Title

Conceptualizing Self-organization in Urban Planning: Turning diverging paths into consistency

Beitske Boonstra* and Ward Rauws**
*Ghent University, Department for Mobility and Spatial Planning
**University of Groningen, Faculty of Spatial Sciences, Department of Planning

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Abstract

Within the realm of urban studies and spatial planning, the concept of self-organization receives increasing attention in understanding spatial transformations and related planning interventions (De Roo et al, 2012; Portugali, 2011). In exploring the potential of self-organization, various scholars however introduce diverging interpretations of the concept, consequentially leading to different understandings of what the concept can offer to planners. In the first part of the paper, we show that the different interpretations have their foundation in two distinct epistemic positions: One is a critical-realist interpretation of complex adaptive systems (Byrne, 2005), resulting in a planning focused on pattern recognition and formulating guiding conditions (Portugali, 2011; Rauws, 2015). The other includes a post-structuralist interpretation of emerging assemblages (Cilliers, 1998; DeLanda, 2006), leading to a planning focused on personal style and situational behavior (Boonstra, 2015). The potential synergies between the two epistemic positions has so far remained unexplored, while aspects of both perspectives simultaneously are at work in spatial transformations. Therefore, the second part of the paper explores their complementarity and discusses how to turn the two positions into consistency with one another – meaning how they can mutually reinforce each other without losing their individual epistemic strengths. Based on this exploration we suggest planners to act adaptively and differentiate in style in response to the situation at stake, among others by means of pattern recognition. On a conceptual level the paper shows how planning scholars can make sense of the diversity of ongoing processes of self-organization in the context of spatial transformations.

1. Self-organization in Urban Studies, Spatial Planning and Governance

In attempts to better address some of the multiplicity, fuzziness, fluidity, fragmentation and resource interdependency contemporary spatial planners face today, and to move beyond command-and-control governance or the pursuit of consensus, planning scholars are increasingly turning their attention towards the complexity sciences (Portugali, 2011; Boelens & De Roo, 2014; e.gDuit & Galaz, 2008; Byrne, Geyer, Gerrits, Batty, Bettencourt, De Roo, Teisman, Hillier, Van Wezemael). What complexity sciences bring to planning is the research on the *evolution* of phenomena. Instead of a Newtonian conception of the world based on reductionism, determinism and predictability, complexity sciences portray a world view of non-linearity and spontaneity as a consequence of the interconnectedness and changeable nature of a countless number of interacting elements (Waldrop, 1992; Cilliers, 1998; Heylighen, 2008; Rauws, 2015). As such, notions from the complexity sciences can assist planners to conceptualize their role in a world which is in continuous change and perform more situation-specifically and adaptive to these ongoing non-linear processes (De Roo, 2016).

In the debate on complexity and planning, especially the concept of self-organization has increased in popularity over recent years (De Roo, 2016; Boonstra, 2015; Rauws, 2015, Zhang, 2016). In general, self-organization is defined as the spontaneous emergence of order out of disorder (Prigogine and Stengers, 1984; Cilliers, 1998). Due to rich interactions between elements within a system and with the system's environment, self-organization processes fuel the emergence of new systems states from *within* a system itself. As such, self-organization is a spontaneous, autonomous, and locally driven process (Cilliers, 1998; Heylighen, 2001; Teisman et al., 2009; Prigogine and Stengers, 1984). Urban studies and planning scholars consider self-organization a helpful concept in for instance understanding underlying mechanisms of urban dynamics and spatial transformations (Allen, 1997; Batty 2005; Portugali, 2000). It been applied to slum and informal urban development [Barros & Sobreira, 2008; Silva & Farrall, 2016), spontaneous emergence of patterns in traffic flows (Kerner,1998), pedestrian movements (Helbing et al., 2001), or the emergence of civic initiatives in spatial development (Boonstra, 2015; Rauws, 2015).

The understanding and application of the concept of self-organization has however been far from uniform. To begin with, at least two schools of thought can be distinguished, respectively building on the 'hard/natural' sciences and the 'soft/social' sciences. Originally, self-organization has been well defined within the hard and natural sciences (Zhang, 2016). Starting with the work of Ashby on cybernetics and investigators entangled in their own systems of observation (Ashby, 1947), this scholarship has been expanded by amongst others the mathematical work of Hermann Haken on synergetics (1977), the study of thermodynamic systems in states of becoming by the Prigogine Group (Prigogine et al., 1977), and the work of biologists Maturana and Verela (1974) on the reproduction and self-maintenance of ecological systems. The perspectives on self-organization offered in these studies, have been translated into research on, for instance, infrastructure systems and urban networks (Batty & Longley, 1994; ADD), evolution of cities (e.g. Allen, 1997; Portugali, 2000; Batty, 2005), and urban planning and design (e.g. Engelen et al., 1993; Batty, 2007; Yamu & Frankhauser, 2015). Many of these studies build on quantitative, analytical models, addressing power laws, fractals and the like in simulating urban dynamics. Reflecting on the development of Complexity Theories of Cities, Portugali (2011) distinguishes at least four achievements: a theoretical basis for understanding the emergence of networks out of local interactions, acknowledgement of circular causality and non-

linear effects, attention for the self-maintaining and self-renewing capacity of cities, and the importance of diversity and variability for urban vitality.

At the same time, serious efforts have been made in addressing self-organization from a soft and social science perspective, as such contributing to a more profound understanding of 'social complexity'. In various contributions, self-organization is seen as an explanation of the spontaneous emergence of a collective social result, for instance social norms, a new dominant discourse, a social organization, out of the interactions by and communication between individual agents. Examples are the work of the sociologist Luhmann (1984; 1997) on society as a self-referential system consisting of several 'structurally coupled' subsystems, Giddens' structuration theory on the dialectical relationship between self-organization and institutional rules, individual actions and institutions (Giddens, 1984) and the work of Fuchs (2003) on the emergence of social movements. These studies have inspired planning scholars in the role of frontrunners in the transition towards renewable energy (Frantzeskaki et al, 2013), rethinking interactive planning approaches (Van Assche, 2007) and analyzing dilemmas in heterarchic governance processes (Jessop, 1997). These and similar studies often have a qualitative and often explorative nature, focusing on narratives, discourses and power-games, addressing the qualitative issues of complex agents (Portugali, 2011), but according to Byrne (1998) and Byrne & Gallaghan (2014) can have a quantitative dimension as well. WIDE RANGE OF METHODS in VARIOUS DOMAINS (Byrne & Gallaghan, 2014; Byrne, 1998).

