy as a discipline.⁵

Would a return to interdisciplinarity’s supposed origins be as fruitful as such an endeavor is claimed to be for philosophy? A reconsideration of its aforementioned origins at the SSRC headquarters around 1925 in an attempt to reconnect increasingly specialized social scientific disciplines will hardly lead to a fundamental rethinking of interdisciplinarity because such thinking will then remain focused on disciplines and their boundaries. So how about alternative means to the end of the adaptation or rejuvenation of interdisciplinarity? Reflecting upon interdisciplinarity’s approaching century mark and its future, Klein explores three different trajectories for “(re)situating interdisciplinarity.” The first entails a “universal radical transformation” of higher education as a whole, foregrounding cross-disciplinary research around problems and topics. The second provides room for an increasing plurality of kinds of interdisciplinary activity on the one hand while emphasizing the need for consistency and criteria for the quality and reliability of

⁵ Proponents of a “critical interdisciplinarity” have argued in a similar way for a reconsideration of the knowledge system, as Klein points out: “Over time, critical interdisciplinarity has influenced the way that research and teaching [are] conducted in established disciplines, older interdisciplinary fields, and general education” (Klein, 2005, p. 58). In so doing, they fulfilled the potential of interdisciplinarity, as it can imply “a more radical questioning of the nature of knowledge itself and our attempts to organize and communicate it” (Moran, 2002, p. 15). As soon as interdisciplinarity crosses over into transdisciplinarity, such radical questions and reconsiderations will inevitably present themselves because of the impact of extra-academic insights and norms.

interdisciplinary education and research on the other. Finally, “institutionalization and self-definition” are a third option for resituating interdisciplinarity within its largely disciplinary context, with such strategic repositioning being necessary for its survival (Klein, 2010a, pp. 158-160).

Irrespective of their differences, these three trajectories all involve interdisciplinarity’s institutional future. Although institutionalization is probably an important precondition for interdisciplinarity’s continuing presence as a force in the world, I think that, as far as its future is concerned, it is equally important to explore what ramifications the relatively recent boundary crossing involved in transdisciplinarity have for interdisciplinarity. Indeed, with extra-academic stakeholders co-determining all phases of transdisciplinary work, both the process and the product of that work are bound to be fundamentally different from those of work done by academics alone, with the aim of the work reaching beyond the production of new knowledge and its evaluation influenced by the expectations of those stakeholders. As Klein has observed of the transdisciplinarity that has now “become an essential mode of thought and action,” stakeholders are expecting not just academic insights into but also practical solutions to the problems at stake, not just thought, but action (Klein, 2004, p. 524).

In what follows I will further consider what the transdisciplinary development of interdisciplinarity that includes extra-academic stakeholders and their experiential knowledge, interests, and values and their practice-oriented expectations might hold for the future of interdisciplinarity. I believe that this development will force us to fundamentally reposition interdisciplinarity. And I believe this repositioning must occur in relation to two human faculties that are now not typically considered to be at the center of interdisciplinary projects: action and imagination. I am claiming that the future of interdisciplinarity will in large part depend upon how successfully it will connect to these faculties. In the next sections I will elaborate my views on the roles for action and imagination within interdisciplinary and transdisciplinary work – and especially within a version of the latter called “action research.”

Actionability as a Criterion for Interdisciplinary Knowledge

One of the changes in interdisciplinarity brought about by the inclusion of extra-academic stakeholders among the changes mentioned by Klein above is the shift from a quest for universally valid knowledge to interest in “situated practices” (Klein, 2003, §1). Articulating this development in the context of a more recent reflection on transdisciplinarity’s promising future, she

observes “a clear historical shift from traditional epistemology to problem solving, from the pre-given to the emergent, and from universality to contextuality and subjectivity” (Klein, 2014, p. 74). With the problem setting, methodology for solving the problem, and implementation of results being co-determined by all collaborators, and hence reflecting the subjectivity and positionality of the extra-academic stakeholders, a transdisciplinary project yields a context-specific solution. Transdisciplinarity delivers not just generally valid knowledge as interdisciplinary research does, but also socially robust knowledge that retains its relevance and value in the real-world contexts of its application (Klein, 2010b; Nowotny, Scott, & Gibbons, 2001).

