



## RESEARCH PAPER

SYSTEMS and BEHAVIORAL  
RESEARCH SCIENCE

WILEY

# Rethinking theories of change in the light of enactive cognitive science: Contributions to community-scale local sustainability initiatives

Andrew S. Mitchell

Faculty of Computing, Engineering and Media, De Montfort University, Leicester, UK

**Correspondence**

Andrew S. Mitchell, Faculty of Computing, Engineering and Media, De Montfort University, The Gateway, Leicester LE1 9BH, UK.  
Email: andrew.mitchell@dmu.ac.uk

**Abstract**

Social innovation projects commonly refer to operationalized theories of change to inform strategy and to deliver intended outcomes. Community-based sustainability campaigns, as one example, emphasize the elicitation of pro-environmental activities and decision-making among members of a host community, drawing on mainstream psychological theories of behaviour, motivation and cognitive (mental) processes. Locating an argument within the neurobiological base of structure determinism, this paper explores how theories of change for sustainability campaigns might be reimagined through the lens of enactive theory. Following a brief introduction to the enactive model of embodied cognition, implications associated with trying to operationalize the model to inform how theories of change are mapped out and used in sustainability initiatives are discussed. The paper concludes by drawing on insights from approaches to psychotherapy, which also endeavoured to apply this model of mind, and considers these within the strategic context of sustainability initiatives and public engagement.

**KEYWORDS**

enactive cognition, learning, structural coupling, sustainability initiatives, theories of change

## 1 | INTRODUCTION

Humanity has reached an existential crisis point with evidence indicating potentially catastrophic climate change becoming overwhelming, necessitating an immediate and radical shift in our *modus vivendi*. Some of this is already underway. International policy frameworks are being negotiated to promote Sustainable Development Goals (SDGs; General Assembly, 2015), and regional governance mechanisms in Europe and elsewhere continue to support investment in low carbon infrastructure. Increasingly over the last few decades, ‘third sector’ and

community-based groups have self-organized to offer members of the public opportunities to participate in localized sustainability projects. Indeed, many community-based initiatives now receive support from charitable donations and funding contracts, and it is becoming common for post hoc evaluations to be included as a funding condition.

But evaluations without theory have little probative value to either project learning or to the discipline of evaluation itself (Chen, 1990). Indeed, as Chen argues, to determine the value or merit of a project, there must be a theoretical basis, a coherent model of change and how it

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2020 The Author. Systems Research and Behavioral Science published by International Federation for Systems Research and John Wiley & Sons Ltd

happens. Because Chen's call for an end to theory-free or black-box evaluations, there has been a blossoming of interest within the evaluation discipline to develop, test and reflect on how change happens and is accounted for, and indeed, this informs the methodology of process evaluations (H.M. Treasury, 2011). If anything, new entrants to the discipline may be overwhelmed by too many theorists (Parsons, 2017), and tracking alignment between a project's putative theory of change and its subsequent outputs and outcomes relative to objectives and key performance indicators is now common practice (Morra Imas & Rist, 2009; Rogers, 2014).

A theory of change is a log-frame breakdown of how an initiative defines the problem of interest (here, enhancing local community sustainability), develops a response, attempts to engage relevant stakeholders in processes of change and how it defines success (Stame, 2004; Weiss, 1995). A theory of change often models responses to deeply complex, dynamic and chronic conditions, typically characterized as wicked problems (Rittel & Weber, 1973), of which human sustainability is but one example. As a result, how local initiatives model how change is thought to work and how it might be defined in terms of processes, inputs and outputs is a topic of interest for evaluation and policy research purposes.