The two views on self-organization originating from the 'hard/natural' and the 'soft/social' sciences are often considered fundamentally different. Whereas 'hard/natural' self-organization is understood to result in the spontaneous emergences of (often physical) patterns in space, 'soft/social' self-organization is understood to result in the emergence of forms of human organization or coherent groups of people without central coordination. We argue however, that this this divide between the human (social) versus non-human (natural) world is problematic to planners. Because human settlements – the main concern of spatial planners – are not mere natural phenomena, nor only physical and materialist entities. Human settlements, including cities, are artifacts with agents – and their actions and behavior are products of intentions, plans, social and cultural norms, political pressure etc. (Portugali, 2011). As such, cities require a hybrid understanding. Moreover, a divide between the natural and the social ignores the holistic perspective that is offered by the complexity sciences. As advocated by Urry (2003; 2005a; 2005b; 2006), complexity sciences stress the importance of objects and nature as part of our social worlds, making an analytical division between nature, objects, people, social systems undesirable. Complexity sciences intrinsically address processes of spatial ordering (Thrift, 1999), but also related to the dynamics of a rapidly changing environment, urban life, and changing societal opinions (Van Wezemael, 2012: 93-94; De Roo et al., 2012: 2). Hence, a complexity perspective can assist planner in reuniting the material world and the social world, offering an integral and rich account of the issues they deal with.

Therefore, we do no longer wish to continue on the distinction between hard/natural and soft/social sciences. We do however acknowledge that the interpretations and the subsequent use of complexity – and more specifically self-organization – can differ significantly among scholars. The aim of this paper is therefore analyses the interpretations self-organization at a deeper level, looking at the epistemic traditions in complexity and their ontological bases. In the first part of the paper, we explore the different interpretations of complexity by elaborating on the two major epistemic traditions that have

emerged within the theories of complexity since the 1970s (Hillier, 2010), one from a Critical-Realist ontology and one from a Post-Structuralist ontology. We identify the key characteristics of self-organization mechanisms in accordance to these epistemic positions, and discuss their implications for understanding spatial transformations and related planning interventions. We illustrate these differences along the example of a regenerated shopping street in the city of Rotterdam, the Netherlands. In the second part of the paper, we once again exemplify the differences between the two epistemic positions, but we also start to explore their complementarity. We speculate on how to turn the two positions into consistency with one another – meaning how they can mutually reinforce each other without losing their individual epistemic strengths. Based on this exploration we suggest planners to act adaptively and differentiate in style in response to the situation at stake, among others by means of pattern recognition. On a conceptual level the paper shows how planning scholars can make sense of the diversity of ongoing processes of self-organization in the context of spatial transformations.

2. The Critical-Realist Epistemic Tradition

2.1 A Critical-Realist perspective on complexity

The first ontology that stand behind a specific understanding and application of self-organization is critical-realism. To elaborate on this ontology, we draw on the work of Roy Bhaskar and scholars that further expand his proposal (Sayer, 1992; Collier, 1994). Critical realism embraces the idea that reality has an objective existence outside human construction and cognition (Layder, 1990; Danermark et al., 2002). Critical realists, however, also postulate that knowledge about reality is not directly available to us, but is produced by knowable actors in the social world (Pratt, 1995). For this reason they oppose a view on 'knowledge' as something fixed and pre-determined. Instead knowledge is considered to be subject to revision and modification, mediated by filters of language, sense making and social conventions. Descriptions of reality are affected by both the conceptualizations, values and interests of the observer (i.e. the researcher) and those that are observed (i.e. actors that are part of processes of self-organization) (Danermark et al., 2002). According to Bhaskar, system boundaries drawn by observers are always artificial and limit the possibility to gain a comprehensive understanding of how the system functions. As such, explanations of reality are considered partial at best.

But despite the mediating role of human interpretations, the understanding of reality can still be enhanced through research. Considering the complex social world critical realists take the position that an intersubjective account of reality can disclose some of its real complexity (Alvesson & Sköldberg, 2009). Critical realists aim to confront explanations of reality with human perceptions and experience in order specify, adjust, reject ideas on the structures and mechanisms that give shape to reality (Danermark et al., 2002). Bhaskar distinguishes three layers in how one can understand the world; the empirical, the actual and the real (Sayer, 2000). The first concerns personal experiences, the second is about the events, processes and behaviours that are subject to observation. The third level is the domain of the underlying mechanisms that produce these events, processes and behaviours. It is especially this third layer that is of scientific interest to critical realism: the observation, research and analysis of the mechanisms *underlying* the occurrence of reality (Gerrits, 2012). But in contrast to

universals truths, critical realists regard generalisations of causes and mechanisms to have a limited scope in space and time. Any generated knowledge is local, and explanations are understood to be contingent, meaning they are temporal in time and local in place (Byrne, 2005; Gerrits, 2012). Temporal cause and effect relations do exist and can sometimes even be known, but the potential conjunction between local conditions and recurring patterns does not necessarily imply any general laws (Gerrits, 2012).

To conclude, critical realists depart from the position that reality exists outside human construction, but that this reality can only partially and temporarily known. The subjective interpretations of reality, the impossibility of comprehensively mapping a system, and the changeability of relations, imply that knowledge includes provisional explanations of what generates, produces or enables certain events (Sayer, 1992). This critical realist ontology fits well the complexity theorists attempts to search for causal relations between events and elements, while acknowledging that complexity is a real, non-constructed, property of the social world, and since it is emergent through interaction, as such non-decomposable. Reality and complexity cannot be compressed without losing some of its aspects (Gerrits, 2012; Morcol, 2001).

2.2 Characteristics of self-organization from a critical-realist perspective

A critical realist perspective on self-organization is offered by theories on complex adaptive systems (CAS). CAS theories have been developed within the hard sciences, such as physics, chemistry and mathematics, which traditionally embrace a positivist view. However, moving beyond linear causality and full determinism means that the positivistic ontology does not provide a sound basis for CAS theories. The ambitions of positivists to identify universal laws and mechanisms, to produce universal frameworks of understanding and to assume a high degree of predictability, are considered unrealistic in complex world. In contrast, complexity science emphasizes the changeability of relations and configurations, complex causality and a high degree of unpredictability. Therefore, Archer et al. (1998) and Danermark et al. (2002) argue that CAS theories require a critical realist stance, or what some refer to as a complex realist stance, as a synthesis of critical realism and complexity science (Reed & Harvey,1992; Byrne,1998; Gerrits, 2012).

In CAS theories self-organization processes have a prominent role. They are considered to be a key mechanism in the system's adaptive capacity. It involves the spontaneous transformation of a system due to the uncoordinated interactions between system's elements or actors. This means that through their behavior, actors or elements unintentionally contribute to a change of structure or function on system level. Self-organisation from a CAS perspective includes the spontaneous formation of patterns or structures at a global level out of the interactions between agents at the local level (Heylighen, 2008). Hence, the 'self' of self-organisation refers to the 'unplanned' emergence of organisation 'by itself' or 'spontaneously' (Rauws, 2016). In this process of spontaneous organisation various phases can be distinguished: 1) the occurrence of a symmetry break, (2) reaching a critical point, (3) followed by a non-linear process of adjusting behavior by independent agents, resulting in (4) spontaneous patterns emerging at specific times, revealing the complementary actions of all agents together (De Roo, 2016; Rauws et al. 2016).

