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Reconfigurations in sustainability transitions: a systematic and critical review

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ABSTRACT

Two streams of literature have become especially prominent in understanding social change toward sustainability within the past decades: the research on socio-technical transitions and applications of social practice theory. The aim of this article is to contribute to efforts to create dialogue between these two approaches. We do this by focusing on the concept of *reconfiguration*, which has become a much-used, but poorly defined notion in the discussion on sustainability transitions. To understand what is defined as reconfiguration in systems and practices, and how the understanding of reconfiguration in regimes could benefit from insights about reconfiguration in practices, we conducted a systematic and critical literature review of 43 journal articles. The findings showed a trend toward a focus on whole-system reconfiguration and interlinked dynamics between practices of production and consumption. However, our study suggests that a less hierarchical understanding of transitions utilizing insights from practice theory might be fruitful. Future research on sustainability transitions could benefit from addressing the tensions between and within niche and regime practices; the dynamics maintaining and challenging social and cultural norms; the efforts in creating new normalities and in recruiting actors in practices; and investigating the different roles the various actors play in these practices.

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Introduction

The transition to sustainability requires fundamental changes to societal processes, particularly to the ways products and services are produced and consumed, as well as to how these systems of production and consumption are governed (Cohen 2019). Two distinct literatures have become especially prominent in this field: the research on socio-technical transitions (and the multi-level perspective (MLP) in particular) (e.g., Geels 2002; Schot and Geels 2008) and applications of social practice theory (SPT, e.g., Shove and Walker 2010). Moreover, there is a growing body of research that aims to identify crossovers and intersections in these two approaches (e.g., Geels et al. 2015; McMeekin and Southerton 2012; Shove and Walker 2010), as well as to provide empirical examples of practice-based approaches to transformative change (e.g., Godin, Laakso, and Sahakian 2020; Hargreaves, Longhurst, and Seyfang 2013; Heiskanen et al. 2018; Kaljonen et al. 2020; Laakso 2017; Seyfang and Gilbert-Squires 2019). The objective of this article is to contribute to these efforts, by creating further dialogue

between transition and practice theories. We have done this by focusing on the concept of *reconfiguration*, which has become a much-used, but poorly defined, notion in the discussions on sustainability transitions.

The concept of reconfiguration has been proposed as a way to provide a better understanding of dynamic and co-evolutionary changes in sustainability transitions. Our preliminary understanding of reconfiguration stems from an article coauthored by transition (and particularly MLP) scholars and SPT scholars in an attempt to capture the nature of change processes concerning sustainability (Geels et al. 2015). In this contribution, Geels and colleagues argue for transitions in both socio-technical systems and social practices in societal domains such as mobility, housing, agro-food, and heating, and acknowledge that these transitions entail changes not only in technologies, markets, and institutional frameworks, but also in cultural meanings and everyday life practices. Moreover, the article calls for further efforts to conceptualize interactions between consumption and production that are still

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inadequate in both MLP and SPT. Furthermore, Geels and colleagues argue that understanding sustainability transitions requires a focus not only on systems or practices, but also on understanding how reconfigurations occur with respect to both of these assemblages.

In a broad sense, reconfiguration suggests that several institutions, actors, practices, and constituent elements of practices are expected to change in a sustainability transition, resulting in a new combination of old and new elements (Geels et al. 2015). To elaborate these dynamics and to provide (1) *definitions of reconfiguration in systems and practices*, we conducted a systematic and critical literature review, which concentrated on scrutinizing the premises inherent in these theories. As we will describe later in this article, based on our overview, the transitions literature (and MLP in particular) treats reconfiguration as subtle, multiple dynamics in the relations between three nested levels: niche innovations, institutional regimes, and the landscape level, with the recent transitions literature shifting toward a more holistic whole-system understanding. The interpretation of SPT on reconfiguration, in turn, emphasizes more explicitly the inner dynamics within and between practices. In the transitions literature, reconfiguration is increasingly being used to illustrate how the hierarchies between the niche-regime-landscape relations are becoming blurred and questioned. Therefore, we consider further (2) how the less hierarchical understanding of *reconfigurations in practices can contribute to the investigation of system transitions*, in which social practices and their change have a key role.

The article proceeds as follows: in the next section, we provide a brief overview on transition theories (MLP in particular) and SPT. In the third section, we introduce our method for conducting the systematic literature review. The fourth section presents the identified definitions of reconfiguration and the theoretical premises of our research orientations. In the fifth section, based on the findings of the literature review, we critically discuss the repertoire of approaches to reconfiguration and provide seven potential contributions of SPT to the understanding of reconfiguration in systems transitions. We also relate these findings to other literatures with the aim of understanding the reconfiguration dynamics between the practice and transition theories. We conclude in the final section by discussing potential avenues for future research.

Transitions in regimes and practices

In conducting the systematic and critical literature review we have first drawn from the socio-technical

transitions literature and in particular, the MLP, which has developed powerful concepts for assessing co-evolutionary processes between niches (i.e., protected spaces for innovation and experimentation), regimes (i.e., rules and actor relations in the incumbent socio-technical system), and landscape (i.e., long-term broad societal pressures) (Geels and Schot 2007; Köhler et al. 2019). Within this perspective, changes often stem from niches which are understood to be spaces for novel initiatives, typically developed at the margins of a socio-technical regime, and a likely source of pioneering and radical change in the incumbent system that is characterized by incrementalism and path dependencies (Smith 2007). Niche innovations may diffuse and alter the regime via processes of replication, up-scaling, and translation of key ideas to mainstream thinking (Kemp, Schot, and Hoogma 1998; Seyfang et al. 2014). They can stretch and transform regimes, but the impact of many niche innovations has often been more akin to fit and conform to the dominant regime (Smith and Raven 2012). Mylan et al. (2019) also suggest that niches are able to fit and stretch the regime, which includes both radical and reforming elements. Importantly, the MLP underlines that niche innovations are likely to have only a limited impact unless they are supported financially, institutionally, via networks, or through regulation and policies disrupting the regime (Kemp, Schot, and Hoogma 1998; Kivimaa and Kern 2016). The MLP thus interprets the different levels of niches, regimes, and the landscape as separate, but interlinked and changing in a co-evolutionary manner.

