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Article

Transdisciplinarity in Research about Agrifood Systems Transitions: A Pragmatist Approach to Processes of Attachment

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Abstract: The much-needed transformations of agrifood systems call for novel approaches that are able to bring together a diversity of actors' and institutions' knowledge and visions. While within the literature about participatory research and transdisciplinarity, many articles have discussed the issue of actor involvement, few have addressed it regarding agrifood system transitions, which are the focus of this paper. Inspired by recent work suggesting a pragmatist approach to stakeholder involvement and collective processes of problem framing and solving, this study (based on a reflexive analysis of six different projects involving different approaches to stakeholder involvement) developed an actor-oriented approach focused on what the motivations to enroll actors and for them to be enrolled are, and on the analysis of the diverse visions and controversies at play. The main outcome of this analysis is that a key issue regarding stakeholder involvement appears to be whether the diverse stakeholders and researchers involved share the sense of being part of a "community of fate" that makes them feel *individually* "affected" but also *collectively* "attached" to a shared problem and possibly to a shared future. This is not fixed and stable but can be reinforced through the research–action process itself, which should produce this *collective attachment*.

Keywords: agroecological transitions; research action; food systems; pragmatism; sustainability science

1. Introduction

In the sustainability sciences, transdisciplinarity is increasingly adopted as a key (if not buzz) word. However, the literature tends to adopt normative stances on the design of appropriate approaches and/or the definition of different "degrees" of transdisciplinarity or participatory research (a term that seems to be favored by NGOs, international bodies and policy makers) [1]. Some authors contrast consulting versus "real" participatory transdisciplinarity [2], or "simple" versus "real" transdisciplinarity [3]. By focusing on the *degree* of stakeholder involvement, this literature most often does not address the *motivations* of either researchers or actors for this involvement, nor their transformations over time.

In a recent article on transdisciplinarity in sustainability research, Popa et al. [4] suggested considering this issue of stakeholder involvement through a pragmatist perspective which emphasizes the role of social learning processes and social experimentation in generating reflexivity on values and understandings in concrete problem framing and solving contexts, for researchers and actors alike. They also suggested addressing the issue of stakeholder involvement based on a distinction between the analytical and transformational dimensions of transdisciplinary research, which can, respectively, be translated into complex-system approaches and extended-peer community ones, but are indeed entangled and mutually reinforcing aspects.

Drawing on this article and combining an actor-oriented approach inspired by recent European scholarship in pragmatist sociology, this study, based on a reflexive analysis of six different research

projects dealing with agrifood system transitions, adopted an actor-oriented approach focused on the motivations to enroll actors and for them to be enrolled.

The issue of stakeholder involvement has taken a prominent place in the “sustainability sciences” literature, but has been less explored regarding agrifood systems. Indeed, most recent literature reviews about transdisciplinarity deal with urban transition, landscape transformation, energy, transport and natural resource management [5–7]. Although some deal with participatory research in the agricultural sector, few tackle agrifood system transitions. These make it necessary to bring together a diversity of actors’ knowledge, visions and practices to tackle the interdependencies between the different components of the said agrifood systems that impede or favor sustainable transitions, an approach that is only seen in recent articles [8].

How are conversely transdisciplinarity and stakeholder involvement tackled in the literature dealing with agricultural and agrifood systems? The need to consider farmers and local actors’ knowledge has long been advocated by certain authors [9,10], especially (but not only) in the context of “developing countries”. However, it remained quite marginal in wider agricultural and rural development systems, mostly characterized by top-down processes, even though more participatory and transdisciplinary approaches have progressively been legitimated within this field (as in others) as recent evolutions in international policy circles and institutions acknowledge [11]. This has often led to imposing devoted principles, but has not always brought actual changes in research practices.

Within the agrifood studies, agroecology is one of the areas of research and action where transdisciplinarity has a particular place. For example, a google scholar request based on the keywords “agri/o/food systems” and “transdisciplinarity” shows a majority of works dealing with agroecology and featuring its main theorists [12–14]. In fact, while there are different narratives of the emergence and institutionalization of agroecology and different visions of its internal diversity and its borders [15], common to all is the idea that the agroecological paradigm (whether considered as a form of agriculture, or as a larger vision of agrifood systems) goes hand in hand with specific visions of knowledge construction processes and of research itself, where wider communities of knowledge-building and practice should involve farmers, advisors, researchers and civil society [16–18]. Some authors have argued that different visions of agroecology also correspond to different visions of inter- or transdisciplinarity, showing for example that there is a “weak” vision of agroecology mainly based on a combination of agronomy and ecology and a “strong” one that involves not only a diversity of other disciplines, including social sciences (enlarged interdisciplinarity), but also other actors (transdisciplinarity) [19]. However, this leads to the reproduction of the normative stance that the author specifically wants to avoid here, by adopting a pragmatist stance focused on *how* transdisciplinarity is put in practice.

Agrifood system transitions, which will be the focus of this article, hold certain specificities that have an impact on the kind of knowledge that can be produced and therefore on the kind of transdisciplinarity that can be put in place. While certain specificities such as the existence of strong societal demands and the diversity of actors involved are common to different fields, agrifood system transitions also hold intrinsic features such as uncertainty or context-dependency. This has been argued especially, once again, regarding agroecological transitions [20]. Another important aspect, though less commented, is that compared to fields like energy, forest conservation, landscape or water management, food production and consumption are characterized by the fact that any individual (whether producer or consumer) has a potential “hold” or “grasp” [21,22]. In that respect, one of the main paradoxes of agrifood system transformations is that a productive activity that was fully “controllable” by its users has been industrialized to a point where most users have actually lost most of the control they had on their food—at the level of both production and consumption. For the same reason, agrifood systems are also a field with a large diversity of initiatives and attempts to “regain control” through alternative food systems, participatory certification schemes, etc. These specificities have to be taken into account when dealing with stakeholder involvement.