It is important to acknowledge that calls for a more societally relevant form of knowledge production were voiced several decades before the word “transdisciplinarity” in the current sense began to be used.⁶ Particularly in the context of development activities in the global South, critique was leveled against traditional knowledge production that often occurred purely for its own sake. However, critique was also directed at the production of knowledge for instrumental purposes when those purposes were not sufficiently co-determined by the joint deliberation about insights, interests, and values by all stakeholders in a project and not just the academic ones (Klein, 2001).

In Latin America in the 1970s, so-called “action research” emerged from these debates, partly motivated by epistemological considerations but even more by societal expectations and needs. Fals Borda, a pioneer in this movement, writes that he and his colleagues were increasingly aware of the impossibility of objectivity and neutrality in social scientific research. They were eager to avoid the risk of exploiting subjects or communities for academic purposes. And they committed to the request of their communities that researchers produce “actionable” knowledge that would serve those communities. Taking these motivations seriously, researchers began to initiate their own “insertion into the social process,” insisting that knowledge being actionable should become an important research goal (Fals Borda, 1979).

Actionability of knowledge implies not only that the knowledge is valid from different perspectives (as is required in interdisciplinarity) and maintains its relevance when applied in a social context (as in transdiscipli-

⁶ The term “transdisciplinarity” is being used and interpreted in several ways. For example, the influential OECD report on interdisciplinarity also contains references to transdisciplinary theories like systems thinking or mathematics, which potentially cover different domains of reality (Apostel, Berger, Briggs, & Machaud, 1972). “Transdisciplinarity,” as understood here, referring to the inclusion of extra-academic stakeholders in interdisciplinary work, was developed in Europe (Balsiger, 2004) and this use of the term is now gaining more currency internationally.

narity). Actionability also implies that the knowledge responds to the needs and desires of the stakeholders involved in the interdisciplinary process. Indeed, applied as an additional criterion, actionability enables the distinction “between people knowing about something and their being able to produce that which they desire by using their knowledge” (Bradbury-Huang, 2008, p. 6). With this actionability criterion, action research goes another step beyond both interdisciplinary and transdisciplinary research: It not only includes stakeholder perspectives in its engagement with real-world problems but also subscribes to certain research goals that include “emancipation, empowerment, participatory democracy, and the illumination of social problems” (Grant, Nelson, & Mitchell, 2008, p. 589).

Clearly, by participating in a social process and aiming to produce actionable knowledge, action researchers assume roles and perform activities that are in many ways different from those of other inter- and transdisciplinary researchers. More explicitly aiming for social change and doing so with equal participation of extra-academic stakeholders, action researchers “do not define themselves as (or strive to be) impartial observers, but use their knowledge to help bring about change” (Smith, 2007, p. 162). Actionability understood in this way can only be fulfilled if researchers not only bring along a comprehensive set of research, social, and communicative skills but also are prepared to commit themselves to long-term projects unlike those common in academic research, even in transdisciplinary research. In the case of the development of a regional integrated health network, for example, action researchers participated for the entire period of its construction as partners in the project, being well aware that their role had a political dimension, as well. They have described how they used their theoretical and empirical expertise while contributing to the process in various ways:

Our role as researchers entailed partly identifying the types of development situations, partly contributing with strategies and methods for organizing the development processes, to systematize the participants’ and the researchers’ reflections over practice and in that way contribute to knowledge creation and development. This was a complex development task that reflected the challenges and complexities constituting a world full of ambiguity, multiple identities and conflicting interests. (Huzzard, Ahlberg, & Ekman, 2010, p. 310)

The authors suggest that action researchers in such cases function as “boundary subjects,” as experts who mediate between different organizational and professional perspectives while working towards the changes to which all involved in the project are committed (Huzzard et al., 2010).