Our second source of inspiration comes from SPT which reminds us that no spread of innovation or enduring change in social phenomena is possible without alterations in intertwined, differentiated, and interlinked practices. There are many conceptualizations of practices: as recognizable entities that depend on integration of materials and technologies, know-how, and capacities as well as cultural meanings and engagements (Gram-Hanssen 2011; Shove, Pantzar, and Watson 2012); as spatial-temporal manifolds of activity organized by understandings, rules, and teleoaffective structures (i.e., normatively prescribed objectives and ends) (Schatzki 2016); or as routinized behavior guided by shared understandings, know-how, and standards of the practice, as well as the differentiation of roles and positions within it (Warde et al. 2007), to name a few. Importantly, practices can be of many kinds. As some examples of practices, Schatzki (2016) names religious practices, practices of democracy and publicity practices – as well as mundane cooking, camping, and cleaning-up practices. Although practices

are stable entities, the individual performances provide room for experimentation and change (Kaljonen et al. 2019; Warde 2005) and the potential to change practices as entities lies in replacing or altering the elements (i.e., recrafting or substituting practices) or the ways they are “interlocked” (Laakso 2017; Spurling et al. 2013). Practices also differentiate and diffuse socially, underlining the dynamics of social interaction and contestations in transition dynamics. Shove (2003) has underlined how evolving standards of comfort, cleanliness, and convenience link to the ways in which energy is used for washing, heating, and ventilating in households (see also Laakso and Heiskanen 2017).

Some studies have identified points of intersection between regimes and practices in sustainability transitions as a means of deepening understanding of how sustainability innovations might develop (see e.g., Geels et al. 2015; McMeekin and Southerton 2012; Mylan 2015). As noted by Hargreaves, Longhurst, and Seyfang (2013), both MLP and SPT recognize contemporary sustainability challenges as demanding fundamental systems change. Both theories are also “middle-range” approaches that refuse to give primacy to either structure or agency in socio-technical change processes, but instead focus on the dynamics of “structuration” that drive both system stability and change (e.g., Geels and Schot 2007; Røpke 2009). Also defining the boundaries of practice, as well as those of regime, has proved challenging in both approaches, having implications for understanding the dynamics and processes of change. Units of analysis in both socio-technical systems and practices are conceptualized as heterogeneous configurations with co-evolving elements, and both address the “analytical tension between the reproduction of current systems and normal ways of life (‘stability’) and the emergence of alternatives that can form the seeds for transition (‘change’)” (Geels et al. 2015, 6). Moreover, both MLP and SPT contend that these processes will involve multiple actors, follow nonlinear trajectories, and display co-evolutionary and emergent dynamics that proceed despite various forms of path dependency and lock-in (for a more detailed comparison, see e.g., Hargreaves, Longhurst, and Seyfang 2013). For example, Seyfang and Gilbert-Squires (2019), in their study on the banking sector, argue that MLP would understand transitions to sustainable banking to be a niche innovation, the aim of which is to disrupt the existing banking system and SPT as new practice elements which aim to configure an emerging set of sustainable banking practices, together providing critical understanding of transformative change.

It is important to also acknowledge the differences in how MLP and SPT approaches conceptualize system boundaries and changes in the system. Most importantly, MLP does not aim to offer a social ontology, but rather heuristics for empirical research, making the two approaches ontologically incompatible (see Schatzki 2011). While the MLP understands transition as interdependent but separate developments at different levels (niche, regime, and the landscape), in SPT changes occur within and between practices. The SPT incorporates a large part of the regime concept, as well as the wider landscape, into the concept of practice. In this sense, the ontology of the SPT is “flat” (Schatzki 2016). It sees aspects such as the division of labor, gender relations, as well as political, economic, legal, and cultural institutions as part of the practices, which may then be altered via performances in practices (Røpke 2009; Schatzki 2002; Shove 2014). It is also important to keep these ontological differences in the theories in mind when interpreting the different uses of the concept of reconfiguration for understanding changes in regimes and practices.

Our aim in this article is thus not to synthesize MLP and SPT or to find similar mechanisms of reconfiguration in these two literatures by force. Instead, by critically discussing what reconfiguration means and how it occurs in these literature streams, our aim is to provide further insights on how the understanding of reconfiguration in practices can benefit future studies of sustainability transitions.

A qualitative systematic and critical literature review on “reconfiguration”

In this article we used a systematic and critical literature review as a method to study reconfigurations in transitions and practices. In conducting our literature review, we followed the guidelines of Liberati et al. (2009) to depict the process (Figure 1). Our focus was on those articles that explicitly used the term “reconfiguration” in the context of sustainability transitions and/or social practices.

We searched Scopus combining terms “reconfig*” AND “sustainab* transition*” OR “sustainab* transfor*” OR “socio-technical transition*” OR “socio-technical transition*” in the title-abstract-keywords fields. The year of publication was not limited. The search led to 55 articles. We conducted an identical search in Web of Science (WoS), leading to 40 additional articles. A similar process was done by using search terms “reconfig*” AND “practice*” AND “sustainab*,” but to limit the search, the subject area was restricted to the social and environmental sciences. The search led to 92 articles in Scopus and