Based on a reflexive analysis of the transdisciplinarity approaches carried out in six different research projects dealing with agrifood system transitions, this article discusses three key issues of recent debates about stakeholder involvement within the sustainability sciences. The first one is the role of stakeholders in knowledge production and in the orienting of research [4]. The analysis of these six situations will show that the type of motivation for this involvement is also a key issue: do researchers involve stakeholders because they consider them as *representative* or because they see them as *legitimate* to tackle the “shared problem”? Do stakeholders accept getting enrolled because they are *appointed* by their organization or because they feel *affected* by the question and (individually) “attached” to it? Do the different actors, whether researchers or stakeholders, (collectively) share the sense of being a “community of fate” [23] that reinforces their collective “attachment” to the problem [24]? Based on the characterization of these six projects in terms of the nature and process of stakeholder involvement, this article shows how important it is for the diverse stakeholders and researchers involved, to feel not only *individually* “affected” but also *collectively* “attached” to a shared problem and possibly to a shared future. It also shows that these motivations and forms of attachment are not pre-given: they are dynamic and can be reinforced (or not) through the research-action process itself.

The second key issue discussed based on this reflexive analysis of these six projects is the combination of analytical and transformational postures in transdisciplinarity. The pragmatist approach applied here shows how the construction of shared narratives and shared experimentations allows to produce both analyses and transformative actions.

The third key issue is the kind of *interdisciplinarity* which is in question in transdisciplinary approaches: What are the interactions between the different disciplines? What are their respective roles? This issue is often overlooked in the transdisciplinarity literature, which leads to black boxing the specificities of *interdisciplinarity* that are involved in different forms of *transdisciplinarity*. The study analyzed the type of *interdisciplinarity* involved in each of the six projects and the combinations of different forms of *interdisciplinarity* and *transdisciplinarity*. The outcome is to suggest that some combinations might be more appropriate to specific “shared problems” depending on the degree of collective attachment to a “shared future” of the said “community of fate”.

The second section presents a short and focused literature review and then the author’s own approach; the third section describes the methods that were used, the fourth section presents the six projects and the way each one views transdisciplinarity and stakeholder involvement and translates this into specific approaches and processes. The discussion addresses the three key issues raised by the reflexive and comparative analysis of these projects: the motivations for stakeholder involvement, the way analytical and transformational postures can be combined in a pragmatist approach (through shared narratives and shared experimentations), and the possible combinations of inter and transdisciplinarity that relate to different configurations of problem-framing.

2. Transdisciplinarity in Sustainability Sciences: Towards an Actor-Oriented Pragmatist Approach

Transdisciplinarity, which can simply be defined as research approaches that include multiple scientific disciplines and practitioners from outside academia focusing on problems of common concern [25], is addressed by a growing literature, especially within “sustainability sciences”, even though transdisciplinary approaches are used in various other fields (e.g., social issues such as poverty and social inequalities, city planning, agriculture, etc.). This field, a problem and solution-oriented research field that emerged in the late 1990s and actually encompasses diverse strands and disciplines, has recently given place to vivid debates and strong renewals in methodological approaches to transdisciplinarity [6,7]. We thus could consider, in an “evolutionist” perspective, that transdisciplinary approaches have been refined over time, not only because of the proper dynamics of scientific debates in the literature dealing with science and society interactions (exemplified in the Mode 2 turn [26]), but also due to actors’ criticisms and to institutions and funders’ injunctions. This is attested by the “triple helix” concept, present in all kinds of institutional reports and programs since its appearance in the

early 2000s [27]. In that view, “weak” transdisciplinarity would progressively have been replaced by stronger forms.

However, we could also contend that diverse epistemologies and ontologies have long been at the basis of contrasting visions of transdisciplinarity, which led certain authors to assess a north-south divide [28] rather than a uniform evolution. On the one hand, according to this vision, there is a “northern” tradition of action research, considered to have emerged with the work of K. Lewin and his notion of “social engineering” [29] and which can be defined as “pragmatic” (and not pragmatist as we will later see in other approaches). It is characterized by working on contexts where immediate action is needed [30] as well as by consensus and conflict avoidance, and can even be considered as working hand in hand with existing structures of dominance in society [28]. Transition management approaches, as they are developed in several policy fields in the Netherlands and other countries, partly derive from this northern tradition [31]. On the other hand, in a “southern” perspective that can be defined as “critical”, researchers engage themselves in the emancipation of underprivileged groups by helping them through reflection to unveil dominant ideologies and coercive structures. This is exemplified by the work and writings of the Brazilian P. Freire and his “Pedagogy of the oppressed”, but also by some perspectives adopted by European critical thinkers such as M. Foucault or P. Bourdieu, in situations where they were involved with fragilized and/or oppressed social groups (prisoners, AIDS patients, and the poor), and could be discussed today in the light of the notion of southern epistemologies suggested by B. de Sousa Santos [32]. Therefore, different types of transdisciplinarity and action-research perspectives need to be related to the specific historical and socio-political contexts where they emerged and are developed.

Despite this need for contextualization, a large part of the transdisciplinary literature, whether in the academia or on the “actors” side, adopts a normative perspective and suggests hierarchical classifications of transdisciplinarity or participatory research. These are based on the nature and degree of stakeholder involvement and/or the methods used to involve them in the research process. In the 1990s, the first critical appraisals of participatory research were based on the argument linked to the risk of “depoliticizing development”, and thus suggested different “degrees” of participatory research: nominal participation (when legitimation is the main goal), instrumental participation (when an efficiency or cost-effectiveness goal is dominating), representative participation (when appropriation is aimed at), and transformative participation (when empowerment is the main goal) [33]. Such a hierarchical vision of forms of transdisciplinarity remains present in recent scientific literature, with classifications of transdisciplinary approaches through normative hierarchies such as information-consultation-collaboration-empowerment [1]. Some authors contrast consulting versus “real” participatory transdisciplinarity: consulting transdisciplinarity would apply to situations where actors from outside academia respond and react to the research conducted (once it is done), while participatory transdisciplinarity defines situations where different kinds of actors are included on equal terms in the knowledge production process [2]. Others contrast “simple” participatory research and “real” transdisciplinarity, the former including practitioners in the process of knowledge production, but *not* in the co-leadership of research [3].

The article’s aim is not to suggest another distinction between these categories, but rather to focus on the question of why and how stakeholders are involved. In other words, the motivations and processes of stakeholder involvement.

