

# **An institutional approach to socio-ecological transformation: agency, structure and evolutionary political economy**

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## **1. Introduction**

Humanity faces multiple crises: economic, financial, ecological and social crises are all occurring, characterised by multifarious issues such as inequality, biodiversity loss and mass extinction, and austerity measures. In light of these severe crises, this paper contributes to an institutional economic approach to socio-ecological transformation. Scholars from several scientific disciplines have come together and analysed planetary boundaries. However, from an ecological economics perspective the concept still lacks a concise theoretical framework to accommodate the demands in economy and society stemming from these limits to growth. The concept of planetary boundaries is not sufficient in overcoming dominant institutional inertia if presented in nomological terms. To this extent an evolutionary political economy framework stands to reason where the actors and their socioeconomic networks play the most significant role in changing the world.

In particular we argue that current attempts in transition as well as evolutionary innovation studies enforce this aforementioned dissonance through a vague conceptualization of change. Here the proxy of change is still given by the idea of a technological trajectory, later extended with the concept of a sociotechnical system. Our evolutionary political economy approach emphasizes the knowledge-power nexus of change in contrast to material interests and moral sentiments. The former focuses on social structures and their reproduction through practices and habits, the latter is still lost within a methodological individualism extended through group selection mechanism. Recent evolutionary ecological analysis has highlighted the importance of an ‘ultrasocial’ organization of society for the advancement to agriculture as the main driver into the ‘anthropocene’. Where these findings put forward new insights on the stability of cooperation in large-scale societies among non-kin, they downplay the existent dynamics between agency and governed social structure. In this regard we highlight the role of governance and exploitation which has shaped the evolution of the socio-ecological metabolism of fossil capitalism.

Furthermore our approach entails a theoretical integration of the standard institutional elements of agency-structure heuristics in light of ecological constraints and dominant power relations. Institutions are understood as governed social structures that evolve in a diversity of strategies, rules and norms. The aspect of governance is significant in our context since institutions may enhance as well as dampen social learning in terms of practices that reproduce existing social structures, leading to inertia

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and lock-in. A deeper understanding of multi-level governance is important to figure out the different speeds of social learning, institutional change and socio-ecological transformation therefore. Innovative technology diffuses only if the social, economic and political practices adapt to its means and ends. They are core elements of transformation processes. Moreover the challenge of socio-ecological transformation demands a radical democratization of current institutions as knowledge repositories to avoid a rampaging division of winners and losers.

From a methodological perspective we connect the sociological theory of practice with evolutionary and complexity approaches in a generic way allowing us to substantiate the conceptual heuristics of transition and transformation. Conclusively we suggest further empirical research in field studies of social, sustainable and governance practices in order to integrate this knowledge in computational simulations of interacting agents on multiple scales. These simulations provide didactic tools to envision real utopias and the formation of pre-analytical visions. The emphasis is thereby given on bounded rational agents interacting on a diversity of networks and their institutional modularization and clustering. Future research in the emerging paradigm of agent-based macroeconomics helps to elaborate on the macroeconomic consequences of different institutional experiments in artificial worlds. This history-friendly methodology is favoured because it is able to integrate insights from qualitative empirical studies in the modelling process.

In section 2 we introduce the discourse of planetary boundaries and social foundations by suggesting a symbiotic view on evolutionary change. Section 3 outlines the evolutionary political economy framework and the conception of institutional dynamics between agency and structure. We suggest a synthesis with post-structural sociological research that focuses on social practices, knowledge and power relations. From a theoretical perspective we emphasize the role of relations of exteriority for the emergence, stability and exit of structural wholes. Along this evolutionary foundations section 4 elaborates on the systemic terminologies and political economic implications of socio-ecological change, explaining the differences among discourses of transition and transformation. The section concludes with a plea for radical democratization of institutions and a research outlook for envisioning real utopias on behalf of empirical field studies and computational simulation of interacting agents in artificial worlds. Section 5 concludes.

## **2. Planetary Boundaries, Social Foundations and Symbiotic Evolution**

It is impossible to separate economic activity from the biophysical environment in which it takes place. Current economic growth has been supported and, so far, continues to be supported by a relatively stable biophysical environment over the last 10,000 years, known as the geological period of the ‘holocene’. However, global phenomena such as climate change call this stability into question. Human interference with planetary processes, elsewhere called “the colonization of nature” (Haberl et al. 2011:2) is widespread, as Rockström et al. (2009) illustrate in their paper on planetary boundaries.

Due to the increasing human interference in the biophysical environment, Steffen et al. (2007) propose that we have moved from the ‘holocene’ to the ‘anthropocene’.

Human effects on the biophysical environment are illustrated by Rockström et al. (2009) through the boundaries of nine crucial planetary systems. Attention to natural systems, while crucial, is not sufficient as the current “growth economy runs into *two* kinds of fundamental limits: the biophysical and the ethicosocial” (Daly 1996:33; emphasis: authors’ own). Where the former constrains human activities as an upper bound and the latter as a lower bound respectively, through this terminology Daly (1996) achieves a vision for a steady-state economy. In recent academic debates, the planetary boundaries introduced by Rockström et al. (2009) are thus supplemented by minimum living standards, based on internationally recognized goals such as the UN’s Millennium Development Goals (MDGs) (Raworth 2012). Raworth’s (2012) approach suggests that in addition to thresholds for natural systems beyond which environmental disaster could strike, similar thresholds exist in regards to human well-being that, if crossed, diminish well-being (Wilkinson and Pickett 2011). Combining these maximum feasible strains on the environment and the minimum thresholds for well-being gives rise to a space where critical thresholds in regards to natural systems are not crossed while ensuring human well-being across the globe – the “safe and just space for humanity” (Raworth 2012).

This implies both reducing strains on the biophysical environment and acknowledging biophysical limits while enabling a satisfactory quality of life. The objective then is the transformation of existing societal structures, both in regards to biosocial and ethicosocial limits since the economic, social and ecological crises “have the same root cause in a particular set of human cultural institutions and belief systems now dominating the planet” (Gowdy 2007:27f). However, both the planetary boundaries concept and the additional conceptualisation of socio-economic minimum requirements offer a rather static conceptualisation of human-planetary interactions – they provide a bandwidth conceived as a snapshot of the situation at hand rather than a dynamic, process-oriented view.

The new geological period, informally called the ‘anthropocene’ as of today, is named for the visible effects human development has on the planet: “humankind is wreaking changes upon the biosphere on a scale and at a speed that gives real cause for concern” (Haberl et al. 2007:5). This requires an explanatory approach that considers spatiotemporal dynamics; we argue that an evolutionary perspective of human-planetary interactions recognizes the interdependent processes and can provide an understanding of change as opposed to a static picture. Specifically, we refer to symbiosis (Margulis 1998) as a powerful evolutionary explanatory tool for human-planetary interdependence. Symbiotic evolutionary thinking can provide a bridge between planetary boundaries and socio-economic issues. Evolution refers to the natural phenomenon of the transformation of material processes; symbiosis, in this context, focuses on the relationship between humanity and the planet. Symbiosis highlights co-operative rather than competitive properties of evolutionary processes and poses fundamental ontological questions about the interdependences of material and social structures.