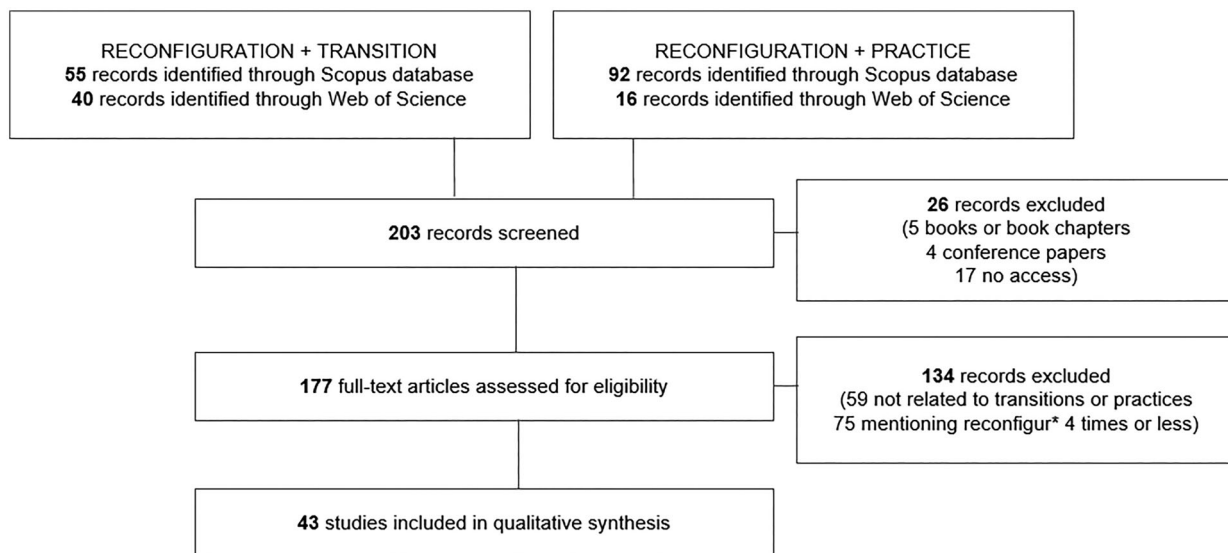


Figure 1. Information flow in literature review (following Liberati et al. 2009, 5).

16 additional articles in WoS, after removal of duplicates.

To be included in the review, the publication had to (1) be a peer-reviewed piece of academic work, thus conference papers and monographs were excluded, (2) be thematically oriented to sustainability transition studies or social practices, and (3) have appeared in Scopus or WoS on March 27, 2020. In addition, we excluded the articles in which “reconfig*” was mentioned four times or fewer. Of the 203 articles identified through Scopus and WoS, we excluded 160 as they did not meet the criteria or we did not have access to the article. The remaining 43 articles (see [Appendix A](#)) were each individually read and coded by two researchers (see [Appendix B](#) for the complete list of the codes used). The authors discussed coding both before and during the coding and also coded some of the articles together.

The term “reconfiguration” appears in the articles from five to 95 times. The articles were published between 2007 and 2020, with the number of published articles growing quite steadily since 2007. The most popular journals were *Journal of Cleaner Production* (8 articles), *Energy Research and Social Science* (5), *Environmental Innovation and Societal Transitions* (5), *Research Policy* (4), *Journal of Consumer Culture* (3), *Sustainability* (3) and *Technological Forecasting and Social Change* (3). The most prevalent author is Frank Geels, who contributed to 7 articles, followed by Mike Hodson and Andrew McMeekin who each contributed to 3 articles. Following the inclusion criteria, the theories most used in the articles were transition theories (especially the MLP, used in 21 articles) and SPT (used in 8 articles), with four articles using both transition and practice approaches. Most of the articles in which empirical data were used focused on Europe (25 articles), and especially the UK (7)

and Norway (4), but there are also articles with empirical observations from Asian, North and South American, and African countries. In terms of their specific substance, the articles focused on energy/electricity (12), mobility (9), and agri-food (7).

It is important to point out that the aim of our review was to systematically and critically review the multitude of ways in which the concept of reconfiguration has been used in research on socio-technical transitions and social practices. Despite the theoretical connections, many articles used reconfiguration as a concept without any definition or deployed it as a synonym for realignment (e.g., Winfield et al. 2018) or redefinition (Rossi et al. 2019), for example. We focused only on the concept of reconfiguration as it has been emerging strongly in the MLP literature (and more widely in transitions literature), and in the SPT literature (e.g., Geels et al. 2015).

The structure of our review follows the theoretical division between MLP- and SPT-oriented reconfiguration respectively, followed by a discussion about the aim to elaborate the concept of reconfiguration for future research purposes. For the latter, we have also brought references from outside the systematic literature review, to discuss our findings and for critical review.

Differing definitions of reconfiguration

In the articles that we reviewed, the concept of reconfiguration was used, first, to describe an evolutionary process that happens due to niche-regime interaction (MLP), when developments at multiple levels link up and reinforce each other, eventually leading to substantial changes in the regime. Second, the dynamics of reconfiguration in practices in SPT refer to multiple interactions and reinforcing

processes in practices and their constituent elements. These definitions with their particular (and sometimes mixed) theoretical premises provide specific perspectives on reconfiguration.

Socio-technical transitions and the multi-level perspective: from pathway to whole-system reconfiguration

The transitions research has defined reconfiguration in several ways at various times. It is possible to identify a development *from reconfiguration as a pathway to reconfiguration as a whole systems change*, while interaction between niche and regime actors, regime destabilization, and contextual arrangements play important roles in both of them.

Reconfiguration as a pathway

The first and most “conventional” way of defining reconfiguration is as one of the four transition pathways, and it is also the way reconfiguration has been used in many of the articles that we reviewed (Forbord and Hansen 2020; Hörisch 2018; Marletto 2014; Mazur et al. 2015; Nykamp 2017; Yuan et al. 2012). Transition pathways developed by Geels and Schot (2007) – transformation, reconfiguration, technological substitution, and de-alignment and re-alignment – are an attempt to bridge agentic capacities and structural developments in sustainability transition studies. In reconfiguration as a pathway, symbiotic niche innovations are cumulatively adopted in the regime “as add-ons or component substitutions” (Verbong and Geels 2010, 1216). They subsequently trigger further adjustments, leading to a gradual reconfiguration of the basic architecture and changes in some guiding principles, beliefs, and practices. While studying German and UK transition policies for electric mobility, Mazur et al. (2015, 88) refer to certain regime actors being replaced by new ones while the main regime actors “survive” the transition. The regime is thus not necessarily replaced, but rather the new regime “grows out of the old one” (Verbong and Geels 2010, 1216).