To address stakeholder involvement in transdisciplinary projects on agrifood system transitions, I adopted a pragmatist stance drawing on a recent article on transdisciplinarity in sustainability research [4] and combined a more actor-oriented approach inspired by recent scholarship in pragmatist sociology. Against a value-neutral positivist vision of science and a relativist skepticism about the possibility of discriminating between competing knowledge claims, Popa et al. suggest two contrasted but also complementary perspectives. First, a deliberative perspective (à la Habermas) emphasizing the importance of collaborative deliberation in building a shared understanding of the problem and a socially relevant framing of it. The objective of such deliberation is to reach consensus, an aim which

can be criticized as an unwarranted attempt at reducing the irreducible pluralism of perspectives and values [34]. In contrast (or in complement) to this deliberative perspective, the pragmatist one “emphasizes the role of social experimentation and social learning processes in generating reflexivity on values and understandings in concrete problem-solving contexts” [4:48]. In a pragmatist approach, the aim should not be to subsume the diversity of values and visions to any form of consensus that risks silencing dissenting voices, but rather to pay attention to overt disagreement as well as trying to trace covert disagreement [30].

Popa et al. [4] also proposed a distinction between the analytical and transformational dimensions of transdisciplinary research. Descriptive-analytical approaches are, for example, complex-system approaches such as socio-ecological systems, and can be combined (or not) with transformational orientations where the aim is to directly contribute to the sustainable transition process. In the reflexive transdisciplinary approach that these authors suggest, the analytical and transformational dimensions of research are entangled and mutually reinforcing aspects [4]. In its descriptive-analytical mode, reflexivity calls for a critical acknowledgement of the values and assumptions, as well as of the institutional and power structures that shape the current epistemological models and the organization of science. In its transformative mode, it calls for building a shared normative vision (for example, a desired transition pathway) which can challenge dominant power structures, and guide social change.

Finally, to qualify the role of stakeholders, these authors suggest another distinction: between a social and an epistemic role of stakeholder involvement in transdisciplinary research. The social role emphasizes democratic participation, social relevance and legitimacy-building, in line with the idea of a “new social contract for science” [26] and the objective of ensuring a “socially robust” scientific production. The epistemic role emphasizes the epistemic potential of co-production of knowledge, by extending the peer-community in order to better address complexity, uncertainty and value commitments, in line with the notion of “post-normal science” [35].

In this article, and based on the comparison of different projects, I argue that this pragmatist stance can be enriched by adopting a more actor-oriented sociological vision of pragmatism that relies on the analysis of visions and controversies over current and possible transitions [36,37]. This pragmatist-sociological stance not only aims at a Foucauldian interpretation of power and order in a distanced and critical posture but, in a more “engaged” way [38], also constitutes a part of the transdisciplinary research process itself. This pragmatist approach is clearly actor-oriented in that it leads to assess the motivation of participants (both researchers and stakeholders) to take part in a project and for the project team to enroll them. Are they there because they are *appointed* by their organization (which is considered as *representative*), because they are as individuals considered by the research team as *legitimate*, because they feel *affected* by the question either individually or collectively, or for a combination of these reasons? Here, I rely on sociological analyses of engaged experiences of participation [38] and on recent pragmatist approaches of participation in French philosophy and sociology [39]. Based on a reflexive analysis of the six projects, I show that a key distinctive feature between different situations is whether the diverse stakeholders and researchers, share (or not) a sense of “community of fate”. This makes them feel *individually* “affected” but also “holds” them *together* [40], because they are *collectively* “attached” to a shared problem and possibly to a shared future. Indeed, being affected allows them to feel an *attachment* to this public or shared problem [24]. This notion of *attachment* was suggested by B. Latour as an “alternative” to that of network [41] and was commented on by A. Hennion in his recent work [24]. I show that this attachment and this sense of community of fate are not pre-given: they are not necessarily present right from the beginning of a research-action process but are the result of the process itself.

3. Methods

This exploratory reflection about how researchers and actors are involved in transdisciplinary projects was based on the author’s experience in six recent projects dealing with agricultural and agrifood system transitions, all involving different disciplines and stakeholders, although to different

degrees and through various modalities. All these projects deal with “wicked” problems—in the sense that there might be disagreement over their nature, as well as varying interests and perspectives involved, which might lead to frame the problem differently [42]. All these projects involved stakeholders and researchers from different disciplines, even though the nature and stage of their implication was different across projects, as the article’s objective was precisely to discuss different and contrasted situations. These projects tackled a very specific problem within agrifood system transitions (such as the experimentation and possible adoption of an alternative biological product instead of a chemical fungicide in Project 1), or considered these transitions in a more encompassing and transversal way (such as a collective reflection about agroecological transitions at the territorial scale in Project 6). One of them involved stakeholders “only” at a late phase of consultation about the project’s findings, while the others involved them along the research process.

Partly based on the article by Popa et al. [4], I defined several key questions that guide this reflexive analysis of the approaches to stakeholder involvement that have been adopted in these six research projects (see the detailed descriptions below and the synthetic table in Appendix A):

- What is the “shared problem” defined within the project and how was the initial question (coming from one or more specific disciplines or actors) possibly discussed and redefined?
- What disciplines are involved and which one(s) is (are) leading the project? What form of interdisciplinarity did this define?
- How are actors chosen and involved in the project? What is their motivation/driver to get involved or mobilized? (Is it because they are appointed by *representative* organizations, because they are considered *legitimate* or because they feel *concerned* and maybe even *affected* by the problem?)
- Are these actors involved in the production of knowledge? How?
- Are they involved in the orientation of research? How?
- Does the project imply an analytical or a transformational approach (or both)?
- Do participants (researchers and actors) share a common future? What is the central object of their collective attachment which possibly led to the sense of being part of a “community of fate”?

This analysis was primarily based on the author’s own participation on the construction and the coordination of these projects, as well as on the production of their diverse outputs (scientific articles, wider publications, public conferences, discussions, etc.) but also on formal and informal discussions held during or after these projects with the involved researchers and actors. In each of these projects, between 20 and 40 interviews were carried out with diverse actors of the agrifood systems under study (including researchers themselves). As a coordinator and/or participant of these projects, I took part in a series of meetings involving researchers and stakeholders.