There is no singular community-based local sustainability initiative model however (TESS, 2016), and initiatives generally involve multiple combinations of focused activities, across scales of space and time, with a range of funding and staffing arrangements. What unites this disparate sector though is the planned elicitation of pro-sustainable behaviour among the stakeholders with

whom it engages. These intended processes of engagement and elicitation are frequently modelled using theories of change, which draw heavily on psychological accounts of learning, cognition and behavioural triggers. But these accounts are not unproblematic. Indeed, in light of what is at stake, such models would surely benefit from a critical review to avoid supporting insignificant outcomes or, worse, merely the illusion of change (McDonough & Braungart, 2002). Moreover, although studies evaluating the processes and impacts of local sustainability initiatives have emerged over the last decade (e.g., Mayne, Darby, & Hamilton, 2012), few studies directly engage with the implicit models of cognition upon which many theories of change are based (Arvesen, Bright, & Hertwich, 2011; McFarlane, 2006).

Studies demonstrate the variable predictive value of psychological models of behaviour change (e.g., Bamburg & Möser, 2007; Steg & Vlek, 2009), and two of the more frequently cited models of behaviour change in the sustainability literature—the theory of planned behaviour (TPB; Ajzen, 1991; Armitage & Christian, 2003) and value-belief-norm theory (VBN; Stern & Dietz, 1994)—both show limited predictive value. These models are summarized in Table 1. For example, structured equation modelling of correlation coefficients of eight determinants of pro-environmental behaviour drawn from a meta-analytic literature review found that when a hybrid model of TPB and norm activation model (NAM; Schwartz, 1975, 1977) was fitted to available data, the impact of all variables was mediated by the determinant 'intention', whereas the impact of problem awareness was mediated by norms and beliefs (Bamburg & Möser, 2007; Cialdini, Kallgren, & Reno, 1991). Indeed,

**TABLE 1** Summary of two widely-used approaches to pro-environmental behaviours

Model	Source	Characteristics
Theory of planned behaviour (TPB)	Ajzen (1991); Armitage and Christian, (2003)	<ul style="list-style-type: none"> <li>• General deliberative theory of behaviour</li> <li>• Intention to act is determined by the interactions among attitudes (a broad measure of how favourable a behaviour will be), subjective norms (willingness to comply in conjunction to the degree of social pressure) and perceived behavioural control (opportunity and capability to behave in the intended way).</li> <li>• Behaviour is therefore taken on the basis of cost–benefit analysis.</li> <li>• The model is unable to account for (self-defeating) habitual behaviours.</li> </ul>
Value-belief-norm (VBN) theory	Stern and Dietz (1994); Stern (2000a)	<ul style="list-style-type: none"> <li>• Extends norm activation model (Schwartz, 1975, 1977), which was developed to account for altruism to pro-environmental behaviour as expressing a personal norm activated by linking consequences of behaviour and ascription of responsibility</li> <li>• Often measured by means of the new ecological paradigm (NEP; Dunlap, van Liere, Mertig, &amp; Jones, 2000), which associates value orientation and personal norms</li> <li>• Pro-environmental behaviour derives from a moral orientation, typically transcendental or biospheric values.</li> <li>• Like TPB, VBN is unable to account for habits and evidences stronger predictive value in low-cost situations.</li> </ul>

the meta-analysis suggests that pro-environmental behaviour is the product of 'self-interest and pro-social motives' (Bamburg & Möser, 2007, p. 21). But neither TPB nor VBN can account for self-defeating habits and offer predictive strength only under relatively low-cost situations (Klößner, 2013; Steg & Vlek, 2009). Despite the widespread reliance on activities that appeal to values and attitudes as triggers for pro-environmental action, these are statistically weak predictors of behaviour (Stern, 2000b).

Another widely referenced model, especially in the transition town literature, is Prochaska's transtheoretical model (TTM) of change, originally developed to explain how addicted persons change their behaviours (Prochaska, DiClemente, & Norcross, 1992). By framing humanity's path dependence and lock in to an oil-based economic and technological infrastructure as an 'addiction', Hopkins (2008) proposes the TTM as a way to understand the processes involved in transformative change. The model of addiction is reflected by the movement's use of a 12-step guide to community change (Connors & McDonald, 2010), a framework directly echoing that of self-help addiction support formats (e.g., Alcoholics Anonymous). Johnstone (in Hopkins, 2008) notes how TTM depicts change as a gradually unfolding process beginning with one's precontemplation to change and evolving through a series of phases until change is acted upon and achieved.