In the ‘anthropocene’ an explanatory approach needs to grasp how societal development interferes with planetary processes. Humanity is an “ultrasocial species” in that it completely dominates the ecosystems it depends on and significantly interferes and changes their regenerative capacities (Gowdy and Krall 2013). In the ‘anthropocene’ we assume that societal, cultural, political and economic activities diminish the resilience of the planetary system called earth. To this extent we conceive the whole planetary system as a living entity, which co-evolves with society in the ‘anthropocene’. In this context a common evolutionary ecological political economy approach may help to understand these non-linear, non-substitutable and non-interdependent dynamics. Moreover, these dynamics are conditioned by the fragility and vulnerability of highly interconnected post-modern societies due to continuous changes in knowledge and power relations.

### **3. Evolutionary Political Economy: The Knowledge-Power Nexus of Institutional Change**

Crises are endogenous in capitalist production systems. They lead to societal transformations along significant redistributions of ownership and wealth. This endogenous process of systemic transformation is the object of investigation in political economy. The financial crisis of 2008 has shown (still shows, since the crisis has not spontaneously vanished) that our current accumulation regime, building upon exploitation of labour and the environment, is not sustainable in social and ecological terms. The previous section has emphasized that a common evolutionary ecological economic approach is emerging through analysis of major transformations in human societies. However, this approach still lacks a clear political economy understanding and vision. Given a so-called ‘Matryoshka organization’ of crises, as several scholars have recently highlighted (Antal and van den Bergh 2013, Foxon 2013, Geels 2013, Witt 2013), we are confronted with the non-trivial problem of shaping this systemic transformation in successful terms. By success we refer particularly to a solidary just and ecological sustainable future. Here we are still lacking concise concepts of socio-ecological transformation processes, allowing for intervention in these terms. Since the problem at hand covers not just a specific sub-system of the economy, such as the labor or capital market, but accounts for the whole planetary system, we suggest a terminology that synthesizes concepts from the natural and social sciences. We build this terminology within an evolutionary political economy approach, where agency and structure are interdependent units of change, thereby emphasizing the role of institutions. Evolutionary economists have made significant contributions especially with regards to innovation and technological change (Nelson and Winter 1982, Dosi 1982, Metcalfe 1994, Safarzynska and van den Bergh 2010). Other evolutionary economists have emphasized the role of “learning to consume” (Witt 2001, Safarzynska 2013) or have elaborated on an evolutionary institutional economic approach (Hodgson 2004, van den Bergh and Stagl 2003, Wäckerle 2014). Recently the approach of evolutionary economics has received further historical and methodological foundation under terms of Schumpeter (Andersen 2009) and has established a coherent theoretical framework within an evolutionary ontology (Dopfer 2005) and a generic rule-based micro-meso-

macro framework (Dopfer and Potts 2008). These works are theoretically linked to early evolutionary economists such as Schumpeter, Hayek and Veblen. Since then evolutionary economics has been a scientific mecca for the investigation of change and transformation. However, due to a significant focus on innovation and technological change, evolutionary economists have emphasized the role of knowledge for the evolving economy, but downplayed the role of knowledge as power and social theory in general to explaining major societal transformations. In this article we want to step into this niche by arriving at a theoretical concept of socio-ecological transformation in section 4, which goes beyond socio-technical and –economic transitions. This synthesizing attempt builds upon an evolutionary ontology and institutional heuristics dealing with the knowledge-power nexus of change. Central for a further integration in analytical terms is the conception of rule-based approaches which synthesize theories of practice and social norms along the notion of local rules, their transmission and persistence, as indicated by Dopfer and Potts (2008) as well as Ostrom and Basurto (2011). Rule-based approaches are highly useful as bridging devices between theory, empirical field studies and agent-based models.

An evolutionary ontology features two major advantages in comparison to other ontologies. First, it features continuity between biological and economic evolution, which is necessary to grasp the significant socio-ecological questions of our time (e.g. biodiversity) and second, it substantiates a co-evolutionary theory of agency-structure dynamics. These features are neither addressed in the methodological individualism of neoclassical economics nor in current social ontologies around critical realism. However, there are still some problems with an evolutionary ontology concerning the so-called 'unit of selection problem'. Hodgson and Knudsen (2006) have argued for a "Generalized Darwinism" as an ontological umbrella for the social sciences. The basic message of this project suggests a full adaptation of the Darwinian trajectory of variation-selection-retention. Thereby the authors emphasize the role of habits as replicators and institutions as interactors for economic change. The original Neo-Schumpeterian evolutionary ontology was introduced by Nelson and Winter (1982), where the genotype (replicator) is represented by organizational routines and the phenotype (interactor) by the firm. However, Nelson and Winter (1982) have formulated this system of thought as an analogy to the biological realm in Schumpeterian tradition. Hodgson and Knudsen (2006) go one step further and argue that the Darwinian trajectory is not only feasible in analogical terms but only makes sense if it is understood as a full ontology for the social sciences. To this extent the authors use a monistic conception of ontology where the natural realm is not regarded as exogenous to the social strata. This logic of systemic embeddedness is, of course, inevitable for a socio-ecological theory or an evolutionary ecological political economy. Still a question remains concerning the transformation mechanisms of information (inheritance processes) under social terms. The doctrine of Generalized Darwinism struggles with core problems of evolutionary theory, especially when it comes to 'habit as a unique dispositional unit of selection'. In general it cannot evade the theoretical caveats that are raised against the Neo-Darwinian synthesis. Referring to the latter, the gene represents an ultimate unit

of selection (e.g. Dawkins 1976) within the Neo-Darwinian synthesis. This synthesis within evolutionary biology is challenged within several fields, such as evolutionary-developmental biology and the conception of an extended synthesis (Pigliucci and Müller 2010) for instance. Knudsen (2002) has defended the position of Generalized Darwinism along a multi-level selection approach, where the social environment plays an additional role for the selection of habits (see Wilson 2010 for an introduction to multi-level selection theory). Others such as Witt (2008) argue in favor of a “continuity hypothesis” and suggest that economic evolution still builds upon biological evolution in monistic terms, but refer to different, more generic mechanisms for societal change such as self-organization and social learning. In evolutionary anthropology, quite similar attempts have been developed under the notion of “dual-inheritance theory” or “gene-culture co-evolution” (Boyd and Richerson 2005). The focus is here given to a differentiation of transmission and persistence of cultural rules and the main question of research is given by “Why do humans cooperate on a large-scale with non-kin?” (Stoelhorst and Richerson 2013).