Another action research project that serves as a case in point entailed the development of a participatory budget in Brazil. To pursue that end, citizens, researchers, and government officials together constructed an innovative democratic process. The process allowed the researchers involved to avoid the risk of “methodologization” or the belief that optimal solutions can be found given a sufficient methodological research design. Instead, as one of the researchers explains, all involved worked jointly to gradually identify the relevant questions as well as the evaluation criteria for the answers to those questions, including the actionability of the knowledge the process would yield. In the case of developing this participatory budget, for example, researchers contributed knowledge and analysis in multiple platforms during the process, aiming for research results for which rigor went well beyond adequate control of variables and instruments. Aiming for a middle ground between research in a theoretical vacuum on the one hand, and research as activism on the other, they defined rigor as “among other things, knowing how to move among the different types of knowledge and ways of knowing in order to help a given community or group to develop their strategies for organization, and to find means that enable them in the struggle for a better living together” (Streck, 2007, p. 123).⁷

In our report on the 2017 international transdisciplinarity conference, well aware of action research being different from inter- and transdisciplinary research, Julie Thompson Klein, Rick Szostak, and I drew attention to its emphasis on actionability of knowledge, pointing out that according to this criterion, “researchers are responsible for producing knowledge that potentiates social transformation, making ‘practicability of knowledge’ a criterion of validity” (Klein, Kestra, & Szostak, 2018, p. 1). Now, in 2019, this explicit devotion of researchers to helping extra-academic stakeholders in their pursuit of a better life still appears to be specific to action research and unusual in the context of inter- and transdisciplinary research.⁸ Nonetheless, I contend, inter- and transdisciplinarity’s futures may well move towards ever-increasing actionability since, as Fals Borda has argued, most inter- and transdisciplinary researchers *are* aware of us facing a global “challenge

⁷ Comparing action research with transdisciplinary research, Streck points out several distinct characteristics of action research: It entails collective (self-)reflection involving diversity of experts and stakeholders; practicability of knowledge as an additional validity criterion; strategies to potentiate action for social transformation; democratization of knowledge; and intercultural dialogue (Streck, 2017).

⁸ In addition, action research has been hailed as forming a barrier against the complete neoliberal management of the university since action research is not aimed at financial gains but instead “[at strengthening] remaining pro-social and pro-democracy forces within higher education and links these to the wants and needs of a broad social spectrum of non-university stakeholders” (Levin & Greenwood, 2008, p. 224).

to create a new science, responsible, democratic and participatory, to bring order to a world that is overexploited and in crisis, with threats of breakdown from the heavens to the caverns” (Fals Borda, 2013, p. 166).

With this plea for and promise of increasing pursuit of actionable knowledge, though, a new difficulty presents itself, for that pursuit involves challenges in addition to those posed by the fact the knowledge that is produced must be produced under the auspices of all stakeholders. In the next section I will consider how actionable knowledge cannot be produced unless all stakeholders decide upon a certain action after jointly imagining potential action options while taking into account the plurality of ideas and positions in their midst. The future of inter- and transdisciplinarity, according to this line of reasoning, must contain a prominent role for the imagination needed to create adequate options for action.

The Role of Imagination in Knowledge-Based Action

As we observed above, inter- and transdisciplinary research projects involve the crossing of multiple borders and the integration of a plurality of perspectives and insights. We noted, too, that Klein’s analysis of integrative process acknowledges that the “principle of variance” reigns in that process. In other words, there is “no universal formula for integration” of pertinent perspectives and insights (Klein, 2011, p. 293). In agreement with that observation, this section draws attention to the fact that the process is further complicated when actionability is embraced as an additional outcome criterion. Actionability or the “extent to which the project provides new ideas that guide action in response to need” (Bradbury-Huang, 2010, p. 103) implies that normative and pragmatic dimensions are important in the integrative process and in its future-oriented outcome. It is not surprising that in most cases a plurality of options for integration is available, none of which mutually exclude each other and all of which are at least partially unpredictable when it comes to their implementation. Choosing among them requires a process of deliberation among project participants as they consider possibilities, all having their own preferences. One participant may propose to respond to a given interdisciplinary health or sustainability problem by an adjusted prevention policy, for example, while another may prefer a new intervention, with a third suggesting further exploration with a computer simulation under certain limiting conditions, perhaps in combination with other approaches and actions. Individually and together, participants need to balance the positives and negatives that each solution to a problem might bring against those of others, involving costs and benefits, values, interests,

and priorities (Boix Mansilla, 2006; Hirsch & Brosius, 2013).