Complex adaptive systems are considered as open systems, being sensitive to changes in their environment, that evolve through feedback and feed-forwards loops with sub-systems and supra-systems (Holland, 1995; Wolfram, 2002). This means that these systems are dynamic as they continuously adapt to their environment, resulting in non-linear trajectories of development. Self-organize happens through feedback loops that either stabilize or disrupt the system. Feedback loops can be positive, when they reinforce and amplify initial changes, and lead to dynamism (also called feed-forward loops (De Roo, 2012)). Feedback loops can also be negative, when the reaction of the system is opposite and suppresses the initiated change. Such feedback loops lead to stability (Teisman et al., 2009: 12; Heylighen, 2001: 8-9).

Whereas critical realism allows for the acknowledgement of subjective interpretations of reality, the impossibility of comprehensively mapping a system, the changeability of relations, and the contingency of knowledge, it does study these feedback loops and emerging patterns, and searches for contextual conditions that explain this emergent behaviour.

2.3 A critical-realist perspective on self-organization in cities and planning

With the aim to better understand the volatility and interconnectedness of urban systems, also planning scholars have adopted CAS theories in analyzing the development of neighborhoods, cities and regions, as examples of such self-organizing complex adaptive systems. The critical-realist perspective is evident in the way CAS theories are used to explain the emergence of urban form (Thrift, 1999: 32). Well-known examples can be found in the work of Peter Allen (1997; 2012), Paul Krugman (1996), Michael Batty (Batty, 2005; Batty, 2013; Batty & Marshall, 2012), Bill Hillier (2012), and Juval Portugali (2000; 2006; 2011; 2012a; Alfasi & Portugali 2007). What is common to the various applications is that they connect to the epistemology of the Santa Fe-tradition. All concern the emergence of large-scale, macro-structures from the interactions between individuals and collective entities. For instance according to Allen (who was, for a time, part of the Prigogine group in Brussels (Thrift, 1999: 32)): “Spatial structures of cities, regions, and urban networks emerge from the continuous interaction between individuals, their goals, their aspirations and the macrostructure that they have allowed to emerge” (Buijs et al., 2009: 97). According to Portugali (2000), the city is a reciprocal product of the initiatives of actors, influenced by personal/individual motives (caused by their environment) versus spatial developments that are in their turn the product of collective actions. The outcomes of such self-organizing processes manifest themselves in specific urban forms and patterns (morphological or functional), physical growth, the emergence of new socio-spatial groups as a result of geographical settings or characteristics such as houses, lots, and housing blocks (Portugali, 2000), or the spontaneous emergence of economically specialized districts (Krugman, 1996). Other examples are the spontaneous emergence of patterns in traffic flows (Kerner, 1998, Chowdhury & Schadschneider, 1999), pedestrian movements (Helbing et al., 2001), urban land transformation (Webster & Lai, 2003, Barros, 2005), and informal settlements (Silva & Farrall, 2016). (Wagenaar, Gerrits, Rauws, Bettencourt; Weidlich, Helbin; Pumain; Batty, 2013).

In this understanding of complex adaptive systems, both the physical aspects (e.g. infrastructure, buildings or transport vehicles) and social aspects (e.g. organisations, actor-networks or institutional codes) of self-organizing processes, are considered as properties of a real world. Sense making by actors greatly enriches the dynamics of these urban systems (Portugali, 2011). There is no collective ambition amongst actors to establish a transformative change though. Instead, the emergence of new spatial and/or institutional configurations is a result of actors that act on the basis of individual ambitions, but nevertheless produce a collective output. The nonlinear aspect of self-organization relates to the uncertainty to what extend a spontaneous pattern will emerge: will there be a minimal response, or will the pattern be massive, or will it be something in between. No one can tell.

The incentives for feedback and feed-forward loops are seen as part of the system, and can come from both individual citizens and professional planners. Professional planners, and their predictions and plans, can make the plan and reality bend toward each other (Portugali, 2012b: 231), and intervene when self-organizing processes head in an undesired direction (Krugman, 1996; Rauws, 2015). This leads to a planning in which pattern recognition and condition planning are crucial. The recognition of emergent patterns at a system level should reveal any underlying structures, which can then be influenced by changing conditions to such an extent that the outcomes of the self-organizing processes can be steered towards a socially desired direction (Rauws, 2015).

3. The Post-Structuralist Epistemic Tradition

3.1 A Post-structuralist perspective on complexity

The second ontology that leaves its marks upon the understanding and application of self-organization is post-structuralism. Post-structuralism is a philosophical and sociological thinking that is not necessarily a coherent whole to be captured under one denominator, but much more a complex web of thoughts and mutual influences. The work of several, predominantly French thinkers in the second half of the twentieth century can be considered as its' core: Gilles Deleuze, Michel Serres, Jacques Derrida and Jean-François Lyotard (Ieven et al., 2011; Belsey, 2010). An important threat that runs through the work of these thinkers is the explicit rejection of representation. Representation is simply impossible, according to Deleuze, due to the complexity and heterogeneity of relationships (Romein et al., 2009: 60). It is therefore not the thing or its representation that deserves attention, but rather its becoming, individuation, and differentiation. The only way in which representation is interesting, is when it is performative, when the representation is a becoming in itself that affects and encounters (Posman, 2009; Huyghens, 2009; Oosterling, 2009). This also resonates with Lyotard's notion of presence and representation. According to Lyotard, representation of the real is impossible due to the heterogeneity of meaning: Of what is meant, who means it, and to what the meaning is assigned. According to Lyotard, looking for representation is nothing more than an attempt to achieve the impossible, namely to bridge all these irreconcilable elements (Parret, 2011). In the world, becomings are happenings, and it is these happenings that people communicate about and seek representations of, in order to transform this elusive happening in the here and now into a conceivable presence that can last. However, these representations themselves are also happenings that become and affect. For instance, an artwork is interesting not so much for what it represents, as for what affects it induces by being present at a certain time and place. This is what both Lyotard and Deleuze regard as post-

representational (Parret, 2011). In other words, for the post-structuralists, truth in society is not so much an issue, but the appearance of it is (Belsey, 2010).

Between post-structuralism and complexity theory strong resonances exist, especially between the works of Ilya Prigogine, Gilles Deleuze, Michel Serres, Jacques Derrida, Jean-François Lyotard, Bruno Latour and Isabelle Stengers (Cilliers 1998, Thrift 1999, DeLanda 2002, 2006, Morçöl 2005, Hillier 2007, Van Wezemael 2012). Although Deleuze has been criticized for not fully understanding the terms from the natural sciences he was making use of, the natural sciences – including the work of Ilya Prigogine and Isabelle Stengers – have been a major sources of inspiration for his work (Thrift, 1999; Prigogine & Stengers, 1979; Christiaens & De Ronde, 2009). Deleuze's notion of the "fold," for instance, has linkages to the "refiguring of 'internal' and 'external' processes" that complexity theory makes use of (Thrift, 1999: 56). Complexity notions are also apparent in the work of Jacques Derrida (Cilliers, 1998). Notions of difference, becoming, and order not as a law but as exception and emergent property, are crucial elements in these post-structuralist works (Thrift, 1999).