In these transition studies, the main interaction in reconfiguration thus occurs between niche actors who develop and supply the new components and technologies (Verbong and Geels 2010), and regime actors selecting and supporting the innovations – but also acting as a counterforce or a regulator in preventing them from completely replacing the existing practices (Hörisch 2018; Mazur et al. 2015). Reconfiguration of relations between actors and their practices implies new qualities in the technologies, institutions, values, visions, coalitions, competencies, policies, power relations, and regulatory

instruments (Barnes et al. 2018; Betsill and Stevis 2016; Bui et al. 2016; Garud and Gehman 2012; Jørgensen 2012; Marletto 2014). Hörisch (2018, 1158, referring to Smith 2007) uses an empirical example from the UK where “incumbent corporations primarily contribute to reconfigurational changes, i.e., they pick up selected niche innovations and support their establishment on the regime level.” Also in an example from Nykamp (2017) on the transition in Norwegian construction industry, reconfiguration refers to the opportunity of regime actors to test green building concepts in cooperation with niche actors and to form interaction and alliances in intermediary projects, while simultaneously participating in regular, non-innovative projects.

However, some articles point out the heterogeneity of regime structures. For instance, Van Welie et al. (2019, 98), in their article on water and sewerage-utility innovations in East Africa, call for “a much broader set of potential transition pathways” recognizing that niche and regime actors can move between regimes, having different roles in different places and times. Also, in the study by Forbord and Hansen (2020) on biogas production and public transport in Norway, reconfiguration was characterized by several new interactions and alliances between incumbents and new entrants both within regimes and among regimes, overcoming the “siloed” modes of action.

Reconfiguration as whole-system change

As a pathway, reconfiguration does seem to be limited to detectable, gradual changes in the specific regime due to interaction between niche and regime actors. However, in recent years, the concept of reconfiguration in transitions has been developed to cover more fundamental, whole-system change (Geels 2018a, 2018b; McMeekin et al. 2019). This approach is partly motivated by the aim to reframe sustainable consumption and production (SCP) research, arguing for transitions in socio-technical systems and social practices in societal domains such as mobility, housing, and agro-food, entailing “co-evolutionary changes in technologies, markets, institutional frameworks, cultural meanings and everyday life practices” (Geels et al. 2015, 2). The motivation of Geels and colleagues (2015) is to return to the founding interest in system change and to elaborate a reconfigurational understanding of transitions, which accommodates both radical component substitution and incremental system improvements, as well as to change the imaginary of transition. Consistent with the ideas of reconfiguration as a pathway, instead of conceptualizing transitions as breakthroughs of singular disruptive innovations, they are better understood as system

reconfigurations resulting from multiple change mechanisms at multiple places.

Many of the articles that we reviewed adopted the idea of the multitude of change processes in reconfiguration and bring the patterns of supply and demand closer together (Bouzarovski et al. 2017; Huang et al. 2018; Power et al. 2016; Ryghaug et al. 2019; Winfield et al. 2018). For example, in the article by Köhler et al. (2020), reconfiguration in the passenger-transport system in the Netherlands refers to shifts in power relations between regimes of automobility, public transport, cycling, and walking. These shifts require transformative changes in prevailing cultures and mobility lifestyles, as well as in institutions of transport planning and urban development. Pelli and Lähtinen (2020) have highlighted how non-technological innovations and the processual changes such as servitization should be addressed as sources of gradual reconfiguration mechanisms to both maintain and disrupt regimes. Lazarevic et al. (2019, 8) in their study on building sector energy-service companies in Finland, note that these companies have “the most substantial role by reconfiguring practices in the energy and building regimes, such as...reorienting building maintenance actors by providing skills to engage in continuous energy efficiency improvements.” Changes within and between regimes thus occur hand in hand.

This line of work has been consolidated in an understanding of reconfiguration referring to a comprehensive approach to transitions and the ways in which whole systems are being reconfigured (Geels 2018a, 2018b; McMeekin et al. 2019). In the whole-system transitions approach, both techno-economic and socio-institutional developments are addressed, drawing attention to the multiplicity, co-existence, and interdependencies of change processes. Most whole-system transitions are likely to involve several niche innovations and multiple regimes, thus also taking steps away from solely vertical understanding of transitions as changes between a single niche and regime. Moreover, in his study on reconfiguration of the passenger-mobility system in the UK, Geels (2018a, 87) refers to a “gradual system reconfiguration” in which system elements can be incrementally improved, replaced, or changed in terms of relational architectures, while also accommodating the radical component substitution via niche development. Moreover, Hodson et al. (2017), in their article on urban sustainable mobility transitions, refer to “contextual reconfiguration,” which means that reconfigurations always occur in specific contexts, setting some socio-spatial preconditions for transitional processes (see also Huang et al. 2018; Torrens et al. 2019). In

turn, these contextual arrangements are continuously (re)shaped by emerging socio-technical transitions in different systems. They thus play a both a role as the medium (contextual enabling/disabling factors) and as the consequences (socio-spatial manifestations) of socio-technical experimentation in niches (Huang et al. 2018).