4. Six Research Approaches to Agrifood System Transitions with Various Forms of Interdisciplinarity and Transdisciplinarity

4.1. The Botrytis Project: Can We Define a Shared Problem Starting from an “Adoption of the Innovation Problem”?

The Botrytis project was launched in 2007 to set up an on-farm experimentation of a new biological product (not yet marketed). It was started by a team of scientists in plant pathology who were already working in strong collaboration with a range of agricultural stakeholders (farmers, market intermediaries, technical advisors, and manufacturers of biological products), whom they involved through a working group that regularly met and discussed results during the length of the project. These stakeholders all work in the same sector (tomato production) and most of them are located in the same region in Southern France (Provence). They were at the same time *representative*, *legitimate* and *affected* by the research problem. At the time of writing the project, the scientific leader (a plant pathologist) decided to enroll social scientists to address the issue of the future product’s adoption by

the farmers. What are the obstacles and levers to the adoption of a new biological product that would allow to reduce pesticide use? A reformulation of this initial problem was suggested by the sociologists who argued that it was necessary to study the way this innovation would interfere with and possibly influence farmers' trajectories and their current practices and visions of crop protection. This led to carrying out a qualitative survey that allowed identifying three main visions also linked to different types of practices. However, the "shared problem" was not collectively reframed, leaving agricultural and social scientists on different sides and adjusting only marginally their respective research questions and approaches. The experimental approach led by the agricultural scientists and the sociological approach remained disconnected except in the discussions within the multi-stakeholders working group. Expressly anchored in a transformational posture as the goal was to assess the possible adoption of a technological innovation, this project was based on (and reinforced) the links between the agricultural scientists and the stakeholders, who felt strongly affected by this problem and had been working together for a longer period. It did not, however, positively lead to an "attachment" of the social scientists to the "shared problem" which remained mainly that of the other two parties [43].

4.2. The Gedupic Project: Strong Interdisciplinarity and Low Transdisciplinarity

This project was set up in 2006 within a wider research program of the French Research Agency (ANR) about sustainable agriculture. Right from the beginning, agricultural and social scientists worked together to write the proposal and define the approaches to be used. The project had different work packages dealing with input reduction in cereal and fruit production, one of which started from the same question than the previous project, i.e., an "adoption of innovation problem". In fact, the initial question addressed to the social scientists by the agricultural scientists was to help them understand why, despite their good agronomic and economic results, rustic (resistant) wheat and apple cultivars were not selected in low input practices. In this case, the question was reformulated collectively during the proposal elaboration phase and led to the articulation of the perspectives of agronomists, economists and sociologists to study the factors that would either favor or impede the use of these cultivars, which became the "shared problem"—one whose framing did not involve stakeholders at this early stage. A common theoretical framework was elaborated, based on an evolutionary economics approach (path dependency, lock-in), and led to studying and discussing the convergent trajectories of the different components of the wheat and fruit production socio-technical systems and their effects in terms of marginalization of alternative options (such as the use of resistant cultivars in low input practices—as most often these cultivars are grown within conventional crop management techniques) [44,45]. In parallel to this interdisciplinary work, sociological analyses of farmers' trajectories and farmers group dynamics were also carried out. In contrast to the previous project, the Gedupic one was anchored in an analytical posture (as opposed to a transformational one). Within a complex system approach, the objective was to understand transition mechanisms at the scale of the whole socio-technical system. Stakeholders were only involved through a formal "steering committee" that gathered institutional, food chain and agricultural stakeholders considered as *representative* of their profession or institution at the national scale and were mostly appointed by their respective organizations. This committee discussed the results of the research and was asked to establish priorities for future public policies, but did not take part in the orientation of the research or in the production of knowledge. Even though all of the committee members contended that they were also *affected* by the issues raised within the project, their *collective attachment* was weak compared to the Botrytis project, partly due to the scale of the perspective, which was much less situated. This made most stakeholders consider that they had no hold on the transitions that were discussed.

4.3. The Prunus Project: The Co-Construction of a Shared Diagnostic as a Starting Point

The Prunus project (2013–2015) was set up with the aim of extending the analysis carried out within the previous project to a component and a discipline that appeared as key to agroecological transitions, i.e., genetic innovation. Based on the acknowledgement of the limits of the choice of the

large scale made in the previous project, especially in terms of researchers/stakeholders interactions, the work was focused on a specific area of peach and apricot production, that of the middle Rhone Valley in southern France. The agronomists and geneticists were already strongly involved there. The fact that all the researchers felt a strong attachment to this production area and to its stakeholders was an important motivation for them to launch the project and frame it in a slightly different way than the previous one, i.e., within a more situated and localized perspective and with strong involvement of these stakeholders. The main question of the project reflects how the “shared problem” was defined: How can fruit production become more ecological, considering the scale of the regional socio-technical system of fruit production and the interdependencies between its actors? An interdisciplinary team was established to carry out a socio-historical analysis of the evolution of the fruit chain (socio-technical system) as well as two surveys: one of farms and one of the main regional actors. A reflection group was created in the beginning of the project, gathering researchers, farmers, advisers, and market intermediaries, and meeting regularly all through the duration of the project. In contrast to the previous project, these were *legitimate* and *concerned* actors rather than *representative* ones, in the sense that they had expressed a strong interest in the issues debated and had an ongoing collaboration with part of the research team. This was also expressed in sociological interviews that were carried out in the beginning of the project and showed that they felt *affected* by the research problem. They took part both in the orientation of the research and in the production of knowledge: the surveys and samples were co-constructed with them, while the socio-historical analysis was discussed in several meetings and based on a report circulated among them and that was commented and completed by them. This later led to the publication of a co-authored article [46].

4.4. Future Sustainable Fruit Cultivars: The Co-Construction of Innovation

The last phase of the Prunus project led to the organization of specific workshops devoted to the co-conception of future sustainable fruit cultivars (in 2015), funded through another program within the Ardu project (2014–2016). Within the above reflection group, a more specific shared problem was defined: What should be the criteria for sustainable fruit cultivars and how should the innovation system be redefined to favor them? This phase combined two approaches. On the one hand, an analytical approach aimed at analyzing the evolution of the genetic innovation system based on qualitative interviews with nursery operators, geneticists, and breeders. On the other hand, a transformational and participatory approach aimed at co-constructing criteria and then characteristics of future cultivars. This was based on a cycle of three workshops where a large range of criteria was discussed and hierarchized (such as adaptation to climate change, to low-input or organic agriculture, to a diversity of marketing outlets, etc.). During these workshops, different scenarios for future fruit production systems (including marketing and consumption issues) were discussed and translated into description of adapted “ideotypes”. For these workshops, the initial working group (about ten people, researchers and stakeholders altogether) was extended to a dozen more people who embodied the other main components of the innovation socio-technical system (nursery operators, geneticists, evaluators, breeders, seed regulatory institutions). They were chosen (and decided to participate) based on their personal implication in these issues at the regional scale. If some of these were *representative* actors, all of them were *legitimate* and felt *concerned* and individually *affected*. They also shared a strong *collective attachment* to the future viability of the regional fruit production system. These stakeholders were involved both in the orientation of the research process and in the production of knowledge, as the ideotypes produced in the workshops were considered a collective production [47].