3.2 Characteristics of self-organization from a post-structuralist perspective

Even though the notion of self-organization is not so explicitly used within post-structuralist thinking, the shared ontologies between complexity and post-structuralism (Van Wezemael, 2012; Hillier, 2007: 54) allow the development of a post-structuralist understanding of self-organization as well.

Self-organization from the post-structuralist perspective would then refer to what could be called the emergence of a relational "self". According to Deleuze, individuals and their identity are historically constituted entities, which are not a given but are defined progressively (DeLanda, 2002, 10, 26). The emerging self thus never stands alone, but exists and co-evolves within a network of relationships and interactions, 'always playfully changing in an unpredictable way' (Cilliers, 1998). Moreover, according to Lyotard, individuals and their identity, the selves, are constructed in a web of meaning and relationships: "A self does not amount to much, but no self is an island; each exists in a fabric of relations that is now more complex and mobile than ever before." (Lyotard, 1984). Also Derrida elaborates on how we distinguish ourselves and our surroundings: by describing what it is not (difference), by remembering the absences and that which has been excluded (trace) and by relating to what it resembles (la meme) (Berns, 2011). The self thus never stands alone, but exists and co-evolves within a network of relationships and interactions.

One way of describing the emergence of such relational selves is by actor-network theory (Callon and Latour, 1981; Callon, 1986; Law, 1986; 1992; Latour, 2004; 2005), as this theory describes how actor-networks evolve from fairly unstructured beginnings (comparable to the lack of central agency, distributed control, and dynamic boundaries from the complex adaptive systems) into organizational closure, placing emphasis on the relationships that constitute the network (Cilliers, 1998: 112). Actor-network theory can be considered as post-structuralist as it does not take the system as a starting or an end point. Instead, processes are understood as ever-evolving and performative, in a constant process of making and remaking, without clearly identifiable beginnings, delineations, final ends, or outcomes. Instead of seeking an underlying truth or structure of systems, the post-structuralists rather focus on relationships that constitute systems – or preferably: actor-networks. Systems or actor-

networks are performative, and meanings and actions proliferate in unexpected ways, depending on the relations being established (Murdoch, 2006).

An actor-network is formed along a process of translation. This process happens in four sequential steps, described by Callon (1986) as problematization, interessement, enrolment, and mobilization, and by Latour (2004) as perplexity, consultation, hierarchization, and institution. The problematization phase refers to the first phase in the emergence of an actor-network. An actor delineates a problem, and aims at making others see this problem too, and convincing them this problem needs to be addressed by new ways of doing, or a new type of knowledge or organization – a new self becomes visible and renders identity. The next phase is interessement, a phase in which the initiating actor looks for allies, and tries to establish connections between them and the network. By this, validity is given to the problematization and the alliance it implies – the new self acquires credibility. The third phase is that of enrolment, in which the specific roles of the interested actors are negotiated, consolidated, and defined. A common identity is determined and set – the new self acquires stability. During the subsequent fourth phase, the end result of translation, mobilization, the actor-network has proven to be strong enough to remain together and can now exercise the power to follow through. A new type of order has emerged, one in which certain entities within the network control the others – the self is being recognized and acknowledged, and is no longer questioned. The actor-network has become a black box, whose content is taken for granted (Latour, 2004; Callon, 1986). From here, new translations will start again, either when the black box starts becomes an actor in itself, or when the black box is opened due to changed circumstances. Then, a new problematization phase will emerge. The focus of these actor-networks is therefore not on stability, nor on the individual elements within an actor-network, but on the action of actors in the associations they form. Boundaries of an actor-network are emergent and performed, and impossible to specify, as inside and outside continuously shift along the various phases of translation (Cilliers, 2002: 82; Hillier, 2012: 58-59).

The perspective of self-organization adds a dimension to the translation in actor-networks is that emphasizes the "self" of an actor-network. Instead of merely following and tracing ever evolving actor-networks with all their fluidity, openness and transformability, and without clearly delineating any boundaries of the actor-network. The emphasis on the self enables to see some of the internal drivers, the matters of concern and the intentionalities of the actors that operate within, or work on constituting an actor-network. Self-organization as a process of expanding a self, and appropriating an environment in favor of the establishment and maintenance of the self.

3.3 A post-structuralist perspective on self-organization in cities and planning

From the post-structuralist perspective, the study of self-organization is not concerned with emergent patterns or conditions, but rather by the interactions among people, things, places, goals, etc. and the materialities, consolidations and affects created by these interactions. This wide-open process of self-organization leads to frequently changing structures, dependencies, and interactions, which are often only temporary, set up for a particular reason. Lack of centralized control then refers to the multiple actors involved in projects, developments or initiatives, of which each one has some degree of power to act, invest or withdraw, and to appreciate and enjoy the benefits of any results (cf. De Roo, 2012: 159). Self-organization is not a property of the system as a delineated entity, but the expression of the

interactions and relationships between individual actors and non-human factors that over time form networks around specific situated issues.

In a post-structuralist view, spatial planning and governance are seen as performances of representation – and not seeking representations or underlying structures per se. The performer and the context of performance are entangled in heterogeneous processes of spatial becoming, performance of social practice and space go hand in hand (Murdoch, 2006). Self-organizing actors are actively engaged in producing representations and becoming of representations as attempts to understand and influence spatial becomings. Translations happen when an initiative, project or actor aims at achieving or changing something in the environment, adding new activities, new uses and new physical objects to an existing spatial configuration. And as the actor-network perspective includes human and non-human elements, both the people who were important in the materialization of an initiative as planning-related factors, such as a site, architecture, planning documents, procedures, legal settings etc are addressed. Spatial planning itself can be seen as a process of network-building, in which entities of various kinds are assembled in ways that allow the network to undertake certain functions (Boelens, 2009; 2010).

The perspective of self-organization as emergent actor-networks for spatial initiatives opens up to an understanding of various networks which are planning simultaneously. When translated to planning, this post-structuralist view on self-organization can be used to explain ongoing struggles to establish meaning, identity and over whose reading of space should take priority. The focus lies on transformations, and the identification of actor-networks and trajectories through which various actors are forming relational space – and relational selves. From there, collective creations emerge over time, influenced by power laden and relational *stakeholder networks* (Innes & Booher, 2002; 2010), *politics* that intersect in improvised practices and performances, and affect (such as emotions, desires, imaginations) and – following Deleuze & Guattari's notion of the way in which any conceptualization comes with its creators' unique signature – with the specific *style* brought in by individual and collective actors (Hillier, 2007: 223; Deleuze and Guattari, 1991). As such, the post-structuralist perspective on self-organization as the establishment and emergence of relational selves in the context of spatial becoming and spatial planning, also opens up awareness of spatial actors and interventionists to the individual level and role of the individual – including the individuals styles and affects felled and performed among and between actors. It opens up an awareness of the situational context, felled and experienced in the here and now.