Moving away from merely destabilizing or disruptive change dynamics, whole systems may thus experience several types of reconfiguration dynamics (McMeekin et al. 2019). Transitions in the whole-system approach are understood as reconfigurations resulting from multiple, distributed, and both horizontal and vertical change mechanisms: adoption of niche-innovations within existing regimes but also incremental, cumulative regime improvements (or tensions, cracks, and destabilization), shifts in the relative sizes of regimes, regime alignments, or new combinations between niche and regime elements that change system architectures (Geels 2018a, 2018b). The analysis of niche-to-regime dynamics and of breakthroughs of singular, disruptive innovations, dominating the thinking of reconfiguration as a pathway, is thus complemented with an analysis of regime-to-niche dynamics, including incumbent resistance or reorientation (Geels 2018a; Pelli and Lähtinen 2020; Strøm-Andersen 2019; Sunio et al. 2019). An analytical focus on the bi-directional relationships between existing configurations (old) and innovative assemblages (new) allows us to understand the potential variability in the form of reconfigurations (Hodson et al. 2017; Jedelhauser and Binder 2018). This approach thus deconstructs the conventional understanding of MLP of niche innovations as experimental and regimes as stable, recognizing that niches are also characterized by their own stabilities and regimes by their own dynamics.

Social practice theory: reconfiguring elements, practices and their interlinkages

In the articles with a theoretical background in SPT, reconfiguration is most frequently used to illustrate the dynamic process through which parts or elements of practices are reorganized, replaced, or rearranged into a different form, figure, or combination to change the prevailing practices. Following the much-cited work of Shove (2014), the aim of which was to articulate the policy implications of taking social practice as the central topic of enquiry and sustainability intervention, reconfiguration refers to *changes in the organization of a practice or in relations between practices*: “Engendering long-term transformation in what counts as a normal and acceptable way of life depends on reconfiguring the elements of practice; relations between practices,

and patterns of recruitment and defection” (Shove 2014, 419).

Reconfigurations in the organization of a practice

Among the articles that we reviewed, what is shared is the view that for practice reconfiguration, the change is required in more or less all of the elements that comprise a practice. These elements can include various forms and combinations of meanings and understandings, skills and competences, and material arrangements. What is also critical for practice reconfiguration is the availability of new (or re-invented) elements. In the process of reconfiguration, visions and imaginaries of and negotiations between actors are also central. In his article on the post-fossil fuel experiment in the residency of Mustarinda in Finland, Järvensivu (2017) describes the experimental arrangement in which meanings and competences of a number of everyday practices become reconfigured due to material and technological changes, as well as changes in rules and instructions. The community-care practices in a Brazilian ecovillage studied by Roysen and Mertens (2019) emerged from social needs (healthy food and clean spaces) and shared symbolic meanings (such as the wish to create a sense of community and the desire to make daily processes more collective), materials created to enable the practices (such as a bigger collective kitchen and pantry), as well as both skills acquired in the participants’ previous experiences and new skills (such as the ability to cook for a large number of people).

In the articles, it is not only recognized that changes in constituting elements are needed to change the practice, but also that changes in some of the practice elements can accelerate the change in the rest of the elements, making the reconfiguration in practice elements a cascading, or gradual, process. Green et al. (2018), in their article on driving-related desires and practices of young adults and their parents in the UK, refer to changes in material elements, such as the provision of public transport or cycling infrastructure, and their potential to disrupt the symbolic meanings and discourses of private driving. Roysen and Mertens (2019, 2) refer to social norms as a “structural” element influencing the emergence, maintenance, and development of (more sustainable) social practices in a Brazilian ecovillage.

The practitioners themselves can have an active role in this process of creating innovative practices, as described by Roysen and Mertens (2019, 2): “[t]he mere presence of elements does not explain how they are actively connected by agents to create... ‘new normalities’”. In the Brazilian ecovillage, new forms of action are collectively decided,

encouraging, or even pressuring, people to take part in them, which engenders circuits of reproduction leading to processes of normalization. Practices are thus being given new meanings, allowing (some of) them to transform toward sustainability. Creating new, “sustainable” normalities also enabled the emergence of other innovative practices in the community. Järvensivu (2017, 150) even suggests that some “forcing of the new arrangements” is required to enable reconfiguration, implying that someone (like the collective in the example of Roysen and Mertens) could hold this power of practice reconfiguration. The practitioners can also determinedly maintain the old practices instead of moving to new ones, as illustrated in the example of Shaw and Ozaki (2016) on social housing and the reluctance of some housing managers to shift from mere renting and management practices to utility-provision practices due to the emergence of new energy technologies.

Welch (2020) diverts from Shove’s elements of practice (i.e., materials, meanings, and competences) and utilizes Schatzki’s (2002) notion of teleoaffectivity and teleoaffective formations (understood as normatively prescribed objectives and ends) in his article examining the historical changes in how these teleoaffective formations in commercial communications (advertising, marketing, public relations, and so forth) mirror the understandings of consumer and consumption norms. He notes how reconfigurations of these teleoaffective formations often arise through the performances of actors problematizing existing general understandings in the context of socio-technical and political economic change, and developing novel understandings and practices. Reconfigurations commonly involve the articulation of components which can destabilize the existing practices (Welch 2020, 69). Also, the ecovillage in the study of Roysen and Mertens (2019) provided a space in which the members of the ecovillage could bring previously habitual practices to the level of discourse, so that the more sustainable practices could become reflexively regulated.

Reconfigurations in relations between practices

In addition to reconfigurations in the elements of the practice, interconnected practices (or bundles or complexes of practices) can also be reconfigured. For instance, Devaney and Davies (2017, 823) have taken the SPT as a starting point in an experiment in which the interventions carried out enabled householders “to question, disassemble and reassemble” their eating practices onto more sustainable pathways across the integrated practices of food acquisition, storage, preparation, and waste management. In their work, reconfiguration refers

to a more fundamental and “dramatic” change in practices, compared to “minor tweaks to existing routine” (834), the changes covering a number of interrelated practices via shared elements. Similarly, the establishment of the “community care” practices (consisting of chores such as cooking and cleaning) allowed residents of the Brazilian ecovillage to develop trust and abilities in sharing objects and spaces, which in turn enabled the emergence of car-sharing practices (Roysen and Mertens 2019). Järvensivu (2017, 150) describes how reconfiguration involves “learning new skills that involve bodily doing (working in the field, shoveling snow), reconnecting with natural cycles (seasonal cycles in food production, daily cycles in energy production), understanding the material dependencies of human life (what is required to produce electricity, heat, food) and taking a break from the always-on society (work and transportation rhythms related to available electricity).” This understanding of reconfiguration also included the idea that when new practices are being configured, the old ones need to go.