Within this bio-cultural evolutionary strand scholars investigate different mechanisms that are capable to guarantee cooperation among non-kin on a large scale, such as indirect reciprocity (Manapat et al. 2013) or altruistic punishment (Bowles and Gintis 2011). The concept of “ultrasociality” introduced by Campbell (1982) and revisited by Gowdy and Krall (2013) indeed deepens our understanding of the social origins and moral sentiments regarding the social organization of our species. The evolution from hunter-gatherer societies to agricultural economies invoked a revolution in social organization that has led to the ‘anthropocene’ as a first building block. In a political economy perspective it marks the significant developmental stage for feudalism and was crucial for the evolution of capitalism thereafter, as prominently observed by Marx. However it is this latter development, which indicates that the knowledge-power nexus may even lead to the destruction of this highly “ultrasocial organization” of society from within, in contradictory terms. Thereby conceptions of the human species as a super-organism (Sober and Wilson 1999; Corning 2005; Hölldobler and Wilson 2009; Gowdy and Krall 2013) are perhaps misleading, since they assume full *functional* systemic coherence of greater wholes such as species. But complex human societies go far beyond their socio-biological correspondents such as ant systems. In this respect we may just speak about *structural* systemic coherences. As DeLanda (2002:9) elaborates, the former logic builds upon *relations of interiority* as explanations for the emergence of greater wholes. In this picture the parts are functionally controlled in terms of “organic unity”, resulting into a strict reception of Hegelian dialectics where additive composition and aggregation remain. Otherwise the latter logic builds upon *relations of exteriority* where interaction of the parts plays a more dominant role and is closer to terminologies of complexity and evolution. In terms of contingent path-dependent evolution this notion is in line with a Marxian and Schumpeterian reception of Hegelian dialectics (Schumpeter 1954:437), where individual practices reproduce social structure through synthesis. Within this examination it seems more intuitive to follow Gould’s (2002:601) interpretation where organisms as

well as animal kingdoms and human species are always considered as individuals with their own evolutionary history. Moreover a strict bio-cultural evolutionist view may still deliver novel findings to derive significant explanations for the evolution of humans as cultural beings, but they lack a realistic social ontology of power relations dominant in political economy.

Respectively we refer to an evolutionary realism perspective such as elaborated by Dopfer and Potts (2004) and extended by Wäckerle (2014). This ontology is conceptualized along a layered induction system, where the socioeconomic layer builds upon a biological and a physical layer. The central empirical axioms are given along bimodality of matter-energy actualizations of ideas, associations of all existences as well as a process axiom which shapes the dynamic core of the ontology. In addition to the general assumptions made in critical realism (Bhaskar 1997, 1998) we also emphasize the virtuality of existences and not just their actualizations (see Pühretmayer 2013 for an introduction to critical realism). This line of arguments aligns very well with conceptions of speculative realism (Harman 2008) building upon the social ontology of DeLanda (2002) who synthesizes the post-structural philosophy of Deleuze and Guattari with insights from evolutionary theory and complex systems research (DeLanda 2011). The emphasis in evolutionary realism is therefore given to a contingent path-dependent evolution of socioeconomic systems under generic mechanisms, such as (circular) cumulative causation, self-organization, modularity, social learning, catalysis and phase transition.

By rendering this evolutionary ontology closely to post-structural sociology we gain a significant advantage concerning the potential social heuristics of change. The literature in this respect is very rich and is well discussed since a few decades. If we consider Foucault (1978) we cannot address knowledge without talking about power. Agamben (2008) explains that a *Dispositif* is a generic network of knowledge-power relations and can therefore get rendered as a generic network in terms of Dopfer and Potts (2008) or as a *hyperstructure* in terms of Potts (2000). The *Dispositif* is then a real social structure of change that are "...shaped by strategies of power relations, that underpin kinds of knowledge and are simultaneously underpinned by themselves." Foucault (1978:123). Consequently they also form loci of transformation, best illustrated as knowledge- and power topologies. However the heuristic core of this methodology is given by social practices, or Bourdieu's (1982, 1994) concept of habitus/field dialectics, as a sociogenetic generator of social practices. The habitus co-evolves within its corresponding social field and emerges on behalf of a network between cultural, social and economic capital. Bourdieu (1994) clarifies all forms of capital as social relations in a Marxian tradition. In order to transform one form of capital into another it requires a time-intensive process of transformation work. Capital cannot be transformed instantaneously via economic currency (money) or transaction costs. Concerning the latter we claim a clear distinction from the new institutional economic literature (Williamson 1979, Coase 1998). Correspondingly we emphasize a strong nexus of the evolutionary political economy approach with the old institutional economics as developed by Thorstein Veblen, Wesley Claire Mitchell and John R. Commons. These authors were inspired by

American pragmatists such as Charles Sanders Peirce, William James and John Dewey. Implicit in this particular stream of thought is a theory of practice approach as also envisioned by Bourdieu (1994), see Schwingel (1995) for an introduction. Recently regulationsists have also referred to the Bourdieuan theoretical system of social change as a candidate for an institutional meso-foundation of ‘la theorie de la régulation’ (Boyer 2008).

This endeavor seems promising since socio-ecological researchers have revisited the theory of social practices and discussed the realm of sustainable practices (Shove 2012) and of low-carbon lifestyles (Urry 2011). The institutional heuristics we are framing work along the social practice approach constrained by the knowledge-power nexus. In this respect we speak of a contingent path-dependent evolution of social practices bounded by the *Dispositif*. This terminology refers to a generic evolutionary mechanism of social stratification. Veblen’s (1898, 1899) theory of cumulative causation of habits as dispositions remains consistent with the aforementioned adaptations and extensions. It is still the conspicuous consumption which drives the imitating dynamics stemming from class conflict and leading to correspondingly hungry lifestyle. These dynamics truly constrain the working class in a contradictory form. This boundary makes a socio-ecological transformation a highly complex problem.

#### **4. Systemic Terminologies of Socio-Ecological Change: Transitions and Transformations**

As outlined in the previous sections of this paper, humankind is facing multiple crises. Polanyi’s (1944) great transformation is invoked by scholars to illustrate how comprehensive change has to be (Fischer-Kowalski and Hausknost 2014). A holistic socio-ecological transformation is an inherently political endeavour and when considering how such a transformation can and might take place, one has to differentiate between top-down and bottom-up approaches, deliberate steering and spontaneous emergence as well as spatiotemporal dynamics. As we will argue, sustainability can be seen as a conservative concept, aiming at sustaining not changing. This is related to the use of terminology that advocates top-down, managerial approaches such as socio-technical and socio-economic transitions. We show that using terminologies related to socio-ecological transformation allows for a much more dynamic and progressive understanding of institutional change and that an evolutionary political economy perspective best meets these conditions. An evolutionary ontology, as we argue in this paper, allows for comprehensive analysis: it provides a nested ontology and dynamic heuristics, hence lending itself to the analysis of socio-ecological transformation.