4. Illustration: The transformation of the Nieuwe Binnenweg, Rotterdam

We can further clarify the two epistemic perspectives with the empirical illustration of a urban transformation in the city of Rotterdam in the Netherlands. In the center of the city, we find the Nieuwe Binnenweg. The best days of the Nieuwe Binnenweg directly followed after the Second World War. Whereas bombings had devastated the city center of Rotterdam, major shopping facilities settled on this street which connecting the devastated city center with neighborhoods that had survived the bombings. When in the decades that followed the city center was step by step rebuilt, the Nieuwe Binnenweg gradually lost its function as central shopping destination. At the beginning of the 2000s,

this street had become strongly deprived (Naafs, 2012). The main economic activities that took place in the street were sex and drugs related, and the street had turned into a hot spot for criminal activities. Most of the real estate located on the street was privately owned, and occupied by entrepreneurs who solely focused on their own (short term) profits. Many buildings were vacant and the public space was badly maintained. The public authorities mainly targeted their interventions and investments toward the surrounding streets and residential buildings (social housing). The street itself had turned into an area which residents and visitors of Rotterdam avoided.

Today, however, the Nieuwe Binnenweg stands as an attractive shopping and business street again. Economic activity on the street has a hybrid contemporary character: entrepreneurs mix shopping, business, hospitality and community activities, are specialized in sustainability, local production, design and lifestyle, vintage and re-use. The entrepreneurs in the street share a strong collective identity, which radiates to its surrounding area and has made the neighborhood much more attractive, not only for entrepreneurs and visitors, but also for residents. Analyzing this transformation process helps to further clarify the different readings that critical realism and post-structuralism offer, as well as the practical implications these two different readings bring to planners.

4.1 The transformation of the Nieuwe Binnenweg from a critical-realist position

What happened in between halfway 2000s and today, can be described according to the critical-realist understanding of self-organisation from a CAS perspective as follows. What happened in between halfway 2000s and today, can be described according to the critical-realist understanding of self-organisation from a CAS perspective as follows. After the deterioration that set in when the newly build city center of Rotterdam became completed, several conditions started to trigger its regeneration. A new policy was instated in Rotterdam with a zero-tolerance attitude towards (street) crime and drugs related nuisances. Major spatial interventions in the city (including the rebuilding of the city center and the transformations of major former harbour areas) were declared finished and the attention of the city drifted elsewhere. Just before the financial crisis hit in, economically the city center of Rotterdam started to do really well, and the Nieuwe Binnenweg cautiously started to profit from this developed as well. And when the financial crisis did hit in, the Nieuwe Binnenweg had enough empty buildings to accommodate new and experimental economic activities (sharing economy, coorperative work spaces, pop-up shops etc.) against low rent or no rent at all. One of the major characteristics of the Nieuwe Binnenweg was the dispersed private land ownership – in contrast to the surrounding streets that mostly accommodate social housing – giving the local authorities limited space for manoeuvre to invest and intervene in a way that tackles deterioration.

The street appeared to regenerate itself through a series of uncoordinated and relatively independent actions by the public authorities, by various, individual shop-owners and by local community groups. Some decorated the public space, others transformed the function of their shops from retail to food and beverage, and again others organized social events to attract new visitors to the street. These activities and investments were trigged by a symmetry break (e.g. the rise of online shopping/changing in rental legislation/economic crisis). Over time, these actions result in changing spatial patterns on a wider scale, resulting in a structural change of the function and structure of the street (e.g. the shopping street becomes a public ‘living room’/ street in decline to hipster hang-out). Typically,

structural change is unpredictable in the sense that it cannot be deduced from the sum of all actions. Also, the activities and investments were not centrally coordinated, let along that they a part of a blueprint plan for the revitalisation of the street. Hence, a CAS perspective on self-organisation emphasises the spontaneous and emergent character of structural change of urban systems by analysing processes of pattern formation.

In the context of urban development, the critical-realist CAS perspective on self-organization thus implies the absence of a collective ambition amongst actors collectively to realise a particular urban transformation. Instead, the emergence of new spatial configurations is mainly driven by actors' actions that are based on individual ambitions. Therefore, this type of self-organisation covers the emergence of urban developments out of uncoordinated and relatively independent actions (e.g. transformation of a shop into a bar or café) by multiple actors (e.g. shop owners). These actions are a response to a trigger for change (e.g. the rise of online shopping). Over time, these actions result in changing spatial patterns on a wider scale (e.g. the shopping street becomes a public 'living room'). Typically, these patterns are unpredictable in the sense that they cannot be deduced from the sum of all actions. Thus a complexity-inspired understanding of self-organisation, from here on simply referred to as self-organisation, emphasises the spontaneous and emergent character of urban developments.

Conditions were created to attract new businesses. Businesses with a creative or hybrid profile were given start-up funding, and real estate owners were encouraged to lower their rents – arguing that vacancies would be more costly than low-rent use. Also conditions were created that would stimulate real estate owners to renovate their buildings, by giving them a choice: either renovate your building, or sell it to a collective trust. In both cases, the real estate owners would be financially compensated with municipal funding (Interview Frank Belderbos, 2014).

Slowly, a new mix of craft industries, design shops, hubs for creative entrepreneurs, bars and lunchrooms and other hybrid economic activities, often in combination with on-line businesses, and highly attractive to young urban residents emerged (Interview Frank Belderbos, 2014).

4.2 The transformation of the Nieuwe Binnenweg from a post-structuralist position

What happened in between halfway 2000s and today, can also be read from a post-structuralist perspective of self-organization. Then, the transformation of the Nieuwe Binnenweg would foremost be described as a matter of relationships being established in order to establish a sense of a collective self among actors and factors in and around the street.

Actors actively engaged in making representations started in the early 2000s, when several businesses who identified themselves as the "remaining decent businesses" (in furniture and quality food) in the western part of the street started to address the deterioration of the street to the municipality, while pleading for policy to improve the connectivity of the street to the city center (Interview Frank Belderbos, 2014). Meanwhile, in the eastern part of the street (closer to the city center), several businesses started to address the same concerns. However, instead of addressing the municipality directly, they first made attempts to establish networks among themselves. The owner of a shoe store wanted to renovate her building, and managed to get the neighboring shop owners on the same line,

and enrolled a well-known architect to draft a renovation-plan. Based on this plan, the municipality was asked to co-finance the renovation, to which the municipality surprised but happily applied with a funding mechanism for civil initiatives. From there, other interactions between the municipality and the local businesses emerged as well: a local hairdresser learned that the transport-agency planned a renovation of the tram-line, a year before the municipality planned the renovation of the street and pavement. He managed to organize a simultaneous renovation, and knew how to engage the restaurants and bars in this part of the street to take the opportunity to expand their terraces, bringing increased activity to the street. Other networks established between the local businesses, the city authorities and other shopping areas in and around the city center emerged as well – both in the form of city-wide events as in the form of structural deliberations. In 2011 the local businesses in the eastern part voted in favor of a Business Improvement District (Naafs, 2012).