Even in the absence of a fully articulated theory of change, approaches to eliciting pro-environmental behaviours are replete with terminology, which draw on implicit theories of mind and cognition. For example, initiatives may seek to appeal to the *values* people hold about the environment (e.g., Kaiser, Woelfing, & Fuhrer, 1999) or seek to shift people's *attitudes* in support of pro-environmental perspectives (e.g., Kollmuss & Julian, 2002) or even encourage people to *co-identify* with nature (e.g., Dunlap, 2008). Moreover, methods of engagement also return variable outcomes; for example, the widespread use of 'bottom up' participatory methods for community engagement (e.g., Bass, Dalal-Clayton, & Pretty, 1995; Green & Hunton-Clarke, 2003) was initially purported to be good practice, yet a recent literature review suggests disappointing results (Reed, 2008).

It is evident then that theories of behaviour change vis-à-vis environmental problems are complex and wide-ranging and show highly variable results (Gardner & Stern, 2002) and as a consequence may leave some practitioners confused about which models to adopt, how to implement them and how they are to be assessed (Ika, 2012). Is this because, as Lakoff (2010) argues, our latent epistemology struggles to respond to the complexity of the sustainability crisis? And if so, then what—if anything—will change as a result of

doing more of the same (Burns & Worsley, 2015; Ramalingam, 2013)?

Much of the psychology imported into the theories of change used by sustainability initiatives is based on a modernist paradigm, seemingly ill-equipped to deal with the dynamic non-linearity, multiple perspectives and self-reflexiveness that characterize complex systems (Rohde, 2010). As a result, this poses the legitimate question about the validity and viability of common psychological models to meaningfully contribute to addressing the challenges of climate change and our unsustainable ways of living. This is a non-trivial matter. Our epistemological framework shapes how environmental problems are construed, the identification of available opportunities to ameliorate, mitigate and adapt to the dynamic future conditions envisioned and the sense-making capacities by which a direction of travel is ascribed significance by stakeholders in local initiatives. In recognition of this, this paper locates cognition at the epicentre of transition and sustainability evaluation and policy research.

Theories of mind, thinking and epistemology have long been the preoccupation of philosophers, and the nature of mind is one of the five 'perennial questions' Baumer (1977) traces in his history of modernity. In traditional Western epistemology, mind and body are essentially different matters, and the latter has generally been devalued and associated with the *corpus* of the Earth (Stephens, 2013). It is somewhat ironic then that the prime challenge to sustainability concerns the body itself. We warm and shelter our bodies in buildings that tend towards thermal inefficiency, we feed our bodies with food bearing embedded carbon footprints and we transport our bodies to work and elsewhere using fossil fuel-based infrastructures. Although sustainability initiatives do focus on these facets, generally, the theories of change favoured are based on psychological models that have little to say about the body per se. Moreover, in a note of caution to those who imagine a technological fix to the problems of sustainability, McDonough and Braungart (2002, p. 62) observe that technological solutions pursuing sustainability via improved eco-efficiency do not 'reach deep enough [because the solution] works within the same system that caused the problem in the first place [and] presents little more than an illusion of change'.

In the following section, an explicitly embodied theory of cognition—enaction—is introduced. Thereafter, some of the implications of applying enaction to theories of change are considered, and inspiration for doing so is drawn from therapeutic practice rooted in enaction. The paper concludes by reflecting on how local sustainability initiatives might utilize enactive theory in reflective and engaged practice.