4.5. The Rethink Project: The Challenge of Involving Locally Anchored Stakeholders in an European Project

The Rethink project (2013–2016) was forged by a consortium of different European teams in social and agricultural sciences, with the aim to rethink the links between farm modernization, rural development and resilience. The shared problem, defined in very ambitious and general terms (How can agricultural modernization be redefined?), was forged by these different teams in the process of

elaborating the proposal. Fourteen case studies were carried out in the 14 countries taking part in the project, diverse enough to address the ambition of the above research question—the French case study was about the ecologization of the agrifood system and focused on fruit and vegetable production and on the regional governance of the organic sector. Results were discussed at the scale of the whole project based on four cross cutting themes (resilience, prosperity, governance and knowledge and learning). In terms of stakeholder involvement, an advisory board was created at the project's scale, gathering experts such as European NGOs or external researchers, while “Stakeholder Partnership Groups” were established by the different national teams. The theoretical framework established at the beginning of the project focused on systems thinking as well as on reflexivity and participation, and gave national teams guiding questions they had to keep in mind when composing their national stakeholder groups: “How will you select the members of the Stakeholder Partnership Group? What implications will this choice have: whom do you exclude? Whose power do you reinforce?” In the French case, a group of ten people (farmers, local authorities, organic organizations, and market operators) was composed based on the criteria that they were *legitimate* to tackle the issue, felt *concerned* and were potentially interested by the comparison with other countries (which was the specificity of this project); some of them were de facto also *representative* of their different professions and institutions (for example, one farmer was a member of the organic farmer organization). In this group's meetings, the research orientations and results were discussed, with the actors contributing also to the choice of relevant target people for a qualitative survey about the governance of organics at the regional scale. Nonetheless, they did not really orientate the research, except for the fact that a co-led PhD project was elaborated by the researchers and the local “departmental council” during the project.

4.6. Territorial Agrifood System Transition: The Long and Progressive Elaboration of a Transdisciplinary Approach

In recent years, research calls have tended to increase the place of participatory research in their goals and requests, for example by including CSOs or SMEs among the possible (or requested) partners of research projects. In this context, new or ongoing partnerships between researchers and stakeholders found a new ground to expand and gain in legitimacy. This is what was aimed at when in 2015, a group of a dozen researchers (sociologists, geographers, and agronomists) and CSO employees and activists decided to set up an action-research project on agroecological transition at the scale of their small region (in southern Ardèche, France). Through several meetings during the proposal's elaboration phase, a shared question was progressively defined, i.e., how can the territorial agrifood system be ecologized in an inclusive way, considering necessary transitions in agricultural and food practices together? While agroecological transition processes (their factors, motivations, mechanisms, the need to tackle both the production and the consumption side) was a question already shared by the different researchers and local actors, “inclusiveness” and social justice issues were raised by some actors who had worked on low-income families' access to local quality products and young and/or new farmers' access to land, agricultural knowledge and support. The fact that these researchers and actors had already worked together (or regularly met in diverse networks) and that most of them were living and working in this small region made them feel *concerned* and even *attached* to this shared problem. Landscape, rural vividness, farm resilience and social links were the building blocks of a *collective attachment*. The shared problem was declined in different tasks of the research proposal that combined agronomic and social experimentation “at the real scale” (that of the farm or of a box scheme for example) as well as a reflexive analysis about access to food, tutorship systems between experienced and new farmers, and on-farm seed production. In this project, stakeholders were supposed to take part in both the orientation of research and the production of knowledge. However, the funding body decided not to fund this project partly because it considered the participating stakeholders to be “non-representative”. Although this was precisely what the research-action team aimed at—involving concerned and attached rather than (only) representative actors—this evaluation criteria reminds us that *even* in action-research programs, large and dominant stakeholders (whether institutions, CSOs,

or agricultural organizations) are considered more legitimate than small local CSOs—even when these are part of larger national networks as was the case of two out of the three main CSOs taking part in the project, not the least because the expected effects of the research in terms of diffusion are supposed to be better when so-called “representative” organizations are involved (as they can allegedly reach more farmers or consumers).

5. Discussion

5.1. The Motivation for and of Stakeholder Involvement: From Representativeness to Attachment

The comparison of these different projects brings to consideration three key questions regarding stakeholder involvement: their choice, the role they are given, and the motivations to enroll them and for them to be enrolled. While the first two questions represent two classical issues in the transdisciplinarity literature, the third one has been less tackled. The question of the choice of the stakeholders who are enrolled to take part in a research project should not be reduced to its final result or expression, i.e., who is in, who is out, who is included and who is excluded. The *process* of choice (*how* people are chosen) appears as even more important because it reveals, first, how participation is conceived by the projects’ leaders and, second, their vision of the social system under study (and of its boundaries). In the case of Gepudic, the process of choice among the project’s leaders mainly consisted of discussing who were the representative and “inescapable” actors and/or organizations: thus, it reflected a vision of the social system defined by the inclusion of the main farming organizations, the main food chain and public policy actors, as well as the largest French environmental NGO which was supposed to represent environmental issues and societal demands. By contrast, in the Prunus project the choice of stakeholders was the result of an iterative process whereby stakeholders were selected based on researchers’ past and current collaborations and could then suggest to also involve other persons and institutions. Since such a process of choice carries the risk of relying only on a network of “usual suspects” [6], the team’s sociologist (also project coordinator) met individually with members of the stakeholders’ group to reinforce the mutual trust as well as take into account the diversity of interests and values within the group itself and with actors outside the group.