Everyday practices also occur in broader contexts characterized not only as mundane practices of consumption, but also those of production, governance, investment, and so on (e.g., Salo et al. 2019). Parodi (2018, 4–5), for example, notes that the farmers do not uniformly or automatically adopt the practices and techniques associated with the agro-ecological transition process, but the changes depend on the institutional elements such as the land-tenure conditions and sticky expectations toward the characteristics of the produce that are difficult to change, such as vegetables of uniform size being visually “attractive.” She also refers to need for reconfiguration in production, health, economic, commercial, and environmental practices as they are linked to farming practices. In their article on building standards in the UK, Shaw and Ozaki (2016) note how practices of professionals designing, constructing, and managing housing affect the ways low- and zero-carbon technologies are incorporated into new buildings, and thus on the practices of energy use in homes. These changes can be non-directional in the sense that not all changes are aimed at sustainability but rather to maintaining the present practices of work, and can have obstructive effects on the transition processes. Green et al. (2018, 26) have discussed how the mobility practices of young adults starting apprenticeships and work were very different from those going to university, or in areas with better public transport services. These “structural differences” intersect with “local contingencies” – young adults are not just recruited into automobility as a global system, but also into specific local networks, in informal transport economies that hold

some practices (e.g., cycling) as currently unthinkable, but others (choosing to not learn to drive) as possible.

Öztekin and Gaziulusoy (2019) combined MLP, SPT, and design theory in studying agency of design in transitions. In their case study of a community-led water-management project in an experimental community in Portugal, they noted how both MLP and SPT address learning as a fundamental process in reconfiguration, which for them refers to substantial changes in institutions, economies, technologies, values, behaviors, and practices. The experiences gained in water management not only supported learning about natural water cycles, but also gave rise to shifts in community practices and reconfigurations in parallel systems such as those of waste and food.

Shove (2014, 424) refers to “reconfiguring paths and projects” of practices, referring to the trajectories of practice and the need to see daily practices as part of wider systems: “in areas like food consumption or building design, global systems of provision are important in structuring diets and meals and in configuring the architecture of urban living” (420). Indeed, these established practices tend to fight back the experimental arrangements, unless carefully addressed. Whether sustainability transition in practices is seen as inspiring or threatening depends on existing competences and the ways in which expected changes are framed in popular discourse (e.g., difficult/easy, normal/deviant). Also, Devaney and Davies (2017, 840) concluded that “aligning regulatory frames, informational support, devices, motivational prompts and products in flexible ways” is more likely to lead to reconfigured practices than individual-level interventions detached from the everyday-life context. It is thus important to address the interconnected nature of practices of production and consumption, as well as of policy, education, management, and communication in order to bring these spheres together.

Discussion

The focus of our systematic literature review was on describing the ways in which reconfiguration is understood in studies building on transition and practice theories. We found that uses of the term reconfiguration vary both within and between the two literature streams, from transition pathways to whole-system transition, and from instigating changes in elements of a practice to the questioning of the dominant discourses and practices maintaining the established patterns of production and consumption. Our findings underline how in all these cases the concept of reconfiguration is increasingly

Table 1. Summary of the contributions of SPT to the understanding of reconfiguration in MLP.

Reconfigurations within regimes	1. The old is always present in the new; regenerating elements instead of generating them
	2. The regimes or practices are never singular nor stable; attentiveness to tensions in various practices relevant for regime change
Reconfigurations across regimes	3. Horizontal circulation of elements in practices and across regimes; adding to the repertoire of elements available for horizontal integration and learning across regimes
	4. Stickiness of practices as connected to horizontal integration with other practices; addressing the transition-enabling or preventing interlinkages
Interplay of people and practices	5. Recruiting and holding actors in practices
	6. The various roles of actors in reproducing practices
Changes in norms	7. The understanding of social norms as deeply embedded in practices, but open for reflection and change through performances

used as part of attempts to overcome the hierarchical separation of reality into macro, meso, and micro levels (as in MLP) or to go beyond changes in individual elements of the practices (as in SPT), when interpreting the dynamics and processes of change. For both theoretical approaches, the concept of reconfiguration enables an interpretation of the dynamic, parallel processes of change taking place concurrently. For SPT, reconfiguration is more firmly based on their less hierarchical, or “flatter,” approach in interpreting processes of change. There are areas where the current discussions concerning whole-systems reconfiguration might benefit from engaging social practices and their reconfiguration as a key component of sustainability transitions. In the following discussion, we critically draw on both the findings of our literature review and other relevant literatures, in exploring seven potentially fruitful points for transitions studies that are also summarized in Table 1.

First, while conventional readings of the MLP tend to equate the regime with “the old” and stability, and niche innovations with novelty and change, the perspective on system reconfiguration underlines how the old is always present in the new (e.g., Bui et al. 2016; Geels 2018a; Hodson et al. 2017). Whether in systems of energy, mobility, or agro-food, this understanding could benefit from practice-theoretical understanding that there is no need to generate meanings and competences from scratch but to regenerate them as part of the reconfiguration process (Shove 2012). Understanding how transitions toward sustainability might come about indeed depends on understanding how less resource-intensive regime practices have disappeared and been replaced in the first place. Moreover, the “old” meanings of sufficiency, frugality, and “enoughness,” and “old” skills related to utilizing natural materials in construction or organic farming methods, could be incorporated with modern technologies in the “new” practices, as means to embed sustainability in consumption and production. This understanding was present in the ideas of many of

the articles that we reviewed, such as incorporating notions of bodily doing, reconnecting with natural cycles, and understanding the material dependencies of human life in change efforts toward more sustainable everyday life (e.g., Järvensivu 2017). Albeit simple, this division between the old and the new may prove useful in analyzing change processes in systems, practices, and contexts if we accept that *niches might also incorporate elements from historical practices not necessarily considered as “innovative.”*