## 2 | COGNITION AS LIVING: A BRIEF INTRODUCTION TO ENACTION

There is something more fundamental to successful transitions to sustainability than just getting the technology right. If '[e]nvironmental destruction is a complex system in its own right—widespread, with deeper causes that are difficult to see and understand' (McDonough & Braungart, 2002, p. 66) and if the 'crisis of the environment is [...] a wider challenge to our ways of knowing and acting in the world—including the relationship between various forms of expert knowledge and understanding' (Irwin, 1995, p. 182), then as Hukkinen (2014, p. 108) puts it, the way 'we theorize about the mind matters a great deal [...] for the politics of knowledge in environmental issues'. The relationship between cognition in the escalating crisis of sustainability and on the generation of viable solutions cannot be neglected.<sup>1</sup> It is becoming increasingly evident that theories of change informing how sustainability interventions are designed and implemented based on linear and reductionistic models are conceptually inadequate to contend with the complexity presented by the sustainability crisis (Lakoff, 2010).

Our models of thinking, mind and cognition and what we say we know, all lie at the heart of the current sustainability crisis. Yet surprisingly little critical review of the models of cognition (and epistemology) prominent in matters of sustainability has been undertaken to date. Our models are still based on computational metaphors of mind, functionalist accounts that favour input–output descriptions in which the mind traffics in symbolic representations of the external world (e.g., Fodor & Pylyshyn, 1981), all of which come together in a 'Cartesian theatre' (Dennett, 1991) as the putative seat of consciousness and action.

This paper introduces a very different account of cognition, drawing on enaction and the neurobiological paradigm of structure determinism. Two points stake out the degree to which enaction diverges from the computational metaphor: The first is that enaction describes a radically embodied cognition—cognition is the neurophenomenological engagement by a living unity with its

world: 'Living systems are cognitive systems, and living as a process is a process of cognition' (Maturana & Varela, 1980, p. 13; original emphases). Indeed, the 'whole organism is a vehicle of meaning' that 'is generated within the system for the system itself [...] and at the same time consumed by the system' (Colombetti, 2010, pp. 147–148). To live then is to be cognate. Cognition is skilful living, of successfully conserving autonomy until doing so is no longer viable, at which point the organization falls apart and the system dies.

The second marker of divergence is that, in the enactive account, cognition is an *active* process of engagement with the world; the mind is not a passive recipient of perceptual data in the form of symbolic representations (Thompson, 2007; Varela, Thompson, & Rosch, 1991). Enaction posits autonomous systems, which enact an environment, one coherent with that organism's own structure, whereby the organism's own biology structures and thus determines what the organism can meaningfully interact with in the world. In other words, an organism brings forth its own world of significance. One is minded of von Uexküll's (1982, 1992) paradigmatic tick with its three capacities by which it sustains itself, seemingly oblivious to anything else beyond its *umwelt* where only that of significance to the tick is selected for attention.

The implications of this are that the significance attributed to the perception of events is those of the observer, not inherent to what is observed. Varela et al. (1991, p. 150) describe this as between 'knower and known, mind and world, stand[ing] in relation to each other through mutual specification or dependent coorigination'. The only product of a living being's (autopoietic) organization<sup>2</sup> is itself and affords no distinction between being and doing (Maturana & Varela, 1992). Unlike the computational metaphor, which posits that behaviour is the result of a complex chain of events involving symbolic representations and cognitive attributes (e.g., motives, beliefs and attitudes), the enactive model is a full emergence of the organism within the world without the intervening switch between perception circuits and action circuits. An enactive unity is an operationally closed system, its identity 'specified by a network of dynamic processes whose effects do not leave the network' (Maturana & Varela, 1992, p. 89). The unity interacts intimately with the medium with which it is coupled, and although different aspects of the system

<sup>1</sup>This claim is reasonably consistent with the observation that post-normal science links epistemology and governance while eschewing 'truth' concepts in favour of those that can offer descriptions of 'quality' (Funtowicz & Ravetz, 1993). For the purposes of this discussion, the examination of those conditions that select out the adequacy of a campaign to trigger community changes is simultaneously a qualitative description of a process that supports emergence rather than a condition that makes recourse to an objective world of truth (what Maturana, 1988, would refer to as *objectivity without parentheses*).