In the western part of the street the local businesses were less organized (the local business association was run by the sex-industry and showcased little concern on the quality of the street itself), and the problems of deterioration were much more significant. Here, the municipality became an active stakeholder in establishing networks with and among businesses, helping them to bring forward their ideas and to develop a sense of collective identity. First, in 2002, a "safety-agent" was posted in the street. His main job was to establish networks among businesses, residents and diverse departments within the municipality in order to organize projects that would increase the safety, sense of ownership and livability in the neighborhood. In an empty building on the Nieuwe Binnenweg he established a meeting-center for businesses, he gathered ideas and opinions about the street and tried to stimulate both residents and businesses to take initiatives that would improve the neighborhood (Interview Marcel Dela Haije, 2013). In 2008, a "regeneration-agent" was posted in the street as well. His main job was to interest the local businesses to participate in a collective regeneration-program – targeting both the renovation of the individual buildings as the refurbishment of the street and its public space. For this, not only networks had to be established among businesses and residents, but also with the transport agency and the local housing associations, and with European funds that would complement the financial resources the municipality could offer (Interview Frank Belderbos, 2014). Efforts were also made to strengthen the – at first hardly active – business association in this part of the street (Interview Frank Belderbos, 2014; Interview Marcel Dela Haije, 2013).

During this period, both actors from the western and the eastern part of the street actively engaged in making representations of the street, in attempts to create a sense of a common identity that would also generate a new image of the street to outsiders: the ragged, messy, rough but at the same time cultural, stylish and diverse character of the street – highlighting the authenticity of the street in comparison to the more mainstream and commercial city center. In the eastern part, the businesses engaged in art projects, organizing events, advertisement and marketing – all to give extra exposure to the street and its businesses (Naafs, 2012; Interview Frank Belderbos, 2014). In the western part, the safety-agent, the regeneration-agent and a retail-manager – together with and sometimes even on the initiatives of local businesses and residents – engaged in attracting additional creative businesses, bars and restaurants to the street, but also facilitated art-projects such as poetry on buildings, the production of books about the street and the neighborhood, and the organization of events (Interview Frank Belderbos, 2014; Interview Marcel Dela Haije, 2013). From a post-structuralist perspective, these representations also account as performances and happenings through which new affects are created among actors.

Today, the Nieuwe Binnenweg has a much more solid image to outsiders, and the street and its economy have become more nested in the surrounding neighborhood – no longer being a nuisance to the neighborhood, but its main attraction instead. Moreover, among the businesses a sense of

collective identity has emerged that is performed though two solid and active business association that work in close cooperation with the city authorities (Interview Frank Belderbos, 2014; Ondernemersvereniging Binnenweg, 2010). However, this identity is not something given, but something that needs to be maintained and continuously developed further. Today, the focus still lies on establishing relationships. Not only in maintaining the business associations and their relationships with the city authorities, but also on improving the interactions and relationships between the eastern and the western part of the street – that somehow got to share the same collective identity but are not necessarily well-connected in their governance (Interview Frank Belderbos, 2014; Interview Marcel Dela Haije, 2013)

In addition to this account largely focused on the process of establishing relationships and a sense of a collective self through the creation of representations, this post-structuralist narrative on the transformation of the Nieuwe Binnenweg also illustrates the before mentioned ongoing struggles over whose reading of space takes priority, and the importance of style. The struggle over whose reading of space takes priority is for instance evident in the western part of the street, where local businesses had to be convinced from stretch on the benefits of a collective approach to the street – as opposed to their usual way of pursuing mere individual interests. It is also evident in the attempts undertaken by several actors to transform the image of the street from sex-industry, drugs and criminality towards creativity, culture, style and urban activity – by forcing out businesses who did not fit to that latter image. A third struggle over reading of space takes place in the eastern part of the street. Here, the initial positive cooperation between the local businesses and the municipality was damaged when the local businesses started to develop a different vision on the future of the street than the municipality. Whereas the municipality blamed the local businesses for not taking into consideration the entire neighborhood and accused them of a lack of professionalism, the local businesses blamed the municipality for taking its hand and responsibility away from the street now that the established Business Improvement District was generating its own financial resources – and thus damaging the still very fragile economic profile of the street (Naafs, 2012).

The importance of style becomes evident as the actors involved in the transformation of the Nieuwe Binnenweg describe their own activities and attitudes. They all describe their work as a continuous pushing, pulling, networking and communicating, trying to establish connections. But perhaps even more importantly, all emphasize the importance of encouraging ownership, intrinsic motivations and initiative among others than themselves, stating that their role should eventually be no longer necessary (Interview Frank Belderbos, 2014; Interview Marcel Dela Haije, 2013; Naafs, 2012).

5. Comparing the two approaches

Following these descriptions of a critical-realist and a post-structuralist understanding of self-organization would be, and what it would mean for planning, at first hand the understandings indeed seem to be fundamentally different and therefore perhaps also incompatible (see table below).

Critical-realism / CAS	**Post-structuralism / STS (ANT)**
Reality has an objective existence outside human construction & cognition	Rejection of transcendence, the social is constructed
CAS – Complex Adaptive Systems	STS – Science and Technology Studies (Actor-Network Theory)

The "self" of self-organization refers to "by itself"; spontaneous emergences within a system	The "self" of self-organization refers to the emergence of a relational and networked self
Individual uncoordinated actions lead to unintended unforeseen collective outcomes; the planned versus the unplanned	Multiple actor-networks are planning simultaneously, struggling over whose reading of space takes priority

Indeed, the literature claiming that the critical-realist and post-structuralist understandings of complexity are incompatible, is redundant. To put it more bluntly, accusations fly back and forth between the two ontologies. Whereas critical-realist do call into question the claim of value-free observations, they distance themselves from – in their words – postmodern view that denies a coherent, unified real world (Alvesson & Sköldberg, 2009). By some, the post-structuralist understanding of complexity is even called "fashionable nonsense" and "an abuse of science" (Sokal & Bricmont, 1999), accusing the post-structuralists of abusing strict mathematical entities, or physical and brain processes such as chaos, entropy, order, disorder as mere loose metaphors, in city planning leading to nothing more than architectonical kitsch (Portugali, 2011). Another accusation made at post-structuralists is that in a post-structuralist perspective on cities nothing is stable, true or that nothing matters for more than a second (Portugali, 2011). On the other hand, protagonists of the science and technology studies are caustic against any sciences who speak of the "world" or "nature" independent of relationships, and accuse them of "pretentious arrogance" and "narrowmindedness" (Stengers, 2003: XX). Such scientists, according to Stengers (2003), refuse to see themselves as part of the 'event' of science. Bruno Latour adds to this his AFKEER of researchers who either take social aggregates (which system definitions essentially are…) as a given and that subsequently look for underlying structures or contextual conditions that explain its emergent behavior. According to Latour, such conditions and structures explain nothing, and the only thing they do is that they abstain actors and make them irrelevant: actors only fulfill a function, they simply realize a potential that was already there as any agent in the same position would be forced to do the same. As such, research based on such pre-assumptions tends to put a veil over what is actually happening, and will thus only come with pretentious, false or at best impartial explanations. Such research is considered by Latour as completely incompatible with his science and technology studies (Latour, 2005).