The second question relates to the role the actors take and/or are given in the research process, once they are “chosen”. As explained above, many authors highlight low versus strong forms of transdisciplinarity, depending on whether stakeholders are “only” consulted about the research results or take part in the production of knowledge or even in the orientation of the research. In the Gedupic project, actors were mostly consulted about the research results; they did not take part in the orientation of the research or in the production of knowledge (except within specific surveys). Towards the end of the project, they were asked to contribute to the construction of a hierarchy of future priorities for research and public action, although this was but a side-output of the project rather than a proper collective knowledge production. In contrast, in the Prunus project actors took part both in the orientation of the research and in the production of knowledge, especially the elaboration of the socio-historical analysis (see above). This implication in knowledge production implied an iterative process and adjustments (e.g., the article co-authored by the researchers and actors was the result of dozens of successive versions and interactions). It also led to different modes of communication and publications corresponding to different “layers” of knowledge and details [48] and co-authorships [49].

The third question is that of the motivations to enroll the stakeholders and for them to be enrolled. As said above, in some projects, actors and/or organizations are chosen because they are considered as *representative* of the issues (the “spokesmen” of these issues). In other ones, they are chosen because they are considered to be *legitimate* to tackle these issues and/or because they feel *concerned* by them, even though they might not be *representative* of their organization or formally appointed by it and might not be influential in the decision system. Past and current close interactions with these stakeholders (through past collaborations and/or interviews in the beginning of the project as has been done in the case of the Prunus project) allow the researchers to acknowledge whether these actors feel *concerned*

and/or are *legitimate* and whether they also feel *affected* by the problem justifying the project (which in all the cases considered here deal with the social, economic and environmental sustainability of the agrifood system, be it defined at a very large scale or at a more regional one where they can feel they have a hold on future transitions). Following previous studies about stakeholder involvement, I use the notion of “affected” actors to suggest that, beyond feeling concerned, they are also affected in their own trajectory and personal life [38]. Some of them can also be considered as *representative* (when they are the leaders of a main producer group or head of the main advisory organization, for example), while others are “only” *legitimate* (because they know the problem well without being necessarily representative). In the Prunus project, I observed that choosing a mix of *representative* and *legitimate* stakeholders—although all *affected* by the problem—had positive effects in terms of actual participation of the different individuals on the debates in contrast to other projects. All these stakeholders were physically present in all the meetings.

5.2. Combining Analytical and Transformational Postures through Shared Narratives and Shared Experimentations within a Pragmatist Stance

As was emphasized by Popa et al. [4], transdisciplinarity can be implemented in an analytical or in a transformational posture, or a combination of both. In the different projects under study here, there was always an analytical posture present, although not always a transformational one. As argued by other authors, even when transformative action is the main shared aim of the research team considered in its extended definition (including the stakeholders as co-producers of knowledge), it needs to be preceded and accompanied by critical thinking and reflection. This allows to analyze diverse social processes of inclusion, exclusion, and power relationships that (in our cases) could impede or favor agroecological transition processes [30]. These authors contend that unequal and invisible power relations need to be unveiled before they can be transformed. Surely, this analytical-critical role is central to the professional identity of sociologists, as its key aim is to analyze the relations of power, the diverse path dependencies and the controversies characterizing the social system under study. In the case of the six projects under consideration, such a critical approach did not aim at emancipating people (as could be the case in other contexts), but rather at acknowledging the variety of values and interests involved [4] and constructing a collective “intelligibility” of the situation and processes [20]. A sociological approach anchored in pragmatist sociology allows to trace the diversity of values, visions and interests as well as possible controversies. It goes hand in hand with the pragmatist stance (in its philosophical meaning) suggested by Popa et al. [4], which allows to collectively acknowledge this diversity of values and interests. This “doubly” pragmatist stance can be performed based on devoted spaces and arenas where the different actors can not only express their values and visions but also produce shared narratives. In these arenas, “relational reflexivity”, i.e. the awareness of our interactions/interdependencies *with* others as well as the awareness of the interdependencies *between* others, is of highest importance [50].

In the Prunus project, for example, the socio-historical analysis carried out with the stakeholders led to the writing of a shared narrative expressing the collective acknowledgement of the fact that, despite strong power relationships and the presence of diverse and sometimes conflicting interests, the current situation was not the result of one (dominant) actor’s action but rather the convergence of diverse trajectories. Stakeholders are neither “guilty” nor victims of external changes. This also led to discussing in a more prospective way how these actors can regain control over their choices—whether production, marketing or consumption choices—and thus share collective responsibility through mutual commitment towards a common future in a context where they share a community of fate [23]. In this case, the shared narrative was that of the researchers and the stakeholders being together, and involved an “extended peer community approach” [4]. In other projects such as Gedupic, the shared narrative was instead that of the researchers and relied on a “complex system approach” involving the different disciplines but not the stakeholders. In these different cases, narratives are elaborated by

social scientists with the contribution of the other disciplines, with or without the actors. Thus, different sorts of “shared narratives” are forged as an output of the shared problem definition and exploration.

Beyond these shared narratives (and when the projects also adopt a transformational posture), shared experimentations might also be involved. In the Botrytis project and the Gedupic one, these experimentations involved the agricultural scientists and diverse stakeholders, but not the social scientists. In the cultivars and the Ardèche projects, the transformational posture led to setting up shared experimentations involving the different disciplines and stakeholders. The collective elaboration of future ideotypes in multi-stakeholder workshops (cultivars) can be considered as a social experimentation of the process of genetic innovation. In the Ardèche project, several tasks were planned to implement both agronomic and social experimentations with diverse stakeholders. Such collective experimentations rely on a triple definition of participation [39]: to participate is to take part, to bring one’s part, and also to receive one’s part. Participation in this sense is inseparable from the process of individuation of which these three aspects are necessary conditions—individuation being, in the French philosopher Simondon’s terms, the ongoing process of constitution and permanent evolution of the individuals in all the relevant domains of life (physical, biological, psycho-social and “transindividual”) [51].

5.3. Problem Framing: Different Configurations of Inter- and Transdisciplinarity

Our comparison also permits to analyze the problem framing processes that take place in these six projects, and how they embody different configurations of both inter- and transdisciplinarity. Different concepts have been suggested to define the process of collective problem framing and its central objects: “common epistemic objects”, “boundary objects”, or more simply “shared problem” which I use in this article [5]. Most articles focused on the place of stakeholders in these problem framing processes, but often overlook the relative place of the different disciplines and thus the characteristics of the interdisciplinarity are often obscured behind the transdisciplinary approach. Therefore, in the author’s comparison, I have tried to consider not only the stakeholder involvement but also that of the different disciplines.