<sup>2</sup>Organization refers to the set of all possible relationships of the organism's autopoietic processes, a space in which the organism 'can be realized as a concrete system', the dimensions of which 'are the relations of production of the components that realize it' (Maturana & Varela, 1980, p. 88).



are affected differently by environmental disturbances, what is triggered is constrained by the unity's structures, not by the environment. The unity is engaged in compensatory changes to conserve homeostasis (autonomy). The unity responds to perturbations (irritation from an 'outside' distinguished by an observer) but only insofar as the 'environment *resonates* in the [unity] by means of the [structures] which the system itself produces' (Vanderstraeten, 2005, p. 473; added emphasis).

This then is the canonical theory of structure determinism: The structure of a unity specifies what is 'picked up'. There is no transfer from an outside to an inside; the unity's structure constrains or determines the responses that are proper to it in its conservation of autonomy.<sup>3</sup> There is no room in this account for instructional interactions: A unity cannot be compelled to do anything outside of that, which its structure determines as compensation in maintaining its homeostasis. Organisms sense only their own state changes, and no parts of an external world are mapped internally by sense organs. Indeed, from the perspective of the nervous system, there is no 'outside'. Instead, enaction describes 'complex, causally spread processes encompassing the brain, the body, and the environment [which] self-organize in opportunistic ways to produce appropriate performance under tight temporal constraints' (Di Paolo, 2009, p. 46).

So what of language, relations and society? What of these third-order couplings? Over time, unities and their media structurally couple, in that the reciprocal and recursive compensations to perturbation mutually shape and condition the unity and its medium. We are, after all, each environments for the other. The ontogenic history of recurring couplings gives rise to a recurring pattern of relations shaped specifically as the ongoing interactional domain, which emerges as a third-order coupling giving rise to a linguistic domain, or *umwelt*, and in humans, it is this linguistic domain of recurring reciprocal interactions from which languaging emerges. Indeed, to languaging is what it means to be human, for 'it is by languaging that the act of knowing, in the behavioral coordination which is language, brings forth a world' (Maturana & Varela, 1992, p. 234). We constitute ourselves 'in language in a continuous becoming that we bring forth with others' (Maturana & Varela, 1992, p. 235). Rather than the transmission of information,

languaging is a particular form of action, the coordination of coordinations of behaviours. It concerns our ways of living together. Because as humans we share structural commonalities, we have in common our accounts of how our own bodies are operating in connection with the surrounding medium within which we persist. These operations lead us to reach consensus in perceiving the world in approximately similar ways, a consensus that gives rise to the abstraction of reciprocally specifying coordinations of behaviours into the domain of 'principles', 'laws' and other forms of discourse. Notions of free will and intentions, attitudes and values are, from this perspective, interesting concepts and within particular applications may have currency but remain semantic distinctions or subordinated phenomenological domains that do not intersect with autopoietic operations (Maturana & Varela, 1980). What we construct in the linguistic domain may not have any relation to what our structure does as it continues its autopoietic processes of conserving our autonomy. Agreements made in the consensual domain of linguistic coordination have no currency in the domain of autopoietic operations. This means that we cannot legitimately claim that third-order couplings, such as human social systems, are autopoietic or that they engage in structural couplings as would biological unities. Maturana and Varela (1980, p. 120) explain that '[p]henomenologically the linguistic domain and the domain of autopoiesis are different domains, and although one generates the elements of the other, they do not intersect'. Behaviours are governed 'by our composite structures, which are continuously in the process of adapting to internal and external perturbations. Terms like "control," "self-control," and "choice" are language *metaphors* applied after the fact. They are not operational realities' (Efran, Lukens, & Lukens, 1990, p. 50; original emphasis). Similarly, social systems are, from one perspective, a cluster of autonomous unities participating in co-ontogenic networks, whereas, from a second perspective, social systems also exist 'as unities for their components in the realm of language', which require structural coupling in the living domain, where unities 'operate with language and [are] observers' (Maturana & Varela, 1992, p. 198).