Navigating such a plurality of options without there being an obviously optimal outcome requires stakeholders to engage in another form of process than integration, a process that allows them to strike a balance or trade-off between different options for action. Interestingly, the process, called “reflective equilibrium,” was developed in political philosophy and ethics as a way of weighing options for action given norms and accepted background theories, allowing participants in a deliberation to gradually reach maximum coherence and agreement (Daniels, 1979; Rawls, 1974). Given the plurality of perspectives involved in interdisciplinary problem solving, reflective equilibrium can help such participants to reach a consensus, too (Boix Mansilla, 2010; Klein, 2019; O’Rourke, 2013). They would also be required to metacognize and reflect upon their own normative and epistemological assumptions as a precondition to further pursuit of the process, because only then could they adequately deliberate about available options with others, eventually reaching the desired equilibrium (Keestra, 2017).

As if such reflection and subsequent deliberation are not yet formidable tasks enough, participants must also employ another faculty when they have to choose between action options in light of available actionable knowledge. Given the plurality and openness pertaining to such options mentioned earlier, details and ramifications of each action option need to be specified before adequate deliberation is even possible. For this, participants in action research – as to a lesser extent also those in any interdisciplinary and transdisciplinary research – must apply “the dramatic rehearsal (in imagination) of various competing possible lines of action” (Bratman, 2007, p. 150). Such imagination of action options is often accomplished in the form of narratives that allow participants to configure and reconfigure the options in many more or less detailed ways, while envisioning those options as integrated into their own biographies and life-worlds (Keestra, 2014). Of course, instead of narrative imagination other forms can be employed for this task, as well.

One might expect people to understand that imagination thus plays an important role in interdisciplinary and transdisciplinary research projects, especially those involving action research. Unfortunately, though, imagination and the arts generally speaking are often contrasted with rationality and science, as Klein notes in a chapter on interdisciplinary arts and music research. In that context she rejects the “false dichotomy that posits rationality (cognitivity) as the realm of science and irrationality (imagination) as the realm of arts,” suggesting that there is value in the joint application of these faculties (Klein & Parncutt, 2010, p. 135). I would reject that false

dichotomy, too.

When imagination has been fostered in inter- and transdisciplinary collaborations, this has often occurred by integrating the arts and “exploring the interconnected creation of worlds” in that way (Gabrys & Yusoff, 2012, p. 19). Less formal creative and imaginative explorations invite participants to engage in “artful doing,” building upon acquired knowledge. Dieleman appreciates that exercising creativity and imagination also provides room for participants’ affective and embodied being (Dieleman, 2017). Imaginative explorations help to develop representations of potential complex futures in the form of narratives or animations, for example, providing participants with experiences that are sufficiently rich and vivid to enable them to sense and understand them, share them, and deliberate about them.⁹ Indeed, artistic imagination can be invoked as a genuine form of experimentation useful in inter- and transdisciplinary work, especially when that work can be characterized as action research: Instead of (or in addition to) using scientific experimentation as a way to test novel insights, participants in ID, TD, and AR, using proper “imaginaries,” can experiment with potential futures and generate new questions and answers about those insights (Born & Barry, 2010).¹⁰

Urban planning projects, an example that Klein uses in discussing this matter, require not only input from academics representing various disciplines but also the full employment of the faculties of all those involved in the projects, including creativity and imagination. Before adequate deliberation about options is possible, the engagement of these faculties is important:

[N]ew objects come into view, practices come into new configurations, theory and learning are contextualized and resituated, and awareness of hybridization heightened when incorporating once excluded forms of knowledge, including the understandings of lay people. (Klein, 2019)

In this way, it is feasible for both experts and lay people alike to have a relatively rich, embodied, and affective experience of future options, enabling all to weigh the options against each other and deliberate about them. Obvi-

⁹ In our research group “Neurocultures” at the University of Amsterdam artists participate on equal footing with scholars and scientists. Artists can be involved in arts-science collaborations, for example, helping to explore neurodiversity as contributions to our 2016 conference demonstrated (Besser et al., 2016). Film director Nevejan presented her documentary about epileptic absences, integrating in them artistic imaginaries co-produced with patients, enabling them to convey their first-person experiences of absences and hallucinations to others (Nevejan, 2019).