Based on the theoretical elaboration on the concept of self-organization and the subsequent empirical illustration of self-organization in urban transformation processes earlier in this paper, we can now even further deepen the divide between the two positions, and bring the divide down to five major points of difference:

Difference 1: Dynamic Systems versus (emerging) Actor-networks

Difference 2: Planner is observer of emergences versus Planner is actor in emergences

Difference 3: Unintentional non-linearity versus Non-linear intentionality

Difference 4: Patterns are recognized versus Representations are made

Difference 5: Consequential self-organization versus Existential self-organization

While even deepening the divide between the two ontologies and subsequent epistemologies, the attentive reader will however notice that by further scrutinizing the differences between the two epistemic views on self-organization, potential overlaps and synergies eventually start to emerge. Earlier criticism on either an abuse of science or pretentious or at least impartial explanations, seems to step over the shared philosophical and mathematical backgrounds of complexity in critical realism and complexity in post-structuralism. For both the Prigogine Group, the Sante Fae institute as well as the post-structuralists Gilles Deleuze, Michel Serres and Bruno Latour found the inspirations in the work of Von Leibniz, Whitehead and Henri Bergson.

As such, perhaps the two positions are not necessarily mutually exclusive. Indeed, we perceive several bridges between the two positions:

Bridge 1: Beyond positivism and cause-and-effect-relations

Bridge 2: Linking the("natural") non-human and the ("social")l human world

Bridge 3: Knowledge is produced by actors

Bridge 4: Room for stability and dynamism

Bridge 5: Focus on experiments and the experimental

Bridge 6: Define a planning that is adaptive to unforeseen circumstances and emerging conditions

6. Turning divergent paths into consistency

6.1 Some differences once again

When just emphasising the differences and the incompatibilities of the two ontologies and their respective epistemologies, the complementarities between a CR-perspective and a PS-perspective on urban transformation processes and self-organization remain largely overlooked. We however aimed to illustrate with the example of the transformation of the Nieuwe Binnenweg, that both positions offer distinctive, but also very complementary readings of self-organization. Therefore, in the remaining part of this paper, we would like to argue that, despite their fundamental differences, or perhaps thanks to their differences, the two positions are rather complementary to each other, especially in the context of spatial planning and urban governance. We argue that acknowledging and combining the strengths of both approaches will allow planners to comprehensively grasp the complex processes they are part of and have to operate in. Our argument is that planners need both the systemic, pattern-oriented view of the CRP and the performative, relational-oriented view of the PSP in order to design and implement interventions that support the vitality and liveability of neighbourhoods, cities and regions. Rather than seeing the two positions as each other's' opposite, we would prefer to see them as each other's reverse, and thus offering a complementary view and approach where either one of the single positions falls short.

CRP on self-organization contributes to an understanding of an urban system's evolutionary path. A system is defined and the object of study. Planners put their attention to changes in the configuration of this system. The spontaneous (trans)formations of patterns on system level out of uncoordinated interaction at local level are analysed, and so are the conditions that enable and constrain this process, and the implications for related systems. Hence, a CRP on self-organization concentrates on a 'bigger picture' – the systemic level.

The focus on this bigger picture is important for planning for at least three reasons. Firstly, planning is concerned with aggregated effects of spatial developments. This can included undesired externalities, such as the impact of urban sprawl on the eco-diversity of an urban region. It can also be about potential synergies between various developments within the same area. For instance, the economic benefits for a city of car industry clustering. A critical realist position on self-organization supports planners in understanding how such system configurations emerge, alter and dissolve as a consequence of the dynamics on local level. This helps in mapping possible externalities and effects of interventions in dynamic, non-linear systems (Refs: e.g. modelling papers on urban sprawl). Secondly, a critical realist position enables planners to compare. Being concerned with the dynamic trajectories of individual systems, critical realism also enables to deal with ensembles of systems. As such, cases and situations and the configurations they represent can can be compared and thus help to understand the *various* ways in which things have come to be as they are, the *various* ways in which they might be different, and – with luck and the wind in the right quarter – how any intervention or changed condition might produce one possible future rather than another (Byrne, 2005). Thirdly, collective needs and desires underlie many planning interventions. One can think of cities that want to fight the consequences of climate change or which have a societal ambition to reduce urban inequalities. Thus the system level is of importance as is it at this level that some consequences of spatial developments manifest themselves and because some needs and desires are collective ones. A critical realist position on self-organization aids planners to identify possibilities to influence systems dynamics by creating conditions for development that can enable or constrain reconfiguration processes (Alfasi & Portugali, 2007; Moroni, 2015; Rauws, 2015).

However, with its focus on patterns and conditions CPR has a blind spot for the motivations underlying the behaviour of individual actors. Although CR acknowledges the importance of local interactions by agents, and the role of sense-making and perceptions, the wheeling and dealing of individual actors is easily overlooked. Emphasis is place on the emergence of spatial form, the spatial outcome of urban development processes, and less on the actual doing and acting within these processes (cf. Portugali, 2011). Moreover, in the critical realist perspective of cities as complex adaptive systems, it is almost obvious to claim that self-organizing processes – which are often market or civic-led - especially take place in cities that do not have planning or zoning entities (Krugman, 1996). As such, the critical realist position allows – or even strengthens – a dichotomy between planned versus unplanned development, placing the planner or planning scholar at a safe distance from the actual happenings that take place (Boonstra, 2015). Lastly, a real pitfall for researchers who take a critical realist position on self-organization, is to pick social aggregates (the systems they observe) or the collective (on whose behalf they apparently act) too carelessly and without reflection. Only when – beside the study of underlying structures – sufficient attention is paid to personal experiences and events, processes and behaviours (cf. Bashar – see section 2), and thus the critical realist ontology is applied thoroughly, this pitfall can

be avoided. Because as urban transformations that are fuelled by self-organization processes are a product of the interactions between individual actors, a comprehensive understanding of what drives these individual actors and how they relate to each other is crucial. To avoid the mentioned pitfall, PSP can offer a complementarity and crucial position to the analysis of urban self-organization processes.