##### *4.1. Socio-technical and socio-economic transitions – discourses of continuity?*

Transition refers to a marked change in a system where the research focus is traditionally on socio-technical regimes. In the late 1990s the term was linked to the normative goal of changes toward sustainability in academic debates. Here system change occurs in ‘socio-technical’ systems. This change does not only include technological novelties, but contextual changes in behaviour, practices, cultural meanings, policy and markets (Geels 2004). Research on socio-technical transitions, however,

focuses on industry and business since these are considered the appropriate arena for innovation. To express the multi-level processes, transition theory makes use of the “multi-level perspective” and identifies three levels: the landscape (macro), the regime (meso) and the niches (micro). Transitions originate from (1) niche-innovations that gradually gain support from more powerful groups through learning processes, (2) changes stemming from the landscape level pressuring the regime, and (3) windows of opportunity on regime levels for niche-innovations opened due to destabilization (Geels and Schot 2007).

Another school of thought identifies the socio-economic realm as the area for transitory processes. Socio-economic transitions expressed through notions such as ‘green economy’ or ‘green growth’ are increasingly on the global agenda (Brand 2012). Out of the financial and economic crises that began in 2007, the notion of a ‘green new deal’ was born. The title is borrowed from Roosevelt’s new deal put in place during the depression in the 1930s to revive the economy through an extensive stimulus package. The green new deal in turn seeks to utilize the crises to restructure the economy in a ‘green’ way, ultimately leading to win-win situations: reduction of poverty, further economic growth, green (and more) jobs, and ecological sustainability.

Put on the global agenda by the Rio +20 summit in 2012, green capitalism focuses especially on issues related to energy use, efficiency and the related technologies. These are means by which green growth will supposedly be obtained, ultimately leading to sustainable development (Barbier 2011). Green growth was proposed and is supported by international institutions and individuals such as the OECD, the World Bank and UNEP, Nobel Prize winner Paul Krugman, and business associations such as the World Business Council for Sustainable Development (WBCSD). It is a high profile issue, receiving global attention; Brand terms it “the new leading strategy in political discourse” (2012:28).

Green growth aims to sustain the connection between economic growth and employment. The insistent need for growth is a feature inherent to capitalism as this ultimately unsustainable growth provides the tax income that all state functions are based on (Brand 2012). Capitalism has thus proven to be quite resilient, providing forms of innovation and adaptation that ultimately lead to further growth (Newell 2012). However, this approach is highly problematic: “Green growth will not mean sustainable growth as long as global ecosystem degradation and loss means that the world continues to face worsening problems of ecological scarcity” (Barbier 2011:234). While this statement is clearly critical of the notion of *green* growth, it still allows for the possibility of some form of growth.

In many ways, the notion of a green economy or green growth is a re-framing of liberal interests: environmental degradation and poverty prevail while subjective well-being and social welfare are still deduced from simple economic aggregates such as GDP, thus perpetuating a flawed system. This conception is of course doomed in the long run due to ecological crises invoked by pursuing exponential growth (Newell 2012). Green growth therefore seems to rally the support of hegemonic socio-economic actors in order to continue in a re-framed version of Business-As-Usual (Barry and Doran 2006), thus providing a discourse of continuity.

#### *4.2. Discourse of discontinuity: socio-ecological transformation*

Traditional economics conceives human action as individualistic and out of social context and therefore does not offer an analysis that includes the impact of social structures on economic processes (Granovetter 1985). Since Ostrom (2005) we should be aware that socioeconomic and political institutions are highly diverse and demand individual problem-solving approaches. Institutions evolve along strategies, rules and institutional statements (Ostrom 2005) and are all embedded in a specific strategic relational context of actors in networks (Jessop 2005). Institutions have developed in a way that they depend on growth from two perspectives. Of course decisive for these ubiquitous institutional developments have been the two world wars that facilitated a massive rebuilding effort (Seidl and Zahrnt 2010). On the one hand the state system needs to seek for economic growth from a business cycle perspective, leading to higher aggregate demand and lower unemployment, thereby raising tax income. Currently this mechanism is still necessary to maintain government spending, investment in infrastructure and general-purpose technologies. On the other hand, the after war period intensified consumer dynamics connected to conspicuous consumption. These more informal institutional dynamics have also fuelled the growth engine of mass production and consumption. The resulting vicious cycle was recently made prominent by Jackson (2009) in chapter 6 of his book, where he conceives the combination of supply-push from a Neo-Schumpeterian perspective of “innovation as a rule” and the conspicuous consumption of demand-pull put forward by Veblen (1899) more than hundred years ago (as well as bandwagon and snob effects) as problematic in this regard. Furthermore, beyond this closed-economy view, a radical restructuring of socio-ecological systems is confronted with institutional inertia connected to the uneven development across the globe: only one third of the population lives in developed and industrialized countries while the overwhelming majority of the world is still in transition (Haberl et al. 2011). The notion of “steady-state” and ”degrowth” thus lacks widespread support because “a world without economic growth was – and is – inconceivable for all but a tiny minority living in industrial societies and was and is not acceptable for the political and industrial elite” (Haberl et al. 2011:8).

Socio-ecological transformation, i.e. the attempt to transform the social metabolism<sup>1</sup> of humanity, refers to the restructuring of production and consumption processes to deal with the current contradiction between production, finance, social relations and biophysical limits. Socio-ecological transformations imply a fundamental and potentially sudden change in the relationship of society and natural environment (Haberl et al. 2011). Major transformations are considered to bring about social turmoil and call into question existing rules and values, such as property rights or power structures (Fischer-Kowalski and Hausknost 2014; Stirling 2014); this involves overcoming hegemonic discourses such as green growth.

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<sup>1</sup> Social metabolism refers to “the entire flow of materials and energy that are required to sustain all human economic activities” (Haberl et al. 2011:3).

Historically, the term ‘transformation’ originated in political science and refers to the democratization of countries, most recently the countries of Central and Eastern Europe after the collapse of the Soviet Union. The term transition is also used in this context; however, transition refers to a steered attempt to change political organisation with a focus on the relevant actors. The conceptualization of change remains rather mechanical and technical (von Braunmuehl in Seidl and Zahrnt 2010). Transformation is a more inclusive term, referring to all forms of transformative processes that involve changes in the political structure of a country (Merkel 2010). Usually causes for political transformations can be found in structural changes in economic, political or social subsystems that bring about existential crises and, in best-case scenarios, pave the way for democracy. Merkel (2010) emphasizes the need for inclusive and deliberative processes – the collective mobilisation of masses is crucial, even inevitable, if the transformation is to be successful.