¹⁰ In their contribution on the ethics of interdisciplinarity, Balsamo and Mitcham draw attention to “technological imagination” as it entails the “performativity and improvisation” necessary for reflecting upon our interactions with technologies (Balsamo & Mitcham, 2010).

ously, the merely disciplinary processing of information and knowledge is incapable of accomplishing this. Even interdisciplinary or transdisciplinary research does not generally encourage participants to engage their imaginations to such ends, yet our exploration of the future of interdisciplinarity suggests we should do so. In action research, imagination often already plays such an important role that a particular method has been developed to enable that role. This research method is called “appreciative inquiry,” which is “a form of action research in pursuit of knowledge creation for social innovation [that] invites us to be daring in our explorations and articulations of alternative possibilities for our shared and organized existence” (Zandee & Cooperrider, 2008, p. 190). In other words: Actionable knowledge requires imagination for its realization in potential solutions to real-world problems.

Imagination and the arts are playing a more important role in action research than they do (or are acknowledged to do) in interdisciplinarity and transdisciplinarity, as the literature shows.¹¹ Yet by exploring the actual and potential boundary crossings at work in interdisciplinary and transdisciplinary research, Klein has fathomed the implications of widening the circle of participants in research collaborations, of extending the set of evaluation criteria for their integrative results, and of expanding the set of options for future action to be considered in the integrative process. All of these evolutions in ID and TD work involve a more prominent role for interdisciplinary imagination and will benefit if that role is acknowledged and deliberately enhanced, especially as AR or the actionability of the work becomes more important.

Actionability and Imagination in the Future of Interdisciplinarity

As noted at the start of this article, then, interdisciplinary activities initially were motivated by ideas of unity and synthesis, a point Klein made in her 1990 book on interdisciplinarity. Since earlier days, though, as Klein

¹¹ A crude indicator of the differential importance of imagination and arts in interdisciplinary, transdisciplinary, and action research might be how often they figure in prominent handbooks. Imagination occurs not even once in the index and only a few times in the *Oxford Handbook of Interdisciplinarity* (Frodeman, Klein, Mitcham, & Holbrook, 2010), not at all in the *Handbook of Transdisciplinary Research* (Hirsch Hadorn et al., 2008), and as “social imagination” and conjugated forms in the index of the *Handbook for Action Research* and at least 20 times in its chapters (Reason & Bradbury, 2008). However, Augsburg notes that inter- and transdisciplinary arts are thriving even though this is not represented in the literature (Augsburg, 2017). It is not implausible that the action research literature is similarly not sufficiently covering the – still larger – role of the arts in action research.

has also observed, interdisciplinarity and transdisciplinarity have come to be increasingly characterized by the plurality, heterogeneity, and hybridity of their communities, practices, methods, and results (Klein, 1996, 2010a). In her description of these fields and their developments, she uses the metaphor of boundary crossing to capture both the relevant dynamics and the permeability of the boundaries involved (Klein, 1996, 2019). With the inclusion of extra-academic stakeholders in transdisciplinary research projects, new forms of engagement and new criteria for success have been introduced, along with new kinds of boundary crossing, which do have fundamental implications for interdisciplinarity according to Klein.

Taking this change in ID work another step further, I have here focused on a mode of research that has been little mentioned thus far in the literature on inter- and transdisciplinarity, to wit, action research. With actionability as an aim and criterion, action research presents several important challenges in addition to those already prevalent in interdisciplinary and transdisciplinary research.

Notwithstanding the plurality and hybridity involved in all ID and TD work, AR requires that we select one option for acting over others. This situation requires, so I have argued, that participants engage in a complex process that consists of two elements: deliberation in order to reach a reflective equilibrium enabling an adequate choice between future action options and imagination to bolster adequate consideration of those options. Extending and transforming some elements of Klein's important contributions, I hope to have made plausible that actionability and imagination should and will become prominent features of interdisciplinary work of all kinds in the future, and that there is actually an urgent need for this to happen and for interdisciplinarians to address how it might be made to do so.

Acknowledgements: This article is based upon my keynote on “The Future and End of Interdisciplinarity. What Is Implied When We Aim for More Robust Interdisciplinary Insights?” for the Interdisciplinary Learning and Teaching Conference on “Practice and Knowledge Production” at Keele University, April 9, 2019. I thank the conference organizers, Ida Kemp, Andy Zieleniec, and Ella Tennant, for their invitation and the audience for their comments. Online conversation about this keynote with Julie Thompson Klein was, as conversations with her always are, inspiring and confirmed our shared interest in its topics. Many thanks are further due to guest editor Tanya Augsburg and the journal co-editors, Gretchen Schulz and Sven Arvidson, for their invaluable comments that helped to turn this work into a readable text.

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