### 3 | MODELLING THEORIES OF CHANGE: IMPLICATIONS OF ENACTIVE COGNITION

In addition to the models of change discussed previously, many social innovation and transition-oriented initiatives also adopt an information-deficit approach to engaging with stakeholders and eliciting change. This approach

<sup>3</sup>However, as noted in a comment on an earlier draft of this paper by the first reviewer, operational closure may itself be a source of the sustainability crisis, a perspective attributable to Luhmann, who applied a number of neurobiological concepts to social systems. Although interesting, because Luhmann's interpretation of Maturana's work has already been comprehensively discussed in a series of critical articles by Mingers (1992, 2002, 2004), and as the origins of the sustainability crisis are not the current concern, this theme is not elaborated here.

proposes that rational minds will make informed decisions and act accordingly when provided with accurate information (de Best-Waldhober & Daamen, 2009; Heeren et al., 2016). Here, a computational metaphor of cognition is implicit—if only the correct information can be given to people, then the assumption is that they will use this to inform their decisions. When cognition is framed as effective action, the concept of learning changes from an acquisition of facts to the generation of novel meanings (Bopry, 2001).

But because we are structurally similar, exposing people to information pertaining to climate change and ways of mitigating and reducing the causes of global warming may trigger changes among some participants in a campaign, but ultimately, any changes the participants undergo is a function of the participants' own structures and the nature of the various interactions they engaged in during the process. It is not due to any information they have been provided with. As we saw in the previous section, because there are no instructive interactions, only orthogonal, a unity is constrained by its structure, which determines how it will interact with the environment and the stimuli to which it appears to respond.

From the perspective of sustainability, this is a crucial point: Sustainability is not so much about our 'addiction' to fossil fuels but the history of our couplings and the way we language what is significant and of value in how we conserve our autonomy. Any sustainability initiative will need to do more than just raise awareness. It will need to find ways of engaging members of the public in ways that trigger structure determined changes consistent with pro-sustainability-related outcomes. This is not as esoteric as it sounds, and even reflects a common-sense view, as evidenced by a 2014 community-scale low carbon sustainability initiative in the United Kingdom. When the initiative recognized that their initial efforts at engaging members of the local community were gaining little traction, the project team relaunched their initiative and this time started with what the local population had defined as priorities and then linked these to the initiative's original sustainability objectives (Cinderby, Haq, Cambridge, & Lock, 2014). Interpreting this from an enactive perspective, the initiative engaged the local community by becoming a medium with which community members could potentially realize their own priorities and ways of living and thereafter linked these with project priorities. This means that sustainability initiatives should be *appropriate* to the communities they are involved in. That is, they should offer a qualitative fit between the receptivity of the host community (Jeffrey & Seaton, 2004), and this will likely enhance the initiative's capacity to trigger meaningful responses congruent with more sustainable outcomes.

The foregoing example also exposes a latent tension in the construction of theories of change. Such theories not only rely on computational metaphors of cognition but also tend to traffic in models of change as if it is done to someone what was referred to as instructional interaction earlier. Clearly, enactive theory does not uphold such a notion: Change is not something that can be predetermined, and it certainly is not done to anyone. Arguably, a theory of change informed by enactive cognition is not a recipe for inducing change at all. Rather, it is a description of how spaces may be created within which a range of dialogic opportunities are presented, only a few of which might trigger compensatory structural change for the participating public (Mitchell, 2017). What this means is that some approaches may gain traction engaging local communities using a range or menu of workshop-based activities, town centre static surveys or investing in infrastructural changes, such as an increased number of connected and safer bicycle lanes and associated support facilities. The point is to provide a range of potential triggers that members of the participating communities might select (Gardner & Stern, 2002) and to propose multiple pathways, which link investments in healthy lifestyles, weight reduction and low carbon emission campaigns, for example, to extend the range of attractors to become incorporated into the production of identity of the local communities.