As outlined, a transformative process can take a top-down, managerial or an evolutionary, organic and radically democratic approach. Considering the current multiple crises, the only option available is radical change (Barry and Doran 2006). Both in academia and civil society, socio-ecological transformation is discussed. A central element is the debate surrounding economic growth as outlined above. The notion of de-growth refers to the overall reduction of the societal metabolism and the subsequent stabilization at a socially sustainable and equitable level (Kallis 2011). Degrowth explicitly sees Western, industrialist, consumer society with the growth objective at the heart of these transformative processes and there seems to be a general consensus that “this will only be possible with such a radical change in the basic institutions of property, work, credit and allocation” (Kallis 2011:875).

The question remains of how transformations can take place in an equitable, just and democratic manner without invoking the spectre of an eco-dictatorship (von Braunmuehl in Seidl and Zahrnt 2010; Stirling 2014). Degrowth can only be achieved through the “collective reviewing and re-establishment of the fundamental values and institutions of society” (Petridis 2012:3). Wright (2010) relates this to the notion of utopia – the process of developing viable alternatives to hegemonic institutions and new visions of society. This involves explicitly dealing with power asymmetries and institutional arrangements that hinder radical democracy: the focus on economic growth needs to be replaced by the empowerment of socio-economic actors that provide alternatives. This, of course, ultimately runs into the problem of current elites that benefit from existing structures and can hinder these movements (Wright 2010). Far from being able to propose perfect solutions, scholars currently emphasize the importance of emancipation – previous, historical transformations such as female empowerment or racial equality have benefited from bottom up, grassroots activities (Stirling 2014). Essentially, representative democracy is no longer sufficient in light of increasing globalisation and privatisation (von Braunmuehl in Seidl and Zahrnt 2010; Stirling 2014). In light of this, complexity and evolutionary theory make suitable candidates to substantiate these political economy perspectives of system transformation with regards to methodological foundations (tools for analysis).

#### *4.3. Tools for analysis: an institutional-evolutionary political economy approach*

The economic process is an irreversible process by nature bounded to the irreversible transformation of energy into work. Therefore, economic analysis needs to be reframed radically to be “more consistent with the systemic interdependence of economic activity on natural resources and waste-assimilation processes” (Foxon et al. 2013:189) and for a better understanding for processes of change in different realms. The idea of constant progress is thus misleading; rather “the global workings of the capitalist process have a dark side, inextricably linked to creative destruction” (O’Hara 2007:19), closely related to Polanyi’s disembedded economy (Polanyi 1944).

An institutional-evolutionary political economy (IEPE) approach has to move beyond the traditional and especially state-centred approach to power. It moves away from “hierarchies of levels, the boundedness of actors and linearities of decision making” (Newell 2012:48). Rather, it takes into account the formation of networks and a multitude of understandings of governance; all of which plays into an understanding of governance processes and in whose interest decisions are made (Newell 2012). In this respect we understand institution always as governed social structures. The ubiquitous composition of the institutional landscape demands a multi-level governance perspective for transformation processes. Correspondingly processes that are enabling institutionalization foster social learning and bridge to other already existing institutions with novel modes of governance. The complexity of evolving social structures depends on the particular mode of governance which restricts or allows social learning at different speeds.

In viewing environmental problems, IEPE recognises that they are “products of existing patterns of political and social power” (Newell 2012:55). This explains the focus of IEPE on power. An explanation for current unsustainability, especially in light of continuing environmental degradation and social inequality, is needed and this, in turn, “means understanding power: the power to change and the power to resist change” (Newell 2012:157). The power to change or the inertia that restrains from change depends crucially on the power topology, which is basically considered as a network of networks that are interconnected through weak links (Csermely 2009). This synthetic approach is in line with Herbert Simon’s (1962) original analysis of the “architecture of complexity”, where decomposition and modularity plays a major role (Callebaut 2005). Moreover this more formal conception of networks may get easily aligned to Latour’s (2005) sociological approach to “reassemble the social” with actor-network theory. As already elaborated in section 3, we are emphasizing relations of exteriority (DeLanda 2002) that lead to the emergence, stability and exit of social structures. Basically “evolutionary ecological political economy” is considered as a synthetic science thereafter (Simon 1996), where the modularization of knowledge-power relations creates critical feedbacks on the environment, leading to climate change and biodiversity loss for instance. However these are further the same theoretical lines which may transform the system radically, obviously this notion implies huge economic and social costs (recurrent crises) that are not determinable. Anyway such a restructuring through crises puts the system under severe stress through

cutting weak links as Csermely (2009) has famously put forward. Then it depends on the self-organization and (re)modularization of disconnected knowledge and power clusters that may invent a novel institutional landscape for the benefit of social and environmental equality. In order to deepen our understanding of such punctual restructuration or phase transition processes that run parallel to longer cumulative transformation processes (Hanappi and Wäckerle 2014) we refer to two methodological cornerstones besides a historical political economy account:

- a deeper and more substantive qualitative analysis of social, sustainable and governance practices
- introducing this empirical knowledge in agent-based macroeconomic models of socio-ecological transformation.

The first methodological pillar receives increasing attention within the ecological economic realm, as authors such as Stagl (2002, 2006), Røpke (2009) or Shove (2012) indicate. Otherwise a new macroeconomic paradigm is emerging which allows the stepwise integration of this empirical knowledge for the analysis of political economy, business cycles, growth regimes and their feedback on the environment. Pleas for this agent-based macroeconomic approach have been raised for years now (LeBaron and Tesfatsion 2008; Farmer and Foley 2009; Delli Gatti et al. 2010; Stiglitz and Gallegatti 2011). Recently authors have further proven that the approach is realistically applicable to explain and understand endogenous crisis from bottom up by testing different fiscal and monetary policy settings (Cincotti et al. 2010; Delli Gatti et al. 2011; Dosi et al. 2013, Seppecher 2013; Riccetti 2013; Rengs and Wäckerle 2014). However two important advancements are still lacking in these models, on the one hand it is the full integration of a material balance to grasp the ecological domain realistically (e.g. Safarzynska et al. 2012) and second it is a deeper integration of knowledge, power and governance structures as it is conceived in game-theoretically applied agent-based models of political economy (e.g. Wäckerle et al. 2014).

The explanatory power of such a synthetic evolutionary ecological political economy approach lies in its “realist analysis of the structure, contradictions and unstable reproduction of economic systems, paying particular attention to the link between agency and institutions, habits and instincts in an environment of uncertainty, ignorance and bounded rationality” (O’Hara 2007:35). This also acknowledges the crucial interaction between agency and structure. Individuals are subject to institutions, habits and instinctual propensities and decisions are made in an uncertain environment. This is crucial to governance since “current governance processes are thus imbedded in the system of norms, institutions, habits and privileges of the system” (O’Hara 2007:30).