In the cases of both the Botrytis and the Gedupic projects, the problem framing process started from an “adoption of innovation problem” raised by the agricultural scientists (in articulation with a range of stakeholders in the first case) who enrolled the sociologists to help them address this question. However, in the first project, this did not lead to defining a shared problem but rather to two parallel and articulated problems, as the sociologists suggested their own formulation. This led to relating the adoption of innovation problem to farmers’ trajectories and their current practices and visions (a classical negotiation and reframing process in inter- and transdisciplinary science(e.g., [6])). In the second project, the different disciplines worked together to frame the problem in an interdisciplinary way, which led to the adoption and adaptation of an analytical framework that would make sense to the different disciplines at least for the part of the project devoted to the socio-historical and “lock-in” analysis (other tasks were more specifically anchored in specific disciplines). The different disciplines gathered together in a shared analysis of the convergent trajectories of the different components of wheat and fruit production socio-technical systems and their effects in terms of the marginalization of alternative options. The first project thus embodied a relatively disconnected vision of interdisciplinarity, even if it involved stakeholders in part of the problem framing process (the design of agronomic field experiments). In contrast, the second project was characterized by a more integrated vision of interdisciplinarity, although it did not involve stakeholders in the problem framing process (these were mainly consulted on the research results, like in the Rethink project).

In the Prunus project (Project 4), the problem framing process involved the different disciplines at the stage of the elaboration of the proposal, as in the Gedupic case. The will to forge this interdisciplinary collaboration had progressively emerged in different contexts in the previous years: two among the three main scientists of the project, the agronomist and the sociologist, had worked together in the Gedupic project; the agronomist and the geneticist worked together on a regular basis

as they specialised on the same fruits, had experiments on the same experimental stations, and were in link with the same professional stakeholders; the sociologist, the economist and the geneticist, finally, had together been part of the national fruit and vegetable sector's scientific committee for several years. In this way, all of them had had strong interactions with one another as well as with the fruit sector's actors and issues. Moreover, while in previous projects agricultural scientists were coordinators, in this case it was the social scientists who took the lead and oriented the problem framing process towards more consideration to issues such as power relationships and actors' visions and controversies. Based on a series of collective informal and formal discussions about the barriers to a larger ecologisation of fruit production, a three-folded approach was defined, based on a socio-historical (retrospective) analysis, an analysis of current practices and visions at different stages of the food chain, and a prospective approach. Once the project had started, stakeholders were directly involved through workshops aimed at defining the survey samples and discussing the analyses carried out about the socio-historical evolution and current practices, thus taking part both in the orientation of research and in the production of knowledge.

In the later phase of fruit cultivars co-construction process (Project 5), the problem was framed by the group of researchers and stakeholders. The approach and methods to tackle this problem were defined by the researchers, but the work carried out during the workshops (hierarchy of criteria and characteristics of future cultivars) can be considered as a process of knowledge co-production involving the different actors at the same level. The two projects (Projects 4 and 5) express both an integrated vision of interdisciplinarity and a strong involvement of stakeholders (see Figure 1).

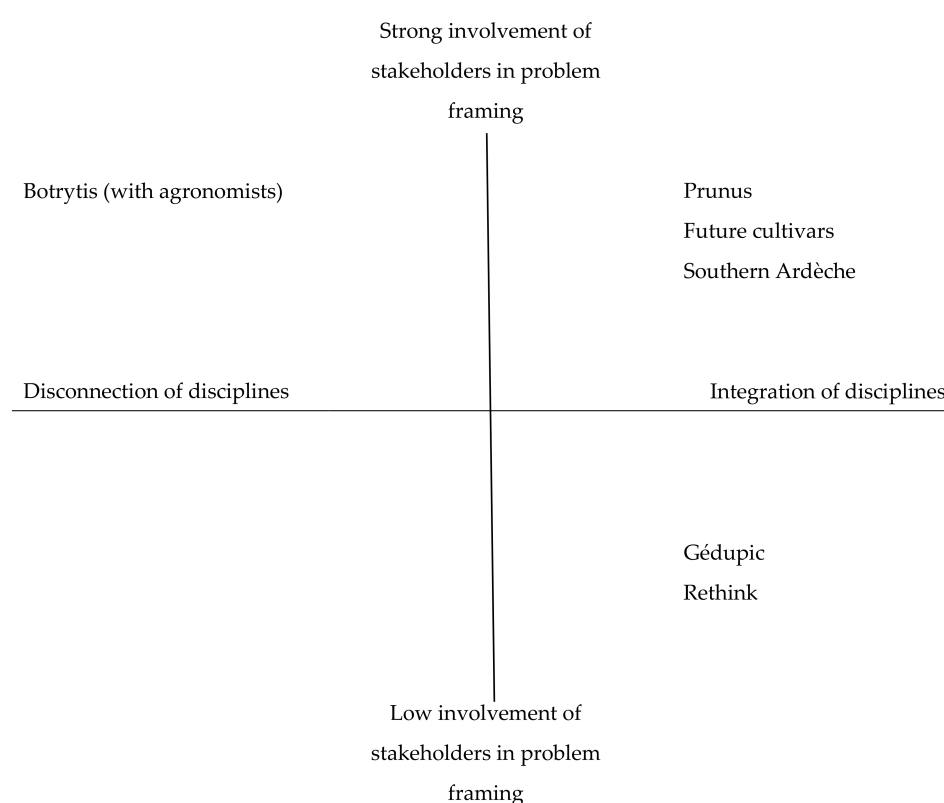


Figure 1. Stakeholder involvement and interdisciplinarity in the 6 projects under study.

In the last project (Project 6), the research question was defined with the stakeholders within a systemic vision of the links between agroecology and food at the territorial scale. Despite the lack of support (the project did not get any funding), and since the researchers and stakeholders wanted to start working together, the action-research was implemented by pieces based on budget and time

opportunities: two of the main tasks, on farmer-to-farmer mentoring and on collective dynamics related to on-farm seed production, were started through co-constructed qualitative surveys. They gave place to different written productions and public presentations. Although the systemic stance of the project has not yet been fully implemented (as the enrolment of stakeholders envisioned initially through regular meetings could not be funded), it has been included in later project proposals writing and in seminar discussions bringing together actors and researchers.