PSP on self-organization focuses on the perceptions, associations and relations individual actors and how these feed into the emergence of actor networks. It analyses how dominant readings of reality emerge out of the interactions between actors, in turn affecting the meaning of these interactions to these actors and their consequences for their actions. PSP put emphasis on associations, actor-networks and controversies 'in the making'.

The performative, relational-oriented view of PSP is relevant to planning in two ways. Firstly, planning is an act of intervention. The post-structuralist position takes this act of intervention seriously as it places emphasis on the actors: anyone who changes anything for anyone is perceived as an actor, and thus regarded as relevant while studying urban development processes. It is thus also open for unexpected actors, and provides insights on the interpretations and motivations of actor in relation to a specific situation. A PSP on self-organisation offers methods to identify these and trace them over time. As such it enables us to understanding how particular readings of reality are emphasised, gain influence, direct action, and are overtaken by other reading again. Secondly, PSP sees action as performative, and thus opens up to the acknowledgement of style and affect. Awareness of this enables planners to not only map the interpretations and motivations of other actors in an emergent actor-network, but also enables planners to adjust their style of operating in this actor-network. This way, the professional planner can more closely align with the involved actors and might be more effective in influencing which reading of ready will dominate over others. Moreover, in order to connect, align, and respond, one first needs to know one's own perspective and position, and the frames through which the world is observed. Only then is one able to see others, and only then can the empathy with other planning actors grow. Frames that follow from this self-consciousness, can give actors clear and stable ambitions, and consistency to their actions, without losing the capacity to affect, to be inspiring, manifold, and flexible (Loepfe 2014; Van der Stoep 2014). Awareness of such selves and frames is especially needed in moments of uncertainty, as these selves and frames can provide a feeling of consistency. Without that feeling, "quick closures" become very probable (Loepfe, 2014: 209-210). Thirdly, PSP opens up the perspective of planners as actors within an (emergent) actor-network. Planners are not mere observers of spatial transformation processes, or instigators of general conditions that stand far away from the individual agents within a spatial system, but become actively engaged themselves.

However, with its focus on stylist and relational performances, building only on a PSP on self-organisation would mean that the aggregated effects and collective needs and desires are largely ignored. The same can be said about the opportunities to influence these by generating enabling and constraining conditions. A PSP standpoint easily becomes relativist. And an easy pitfall is that system definitions or any form of representation or aggregations is made, even though actors in the cases continuously make these. Only when PSP is applied thoroughly, and frames, references, representations etc. are regarded as actors too, this pitfall is not taken.

6.2 Some consistency at last

It is the complementarity of both perspectives on self-organization that motivate us to explore how diverging paths in the debate on self-organization and planning can be turned into consistency. We believe that acknowledging and utilizing this complementarity will allow scholars to more comprehensively grasp the complexities of urban self-organization processes. At the same time it offers planning practitioners a wider set of action perspectives on how they can relate to self-organization processes.

While looking again at the case descriptions of the transformation of the Nieuwe Binnenweg from the two positions, can distinguish various moves planners can take. First, the CRP enables planners to identify emerging socio-spatial patterns by recognizing early warning signals identify global trends that can function as amplifiers (Rauws, 2016). Through pattern recognition, and by looking at emerging patterns, planners can also identity global or local trends that can have a potential influence on the area of their concern. Or they can recognize and identify purely emerging trends within the area itself. Next, pattern recognition in combination with PSP enables planners to identify emerging actor coalitions that co-evolve with these patterns and map the consistencies and inconsistencies in the representations actors produce in the ongoing development process. In the light of supporting vitality and liveability of places, planners could, for instance, be concerned about the influence of particular initiatives on socially and environmentally "just" urban landscapes (Hillier, 2011). They could also be concerned about inconsistencies that emerge out of a fragmented development within a certain territorial environment (Rauws & De Roo, 2011). The way in which both global and local economic and political processes triggered the deterioration and the revival of the Nieuwe Binnenweg are illustrative.

Second, planners can anticipate the impact of these trends through condition planning, and respond to the developments by implementing rules and regulations that enable positive effects and mitigate negative ones. While such a response can be seen as reactive, planners can also proactively trigger self-organizing development processes guided by various conditions. But with help of PSP, planners do not only influence such processes from a safe distance (either from town hall or the desk in a university building), but as active agents within the local area itself. The case of the Nieuwe Binnenweg shows how important the role of those matchmaking agents can be in the actual regenerations. The case of the Nieuwe Binnenweg also shows how condition planning (financial tools to trigger individual landlords, subsidy programs for civic initiatives) and the active networking of individual agents (the safety-agent and regeneration-agent and several individual shop owners) can (or perhaps should) go hand in hand.

Thirdly, PSP makes visible how patterns become recognized and how people start behaving accordingly – the new emergent pattern becomes an actor itself. The emergent collective identity becomes acted upon – whether called enslaving principle or black box, it is no longer put into question. What PSP additionally brings into perspective is the style with which such representations are performed, or the style with which active agency within the emerging actor-networks is performed. Being open to such stylist performances, enables planners to look for more consistency in an area – consistency in the sense of moving in the same direction and a mutual strengthening of (individual or autonomous) actions and initiatives. Not because frameworks or conditions dictate such direction, but by actively empathizing with the emerging selves (be it individuals, actor-networks, projects, initiatives, collective

identities, discourses etc.), and without forgetting about others' and one's own perceptions, intentions, representations.

Together, these perspectives for action can foster a process of continuous adaptation. After all, self-organization processes and planning rules and regulations are co-constitutive, and therefore the development of monitoring, evaluation and learning activities is essential. By emphasizing the complementarities between the CRP on self-organization and the PSP on self-organization we do however not suggest that both perspectives should be merged. This would not only be unrealistic, as they build on different epistemological and ontological standpoints, it is also unnecessary. Planners have a strong tradition of pragmatism (cf. Dewey), focusing on 'what works', and we argue that depending on the situation at stake one perspective can be more informative that the other (cq De Roo, 2012?). Combining the two positions of CR and PS allows and perhaps enables planners to become adaptive in their ontological preferences according to the situations and challenges they face. Then, stylist performances and pattern recognition, planners as individual agents and as the ones who create conditions can go hand in hand. And moreover, planners can start become aware of the style with which patterns are recognized, and the patterns in style that are created. This requires that planner scholars and practitioners become aware of the differences and complementarities. This paper offers a framework to boost this awareness.

However, we fully realize that propagating a combination of post-structuralism and critical realism in planning practice has quite some consequences, and it more easily said than done. Therefore we propose to continue research on the combination of the two ontologies in two ways. The first way is by including pragmatism to the combination and diversification of styles, the second way is to go deeper into the issue of representation and pattern recognition in a way that relates to both post-structuralism and critical realism. Such can for instance be found in the topic of embedded cognition.

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