## 5. Conclusion

In this research article we have highlighted the importance of a dynamic understanding of institutional change for the topic of socio-ecological transformation. We have indicated that a transformation towards a social and environmental just society is inevitable under given planetary boundaries.

Otherwise economic crises as well as social and political conflicts seem to accumulate drastically. Where the pillars for social equality are very well formulated and documented in political economy research, the terms for environmental equality are not yet fully negotiated. In our perspective we regard these two as interconnected and argue that sustainability is foremost a social issue, because it increases subjective well-being and social welfare through the resilience capacities of the planetary system. Thereby a viewpoint of symbiosis is adopted in explaining these evolving interdependencies.

Societal transformation remains a highly complex issue and we elaborate why it is different to a transition terminology. Transformation implies both top-down and bottom-up processes on multiple scales from tight and loose social networks, to organizations and institutions. We understand institutions as governed social structures that are evolving in large diversity between strategies, rules, norms and institutional statements. In particular they underlie processes of self-transformation within and between institutional networks or modules. In order to understand these dynamics we refer to an evolutionary ontology and an evolutionary political economy framework, which focuses on knowledge-power relations.

Recent research in evolutionary ecological realms has focused on the material interests and moral sentiments that arose with agriculture and shifted the geological system from the ‘Holocene’ to the now informally called ‘anthropocene’. Where these findings provide new insights into the moral origins of cultural civilizations that are stable at large scales, they downplay the significance of power topologies for hegemony, international dependencies and socio-ecological exploitation. To this extent they still remain within a methodological individualism where social structure is exogenous or at best abstracted away. In contrast, we emphasize governance and exploitation that has dominated feudalism as well as the socio-ecological metabolism of fossil capitalism. In consequence, an evolutionary political economy approach suggests looking into the social practices and the co-evolving social fields. On the one hand this attempt aligns very well with the theory of practice approach in the old institutionalism à la Veblen and on the other hand such a qualitative empirical foundation can be advanced through the analysis of sustainable and governance practices on multiple scales.

However a socio-ecological transformation cannot be blindly induced alongside a few empirical cases; it demands a pre-analytical vision in Schumpeterian terms and a real utopia in Marxian terms. For this reason it seems intuitive to intensify research with computational simulations of interacting agents on a diversity of networks. The emergence of an agent-based macroeconomic paradigm allows us to integrate empirical fieldwork in the routines and rules of interacting agents in artificial worlds. Thereby we are able to test the dynamics of a variety of agency-structure dynamics with economic policies hinting at socio-ecological transformation. In this outlook for further research the computer is conceived as an “in-silico” laboratory to envision utopias on realistic grounds. In this respect an empirically grounded history-friendly modelling helps us to understand the architecture of complex societies, the modularization of institutional networks and the evolution of multi-level governance. This dynamic network perspective of society provides a theoretical biotope, which is far easier to

visualize and communicate to a broader audience than traditional methodologies building on classical mechanics. To conclude an evolutionary political economy approach offers multiple didactic advantages in theory and methodology to enhance socio-ecological transformation in proper terms.

## References

- Agamben, G. 2008. Was ist ein Dispositif? Zürich-Berlin: Diaphanes.
- Andersen, E.S. 2009. Schumpeter's Evolutionary Economics. A Theoretical, Historical and Statistical Analysis of the Engine of Capitalism. Anthem Press.
- Antal, M., van den Bergh, J.C.J.M., 2013. Macroeconomics, financial crisis and the environment: Strategies for a sustainability transition. *Journal of Environmental Innovation and Societal Transition* 6, 47-66.
- Barbier, E. 2011. The policy challenges for green economy and sustainable economic development. *Natural Resources Forum*, 35(3), 233–245.
- Barry, J. and Doran, P. 2006. Refining Green Political Economy : From Ecological Modernisation to Economic Security and Sufficiency, 2006, 250–275.
- Bhaskar, R. 1997. A Realist Theory of Science, London: Verso.
- Bhaskar, R. 1998. The Possibility of Naturalism: A Philosophical Critique of the Contemporary Human Sciences, London: Routledge.
- Bourdieu, P., 1982. Die feinen Unterschiede: Kritik der gesellschaftlichen Urteilskraft. Frankfurt: Suhrkamp.
- Bourdieu, P., 1994. Praktische Vernunft: Zur Theorie des Handelns. Frankfurt: Suhrkamp.
- Boyd, R. and Richerson, P. 2005. The origin and evolution of cultures, Oxford University Press, New York.
- Boyer, R. 2008. Pierre Bourdieu, a Theoretician of Change? The view from *Régulation Theory*', in Ebner, A. and Beck, N. (eds.) 2008. The Institutions of the Market. Organizations, Social Systems, and Governance, 348-398, Oxford University Press.
- Brand, U. 2012. Green Economy – the Next Oxymoron ? GAIA - Ecological Perspectives for Science and Society 1, 28–32.
- Von Braunmuehl, C. (2010). Demokratie, gleichberechtigte Buergerschaft und Partizipation. In Seidl, Irmi and Zahrnt , Angelika (Ed.), Postwachstumsgesellschaft - Konzepte fuer die Zukunft. Marburg: metropolis.
- Callebaut, W. 2005. The ubiquity of modularity. In Callebaut W. and Rassskin-Gutmann (eds.) 2005. Modularity: Understanding the Development and Evolution of Natural Complex Systems, Cambridge, MA/London: MIT Press.
- Campbell, D.T. 1982. Legal and primary-group social controls. *Journal of Social and Biological Structures*. Vol. 5: 431-438.
- Cincotti, S., Raberto, M. and Teglio, A. 2010. Credit money and macroeconomic instability in the agent-based model and simulator eurace. *Economics: The Open-Access, Open-Assessment E-Journal* 4: 2010-2026.
- Coase, R.H. 1998. The new institutional economics. *American Economic Review*, Vol. 88 (2): 72-74, American Economic Association.
- Corning, P.A. 2005. Holistic Darwinism: Synergy, Cybernetics, and the Bioeconomics of Evolution, Chicago, IL: University of Chicago Press.
- Csermely, P. 2009. Weak Links: The Universal Key to the Stability of Networks and Complex Systems, Dordrecht: Springer.
- Daly, H. E. 1996. Beyond Growth – The Economics of Sustainable Development. Boston: Beacon Press.