6. Conclusions

The analysis and confrontation of the transdisciplinarity “performed” in six research projects leads to confirming the recommendation made by several authors to reflexively consider stakeholder involvement and to ask whether stakeholders are involved: (i) in the deliberation about the work (once done); (ii) in the framing of the problem (and thus the orientation of research); (iii) in the production of knowledge; and/or (iv) in the experimentation of problem solving [4]. The author’s contribution is to add three other relevant questions to enrich this reflexive posture on transdisciplinarity, based on an actor-oriented approach inspired by recent European scholarship in pragmatist sociology.

The first one is the type of motivation for these stakeholder involvement, i.e., whether it is because they are *considered representative* or *legitimate* to tackle the question or instead feel themselves *affected* by the question. This attachment to the shared problem can become collective when the diverse stakeholders as well as the researchers share the sense of being part of a “community of fate”. However, we have seen that this is nothing to be taken as pre-given or stable, and can be reinforced (or not) through the research–action process itself. Temporality and time frames are indeed key issues: stakeholder involvement in the orientation of research is often progressive and a matter of time—they might also become involved in the construction of the *next* project. Moreover, the author’s experience suggests that a combination of different motivations—a mix of *representative* and *legitimate* stakeholders, once they are all *affected* by the problem—has positive effects in terms of actual participation, although this needs to be tested in further research. This outcome of this reflexive analysis about stakeholder involvement and transdisciplinarity within agrifood system transitions may provide some reflections for the implementation of agricultural and rural policies such as within the European partnership for innovation which aims at favoring bottom-up approaches.

The second main contribution is more theoretical: the author suggested here to enrich the philosophical pragmatist perspective to transdisciplinarity by adopting a more actor-oriented analysis of visions, controversies, and attachment processes through an approach based on French pragmatist philosophy and sociology. This suggestion might also lead to “revisit” the notion of “transition arena”, often used in the sustainability sciences: in this pragmatist perspective, transition arenas can be considered as places where shared narratives and shared experimentations can be produced.

The last contribution to pragmatist approaches to transdisciplinarity relates to the fact that most articles do not address the type of interdisciplinarity (or interactions between different disciplines) that is at stake. The comparison of the six research projects shows that different forms of transdisciplinarity are coupled to specific forms of interdisciplinarity (more disconnected versus more integrated interdisciplinarity), that might be better adapted to specific “shared problems” and situations. Indeed, while the transdisciplinarity literature often leads to hierarchical classifications of strong versus low forms of transdisciplinarity and to recommendations over appropriate designs to transdisciplinary approaches, I have shown that different configurations produce different outcomes related to different forms and degrees of stakeholder involvement, as well as different forms of integration between scientific disciplines.

Finally, while the most recent analyses about transdisciplinarity focused on other issues and sectors, this article is centered on agrifood system transitions and suggests that some of their specificities (when compared to other transitions such as energy, landscape, water management, etc.) must be considered when reflecting upon transdisciplinarity or designing a transdisciplinary approach. On the one hand, food with its highly vital and symbolic dimensions, may potentially

generate more individual and collective attachment than other issues. On the other hand, considering the context-dependency of transition processes—key to an agroecological perspective—appears as much more realistic in more localized projects (Projects 1, 4, 5 and 6 as opposed to Projects 2 and 3). Researchers and actors who live and work in the same region are more likely to build a collective attachment to a community of fate, and to collectively reflect about the influences of larger scales and interests. They are also more likely to consider that they have a hold on future transitions. However, power relations are (of course) not absent from local settings and a sociological analysis of visions and controversies is necessary to avoid the classic “local trap”.

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Appendix A

Table A1. Analytical Grid for the Six Projects.

	1. Botrytis (Tomato) France, 2007–2008	2. Gedupic (Wheat) France, 2007–2008	3. Rethink European, 2013–2015	4. Prunus France, 2013–2016	5. Future Varieties France, 2015	6. Ardèche France, 2015–2017
Central question or “shared problem”	What are the obstacles and levers to the adoption of a new biological product?	Why despite their good results rustic varieties are not adopted along with low input practices?	How can agricultural modernization be redefined?	How can fruit production become more ecological, considering the scale of the food system?	What should be the criteria and innovation system for sustainable fruit cultivars?	How can the territorial agrifood system be ecologized in an inclusive way?
Form of interdisciplinarity and involved disciplines	Separate analyses (Pathology–Sociology–Economy)	Analysis led by sociologists with agronomists’ input	Co-led analysis (on farm resilience) (Sociology–agronomy)	Co-led analysis (socio-historical, practices) (Sociology–agronomy–genetics–economy)	Co-construction of criteria and ideotypes (idem)	Co-construction of protocols (Sociology–agronomy)
Forms of stakeholder involvement and Type of motivation	A group that follows the experimentation (Farmers, Biological control enterprise, cooperative, advisors), representative and affected	A formal “steering committee” (Food chain and agricultural actors, Stakeholders), all representative	A national stakeholder group (Farmers, institutions, market operators), some representative, others not, all concerned	A reflection group all along the project (Farmers, institutions, operators, advisors), representative and affected	Workshops with 20 persons (Farmers, operators, nurseries, breeders, advisors, public services), some representative, others not, all affected	From an informal CSOs/Researchers network to involving institutions and agricultural actors
Involvement in production of knowledge	Involved in the pathologists’ experimentation	Reaction to our results (validation), co-construction of analysis with <i>some</i> actors investigated	Contribution to our analysis through their expertise	Co-production of the socio-historical analysis (co-authored article)	Co-production of criteria, and scenario	Co-production of the analysis in different steps (ex local seeds production, young farmers)
Involvement in orientation of research	In the construction of the project	Low, but reinforcement of links with some actors for further projects	Low, but construction of a co-led PhD project during the project	Co-construction of the surveys and samples Orientation of the next project (2016)	Co-construction of genetic research possible orientations	Co-construction of the research project
Analytical/transformational (Popa et al., 2015)	Analytical (Extended Peers community) + transformational (technocratic)	Analytical (Complex System Approach)	Analytical (Complex System Approach)	Analytical (Complex System Approach + Extended Peers community)	Transformational (nor technocratic nor critical = transition arena?)	Analytical + Transformational
Do people share a community of fate?	Viability of their production	Environmental demands. For some, will to redefine the professional model	A (large) territory	Viability of the industry as a whole + environmental demands	Will to redefine the innovation model + environmental demands	Lived (small) territory (landscape, agriculture, quality food, social links, etc.)

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