Second, as noted above, the understanding of reconfiguration in transition theories sees experimentation in niches as necessary, but not enough to trigger a regime shift, and there is an increasing focus on complementing niche-to-regime dynamics with an analysis of regime-to-niche dynamics, as well as the internal dynamics within niches (Lazarevic and Valve 2020) and regimes (Geels 2018a; Hodson et al. 2017; Huang et al. 2018). Indeed, regimes are not merely stable (see also Turnheim and Geels 2012), yet SPT is even more eager to question stability by emphasizing that practices are not static, but rather “internally differentiated on many dimensions” and the performance of practice is slightly different each time, making practices dynamic and adaptable (Warde 2005, 138). As also noted by Shove and Walker (2010, 475), “enduring and relatively stable practices (and complexes of practice) do exist but only because they are consistently and faithfully reproduced, not because they have achieved some kind of closure.” Even established practices, be it those of everyday eating, cooking, or household management, thus continually evolve and can be disrupted and reconfigured in various ways (Devaney and Davies 2017; Kaljonen et al. 2020; Roysen and Mertens 2019; Shaw and Ozaki 2016; see also Spurling et al. 2013). Looking more closely at the tensions, frictions, and windows of opportunity not only within the specific regime, but also within the many practices taking place in and being integral to that regime (such as the relatively stabilized practices of communication, decision making, and tendering that are relevant for

sustainable energy improvements in the housing sector) could thus point to potential avenues for change. These tensions in practices are also critical in keeping the practices primed for change (Kaljonen et al. 2019, 2020).

Third, within the transitions literature that we reviewed, there has also been increasing interest in investigating system reconfiguration by examining the multiple interactions between regimes (Geels 2018a; Jedelhauser and Binder 2018) and thus renewed interest in multi-regime dynamics (Raven 2007; Rosenbloom 2020). Along these lines, Hargreaves, Longhurst, and Seyfang (2013), have highlighted the importance of critical points of intersections between practices and regimes: the ways in which multiple regimes shape practices and constrain practice change, and how these points might also be turned into windows of opportunity, allowing more sustainable regimes and practices to coevolve in a virtuous cycle (see also Seyfang and Gilbert-Squires 2019). This directs attention to the horizontal circulation and reconfiguration of elements in niches and regimes, in addition to the vertical dynamics between them (cf. Shove and Walker 2010). Effective innovation (in practice) is likely to be an outcome of various dynamics: producing, promoting, adopting, and aligning technologies; cultivating novelties within existing regimes; enlisting users, and, crucially; *adding to the repertoire of elements available for integration in the complexes of practices* (Shove and Walker 2010, 474; see also Järvensivu 2017; Roysen and Mertens 2019). Importantly, these dynamics are parallel rather than hierarchical. These findings also highlight how a transitions-in-practice approach need not be limited to investigations of consumption or everyday life only, but how systems of design and construction (Shaw and Ozaki 2016; Öztekin and Gaziulusoy 2019), agri-food (Parodi 2018), and service provisioning (Lazarevic 2019; Pelli and Lähtinen 2020) could benefit from practice-based perspectives on reconfiguration (see also Mylan 2015; Schatzki 2016).

Fourth, social practice theorists' understandings of "stickiness" in practice can contribute to analyses of how and when niche innovations manage to reconfigure regimes (Parodi 2018). From the perspective of MLP, this stickiness can exist both within and between regimes. From the perspective of SPT, for emerging new practices to take hold, they have to recraft or substitute the prevalent practices that maintain and reproduce the regime. Here, the internal stickiness of practices (i.e., the strength of linkages between the constituent elements), as well as the external dynamics between the interlinked practices, is of relevance as these both have

consequences for the stability of the practice (e.g., Devaney and Davies 2017; see also Laakso 2017; Mylan 2015; Shove and Walker 2010). Consequently, the practices that share elements with other practices are likely to be more resistant to change than those that are less interlinked (Laakso 2019) and for transitions, it is indeed important to understand the forms of connections that innovative processes have with each other, as well as with the existing systems (Hodson et al. 2017). Devaney and Davies (2017) have emphasized that new products or services may diffuse more easily if they align with ongoing internal practice dynamics, and for this to happen, it is essential to address the stickiness maintaining the practices. However, the literature review suggests that gradual reconfiguration of practices can take place when changes in some elements of practice accumulate into changes in the rest of the elements – and when reconfiguration in one practice leads to changes in surrounding practices (see Green et al. 2018; Järvensivu 2017; Roysen and Mertens 2019; Öztekin and Gaziulusoy 2019). It is therefore critical for transition scholars to engage with *constellations and complexes of practices as one of the key components of transitions, either slowing down the transition due to sticky constellations or enabling transformative change*. In the articles that we reviewed, one key for practice reconfiguration was the articulation of social norms (Roysen and Mertens 2019) or teleoaffective formations (Welch 2020) that could instigate change, as illustrated by examples from the articles on experimental and eco-communities that we reviewed (e.g., Järvensivu 2017; Roysen and Mertens 2019; Öztekin and Gaziulusoy 2019).