- Dawkins, R. 2006 [1976]. *The Selfish Gene*, Oxford University Press.
- DeLanda, M. 2002. A New Philosophy of Society. Assemblage Theory and Social Complexity, Continuum.
- DeLanda, M. 2011. Philosophy and Simulation. The Emergence of Synthetic Reason, Continuum.
- Delli Gatti, D., Gaffeo, E. and Gallegati, M. 2010. Complex agent-based macroeconomics: a manifesto for a new paradigm. *Journal of Economic Interaction and Coordination* 5: 111-135.
- Delli Gatti, D., Desiderio, S., Gaffeo, E., Cirillo, P. and Gallegati, M 2011. Macroeconomics from the Bottom-up. Springer, Berlin.
- Dosi, G., Fagiolo, G., Napoletano, M. and Roventini, A. 2013. Income distribution, credit and fiscal policies in an agent-based Keynesian model. *Journal of Economic Dynamics and Control* 37(8): 1598-1625.
- Dopfer, K. (ed.) 2005. *The Evolutionary Foundations of Economics*. Cambridge University Press.
- Dopfer, K., Potts, J., 2004. Evolutionary realism: a new ontology for economics. *Journal of Economic Methodology* 11 (2), 195-212.
- Dopfer, K., Potts, J., 2008. The general theory of economic evolution. London: Routledge.
- Dosi, G. 1982. Technological paradigms and technological trajectories: A suggested interpretation of the determinants and directions of technical change. *Research Policy* 11 (3): 147-162.
- Farmer, J.D. and Foley, D. 2009. The economy needs agent-based modelling. *Nature* 460: 685-686.
- Fischer-Kowalski, M. and Hausknost, D. 2014. Large scale societal transitions in the past (pp. 1–65). WWWforEurope Working Paper No. 55.
- Foucault, M. 2000 [1978]. *Dispositive der Macht. Über Sexualität, Wissen und Wahrheit*, Merve, Berlin.
- Foxon, T.J., 2013. Responding to the financial crisis: Need for a new economics. *Journal of Environmental Innovation and Societal Transition* 6,126-128.
- Foxon, T. J., Kohler, J., Michie, J., and Oughton, C. 2013. Towards a new complexity economics for sustainability. *Cambridge Journal of Economics* 37(1), 187–208.
- Geels, F. W. 2004. From sectoral systems of innovation to socio-technical systems. *Research Policy* 33(6-7), 897–920.
- Geels, F.W., 2013. The impact of the financial–economic crisis on sustainability transitions: Financial investment, governance and public discourse. *Journal of Environmental Innovation and Societal Transition* 6, 67-95.
- Geels, F. W., and Schot, J. 2007. Typology of sociotechnical transition pathways. *Research Policy* 36(3), 399–417.
- Granovetter, M. 1985. Economic Action and Social Structure : The Problem of Embeddedness. *The American Journal of Sociology* 91(3), 481–510.
- Gowdy, J. 2007. Avoiding self-organized extinction: Toward a co-evolutionary economics of sustainability. *International Journal of Sustainable Development & World Ecology* 14(1), 27–36.
- Gowdy, J. and Krall. L. 2013. The ultrasocial origin of the Anthropocene. *Ecological Economics* 95: 137-147.
- Haberl, H., Fischer-Kowalski, M., Krausmann, F., Martinez-Alier, J. and Winiwarter, V. 2011. A Socio-metabolic Transition towards Sustainability? Challenges for Another Great Transformation. *Sustainable Development*, 19, 1–14.
- Hanappi, H. and Wäckerle, M. 2014. Evolutionäre Politische Ökonomie: Inhalt und Methode. *Wirtschaft und Gesellschaft* 40 (3).
- Harman, G. 2008. DeLanda's ontology: assemblage and realism. *Continental Philosophical Review* 41, 367-383.
- Hodgson, G.M. 2004. The evolution of institutional economics: Agency, structure and Darwinism in American Institutionalism, Routledge.
- Hodgson, G.M. and Knudsen, Th. 2006. Why we need a generalized Darwinism and why generalized

- Darwinism is not enough. *Journal of Economic Behavior & Organisation*, Vol. 61 (1): 1-19, Elsevier.
- Hölldobler, B. and Wilson, E.O. 2009. *The Superorganism: The Beauty, Elegance, and Strangeness of Insect Societies*, New York: W.W. Norton & Co. Inc.
- Jessop, B. 2005. Critical Realism and the Strategic-Relational Approach. *New Formations* 56, 40-53
- Kallis, G. 2011. In defence of degrowth. *Ecological Economics*, 70(5), 873–880.
- Knudsen, Th. 2002. Economic selection theory. *Journal of Evolutionary Economics*, Springer.
- Latour, B. 2005. *Reassembling the Social: An Introduction to Actor-Network Theory*. Oxford University Press.
- LeBaron, B. and Tesfatsion, L. 2008. Modeling macroeconomies as open-ended dynamic systems of interacting agents. *American Economic Review* 98 (2): 246-250.
- Manapat, M.L., Nowak, M.A. and Rand, D.G. 2013. Information, irrationality, and the evolution of trust. *Journal of Economic Behavior & Organization* 90S, 57-75.
- Margulis, L. 1998. *Symbiotic Planet - A New Look at Evolution*. Amherst: Basic Books.
- Merkel, W. 2010. *Systemtransformation: Eine Einfuehrung in die Theorie und Empirie der Transformationsforschung* (2nd ed.). Wiesbaden: VS Verlag fuer Sozialwissenschaften.
- Metcalfe, J.S., 1994. Evolutionary Economics and Technology Policy. *The Economic Journal* 104 (425), 931-944.
- Nelson, R. and Winter, S., 1982. *An Evolutionary Theory of Economic Change*. Harvard: Belknap Press.
- Newell, P. 2012. *Globalisation and the Environment: Capitalism, Ecology and Power*. Cambridge: Polity.
- O'Hara, P. A. 2007. Principles of Institutional-Evolutionary Political Economy : Converging Themes from the Schools of Heterodoxy. *Journal of Economic Issues*, 41(1), 1–42.
- Ostrom, E. 2005. *Understanding Institutional Diversity*, Princeton, NY: Princeton University Press.
- Ostrom E. and Basurto, X. 2011. Crafting analytical tools to study institutional change. *Journal of Institutional Economics* 7 (3): 317-343.
- Petridis, P. 2012. GPSG Working Paper # 12 - From economism to autonomy: A Greek economic emergency and the transformative vision of degrowth (pp. 1–11).
- Pigliucci, M. and Müller, G. 2010. *Evolution – The extended synthesis*, MIT Press.
- Polanyi, K. 1944. *The Great Transformation: The Political and Economic Origins of Our Time*. Boston: Beacon Press.
- Potts, J. 2000. *The New Evolutionary Microeconomics. Complexity, Competence and Adaptive Behaviour*, Edward Elgar.
- Pühretmayer, H. 2013. Kritischer Realismus. Eine Wissenschaftstheorie der Internationalen Politischen Ökonomie. in Wullweber J. et al. (Hsg.), *Theorien der Internationalen Politischen Ökonomie, Globale Politische Ökonomie*, Wiesbaden: Springer.
- Raworth, K. 2012. Oxfam Discussion Papers A safe and just space for humanity - Can we live within the Doughnut? (pp. 1–16).
- Rengs, B. and Wäckerle, M. 2014. A Computational Agent-Based Simulation of an Artificial Monetary Union for Dynamic Comparative Institutional Analysis', presented at IEEE Computational Intelligence for Financial Engineering & Economics 2014, March 27-28, London, UK. (Proceedings forthcoming on IEEE Xplore)
- Riccetti, L., Russo, A. and Gallegati, M. 2013. Unemployment Benefits and Financial Leverage in an Agent Based Macroeconomic Model, *Economics: The Open-Access, Open-Assessment E-Journal*, 7 (2013-42): 1-44.
- Rockstroem, J.. Steffen, W., Noone, K., Persson, A., Chapin, F.S., Lambin, E.F., Lenton, T.M., Scheffer, M., Folke, C. Schellnhuber, H.J., Nykvist, B., de Wit, C.A., Hughes, T., van der Leeuw, S., Rodhe, H., Soerlin, S., Snyder, P.K., Costanza, R., Svedin, U., Falkenmark, M., Karlberg, L.,

- Corell, R.W., Fabry, V.J., Hansen, J., Walker, B., Liverman, D., Richardson, K., Crutzen, P. Foley, J. A. 2009. A safe operating space for humanity. *Nature*, 461(24).
- Røpke, I. 2009. Theories of practice – New inspiration for ecological economic studies on consumption. *Ecological Economics* 68(10): 2490-2497.
- Safarzynska, K., 2013. Evolutionary-economic policies for sustainable consumption. *Ecological Economics* 90, 187-195.
- Safarzynska, K., van den Bergh, J.C.J.M., 2010. Demand-Supply Coevolution with Multiple Increasing Returns: Policy for System Transitions. *Technological Forecasting and Social Change* 77, 297-317.
- Safarzynska, K., K. Frenken and J.C.J.M. van den Bergh 2012. Evolutionary theorizing and modelling of sustainability transitions. *Research Policy* 41: 1011-1024.
- Schumpeter, J.A. 1954. *History of Economic Analysis*. Oxford University Press.
- Schwingel, M. 1995. *Pierre Bourdieu: zur Einführung*, Junius Verlag, Dresden.
- Seidl, Irmi and Zahrnt, A. (Ed.). (2010). *Postwachstumsgesellschaft - Konzepte fuer die Zukunft*. Marburg: metropolis.
- Seppecher, P. 2012. Flexibility of Wages and Macroeconomic Instability in an Agent-Based Computational Model with Endogenous Money. *Macroeconomic Dynamics*, Cambridge University Press, 16 (s2): 284-297.
- Shove, E. 2012. *The Dynamics of Social Practice. Everyday Life and how it Changes*, Sage Publications.
- Simon, H. 1962. The architecture of complexity. *Proceedings of the American Philosophical Society* 106 (6): 467-482.
- Simon, H. 1996. *The Sciences of the Artificial*. 3<sup>rd</sup> edition. Cambridge, MA: MIT Press.
- Smith, A. 2007. Translating Sustainabilities between Green Niches and Socio-Technical Regimes. *Technology Analysis & Strategic Management*, 19(4), 427–450.
- Sober, W. and Wilson, D.S. 1998. *Unto Others: The Evolution and Psychology of Unselfish Behavior*. Cambridge, MA: Harvard University Press.
- Stagl, S. 2002. Local organic food markets: Potentials and limitations for contributing to sustainable development. *Empirica* 29: 145-162.
- Stagl, S. 2006. Multicriteria evaluation and public participation: the case of UK energy policy. *Land Use Policy* 23(1): 53-62.
- Steffen W., Crutzen P.J., M. J. 2007. The anthropocene: are human now overwhelming the great forces of nature. *Ambio*, 36(8), 614–621.
- Stirling, A. 2011. Pluralising progress: From integrative transitions to transformative diversity. *Environmental Innovation and Societal Transitions*, 1(1), 82–88.
- Stirling, A. 2014. STEPS Centre Working Paper - Emancipating Transformations: From controlling “the transition” to culturing plural radical progress (pp. 1–41).
- Stoelhorst, J.W. and Richerson, P.J. 2013. A naturalistic theory of economic organization. *Journal of Economic Behavior & Organization* 90S, 45-56.
- Urry, J. 2011. *Climate Change & Society*, Polity Press.
- van den Bergh, C.J.M. and Stagl, S. .2003. Coevolution of economic behaviour and institutions: towards a theory of institutional change. *Journal of Evolutionary Economics* Vol. 13: 289-317.
- Vasileiadou, E., and Safarzyńska, K. 2010. Transitions: Taking complexity seriously. *Futures*, 42(10), 1176–1186.
- Veblen, Th. 2000 [1899]. *Theorie der feinen Leute: Eine ökonomische Untersuchung der Institutionen*, Fischer, Frankfurt.
- Veblen, Th. 1898. Why is economics not an evolutionary science? *The Quarterly Journal of Economics*, Vol. 12.

- Wäckerle, M., 2014. The Foundations of Evolutionary Institutional Economics: Generic Institutionalism. Abingdon: Routledge.
- Wäckerle, M., Rengs, B. and Radax, W. 2014. An agent-based model of institutional life-cycles. Games 5(3): 160-187.
- Wilkinson, R., Pickett, K., 2011. The Spirit Level: Why Equality is better for Everyone. London: Penguin Books.
- Williamson, O.E. 1979. Transaction-cost economics: The governance of contractual relations. Journal of Law and Economics, Vol. 22 (2): 233-261, University of Chicago Press.
- Wilson, D.S., 2010. Multi-Level Selection and Major Transitions. In: Pigliucci, M., Müller, G., (Eds.). Evolution – The Extended Synthesis. Cambridge: MIT Press, 81-95.
- Witt, U., 2001. Learning to consume – a theory of wants and the growth of demand. Journal of Evolutionary Economics 11, 23-36.
- Witt, U. 2008. Heuristic Twists and Ontological Creeds: A Roadmap for Evolutionary Economics. in (eds.) Hanappi, H. and Elsner, W. 2008. Advances in Evolutionary Institutional Economics, Edward and Elgar, Cheltenham, UK.
- Witt, U., 2013. The crisis behind the crisis. Journal of Environmental Innovation and Societal Transition 6, 120-122.
- Wright, E. O. 2010. Envisioning Real Utopias. London: Verso.