Fifth, this idea of culturally-driven change expands the notion of reconfiguration in socio-technical transitions, which builds on a tradition of investigating single, and often technical, solutions ("niche innovations"). Following this tradition, MLP tends to view actors and agency as related to proponents and opponents of these niche innovations (Hörisch 2018; Nykamp 2017; Sunio et al. 2019) and highlights the role of networks and interaction (e.g., Barnes et al. 2018; Forbord and Hansen 2020), but seldom provides in-depth understanding of how people are recruited into these "camps" and how the complexes of practices can hold different, and even contradicting, norms and motivations for various participants (Raven et al. 2008). As an example, Shaw and Ozaki (2016) note how present work practices in the housing sector can be in conflict with emerging needs due to energy retrofits, complicating the reconfiguration in the energy sector. In this case, the challenge lies not in people either supporting or opposing the new technologies, but in a

lack of fit between the technologies and their requirements and the existing constellation of practices that people perform. In this, SPT could offer a more nuanced picture of *how practitioners are or might be recruited into new practices*. Here, the stream of SPT following Schatzki's (e.g., 2016) notion on teleoaffectivity, combining the sense of orientation toward particular (sustainability-oriented) goals and ends with the emotions and motivational engagements enjoined by such orientations, could provide useful viewpoints for studying how actors get recruited in sustainability transitions besides the economic incentives, and how they embed the sustainability into the present set of practices. For example, in the study by Welch (2020), the focus on teleoaffective formations proved to be helpful in understanding how normative orientations of sustainability in commercial communications extend into corporations, consumption, and the public sphere, via brand-management practices.

Thus, the sixth contribution might be a more sophisticated understanding of agency in reconfiguration, which could also benefit from utilizing other streams of SPT in addition to that of Shove's elements employed in most of the SPT articles that we reviewed. Directing attention to "the internal differentiation of roles and positions within [the practice], and the consequences for people of being positioned relative to others when participating" (Warde et al. 2007, 364) could bring the spheres of consumption and production closer to each other. For instance, Røpke (2009) highlights the importance of interplay, which refers to actors having parallel roles in practices. Using the example provided by Røpke, even though doctor and patient have different perspectives on a consultation, the activities of the actors are mutually conditioned and the practice cannot be accomplished without the participation of both parties, which advocates conceptualizing such activities as one practice. Similar cases can be found in housing practices and management of sustainable energy technologies (Shaw and Ozaki 2016) or practices within the agro-food sector (Parodi 2018). System reconfigurations could then be investigated from the perspective of the key practices, their elements, and the *different roles the actors play in these practices*, rather than mere proponents and opponents of particular solutions – what is the role of, for example, distributors, vendors, or advertisers, in addition to farmers themselves, in reproducing sustainable farming practices, and how and why are they introducing more sustainable combinations of materials, meanings, and competences for these practices?

Finally, from a practice-theoretical perspective, expectations that draw on deep cultural patterns are not viewed as exogenous to niches and regimes (cf.

Schot and Geels 2008) but inherent in them, and hence to be investigated as part of the reconfiguration process. Even though socio-technical regimes like the energy regime have been challenged by regime-external pressures such as demands to mitigate climate change, such demands (and many others) are culturally negotiated in the everyday life practices that span across several regimes closely linked with energy. For Castán Broto and Dewberry (2016, 3019), reconfiguration refers to fundamental changes in the "nature and context of consumption" in which institutions for new ways of thinking and acting collectively are created along with destruction of culturally and historically structured barriers. In the article by Järvensivu (2017), the Mustarinda residence provided a spatio-temporal context for experimenting with cultural meanings of post fossil-fuel everyday life, making the collective reconfiguration of practices possible. A similar conclusion was reached by Devaney and Davies (2017), Roysen and Mertens (2019), and Öztekin and Gaziulusoy (2019) in their communities or experimental settings. This observation is also pointed to from within MLP: niche innovations involve interpretations of cultural meaning, which are translated to other sites (Raven et al. 2008). Thus, *changes in cultural and social norms might preferably be seen as processes occurring through performances of practices, rather than as homogeneous and stable pressures ensuing from an abstract landscape level*.

Conclusion

The aim of this systematic and critical literature review has been to investigate the concept of reconfiguration in regimes and practices. The trend in the socio-technical transition research, drawing especially on MLP, has been from single-point niche innovations and dynamics of supply toward whole-system transitions. A similar direction can be seen in the articles drawing on SPT in transitions, with increasing emphasis on change initiatives and the interlinked practices in the spheres of consumption and production.

Our review addresses the necessity of connecting transitions research more strongly with practices and the people performing them, norms, and teleoaffective formations, and old and new repertoires. The review also calls for further exchange between these two theoretical fields in understanding the processes of reconfiguration in sustainability transitions and suggests that the less hierarchical understanding of reconfiguration could be beneficial in understanding sustainability transitions. According to the SPT view on reconfiguration, the social and cultural norms that are critical for change are not

external in any sense but integral elements in practices (which are neither limited to one single regime). Thus, by performing practices, actors also participate in producing the social phenomena that are called the landscape in the MLP. What becomes crucial is the way in which the social norms and values upholding practices are reevaluated and linked with other elements for (re-)invention of more sustainable practices and practice constellations. Further understanding of changing norms and values as part of reconfiguration processes both within and across niches and regimes is hence an obvious next step to take in sustainability transitions studies. Moreover, scrutinizing the ways actors are recruited to practices, as well as their varying roles in these practices, could be helpful for research endeavors interested in transitions across different socio-technical systems. The focus on the concept of reconfiguration could thus be fruitful in bringing the spheres of consumption and production closer to each other, providing new insights for sustainable transition research.

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Appendix B. List of codes used in the review

Initial categories:

- Author
- Year
- Title

- Journal and DOI/link
- Scopus/WoS (date)
- Coder [Database]
- Number of times using reconfigur*
- Uses “reconfiguration” explicitly (yes/no)
- Definition of “reconfiguration,” if used
- Theories used (e.g., SPT, MLP)
- Theoretical focus
- Empirical focus
- Country, city (if applicable)
- Description of data (if applicable)

Emerging categories:

- Scale/focus (e.g., niche-innovation, regime, landscape, socio-technical innovation, daily practices)

- Description, findings linked to consumption/use/ niche/micro
- Description, findings linked to intermediaries/networks/contexts/meso
- Description, findings linked to production/regime/ landscape/macro
- Description, findings linked to temporal considerations (including speed, non-synchronicity, historical trajectories)
- Descriptions and findings linked to socio-cultural, institutional, technical, economic elements and developments
- Descriptions of dynamics and mechanisms