Fortunately, the application of some of these ideas to sustainability transition campaigns does not start from a blank slate. As Richardson (in Richardson & Tait, 2010, pp. 32–33) observes, the point is not 'that all methods that do not capture complexity to a complete extent are useless, but that we need to develop an awareness of how our methods limit our potential understanding of such systems'. In recent years, there have been several approaches to engaging people in pro-environmental behaviour changes that specifically evoke resonance with people's identities and link behavioural changes with the conservation of coherence and continuity of identity (e.g., Lakoff, 2010; Stets & Biga, 2003). In the linguistic domain, we as individuals and as members of social groups or 'clubs' participate in the realization of a world premised on negotiated and shared meanings. Membership in particular 'clubs' or linguistic (linguaging) communities is very much a part of what people include in characterizing who they are, their identity. Studies also confirm the importance of identity in understanding attitudes and behaviours with respect to the environment (e.g., Clayton & Myers, 2009; Crompton, Brewer, Chilton, & Kasser, 2010; Crompton & Kasser, 2009), a perspective that pro-environmental initiatives often overlook (Crompton, Brewer, Chilton, & Kasser, 2010;

Crompton & Kasser, 2009), even though the dynamics of these remain controversial as Blancke (2018) observes.<sup>4</sup>

## 4 | DISCUSSION AND CONCLUSIONS

We have seen that instructional interactions are illusions of control that participating members of the public undergo change as a result of their own structures, which compensate for systemic perturbations in the maintenance of homeostasis and the conservation of autonomy. How might these claims be operationalized to enable local sustainability initiatives to use enactive theory to elicit meaningful change to our collective *modus vivendi*?

We can answer this question by leveraging in findings from another context, the *raison d'être* of which concerns behaviour change—the psychotherapeutic relationship. Indeed, during the 1980s, the systemic family therapy community took up the work of Maturana and Varela in significant numbers, interpreting it for their own needs (Parry, 1982; Ruiz, 1996). When therapy is disentangled from its associations with medicalized cures and recast as an ‘inquiry into frameworks of meaning’, it becomes an ‘educational process’, a space within which ‘clients are invited to clarify their options and desires, evaluate the costs of actions, distinguish between the actual and the hypothetical, and speak plainly and responsibly about who they are’ (Efran, Lukens, & Lukens, 1990, pp. xvi, 49). The meaning of therapy itself changes from being a means to ‘treat’ someone to become a context ‘in which to devise and test better ways to live’ (Efran, Lukens, & Lukens, 1990, p. 197). Arguably, there can be no doubt that living sustainably is a ‘better way to live’, and on this basis, local sustainability initiatives may even serve a community therapeutic role (Mitchell, 2017).

The therapists who adopted the ideas of enaction and structure determinism were faced with the task of interpreting a biological account of living systems in terms of a praxis with which to induce change in others. Maturana himself eschews the idea of a method arising from his work (Maturana & Poerksen, 2004), because instructive interactions are irrelevant to structure determined systems conserving their autonomy. However, approaching problem construction and resolution from the perspective of psychotherapeutic engagement with clients, Efran et al. (1990, p. 95) observe that the ‘problem-determined system [...] comprises all those who “language” an issue in similar terms’. Indeed, therapy is itself a collaboration among problem-dissolving linguistic

systems of meaning (Anderson & Goolishian, 1988; Goolishian & Anderson, 1987). Local sustainability initiatives may indeed model themselves on such an approach, and rather than seeking to engage local communities in order to introduce changes to the way they live, instead might offer spaces for facilitating community-scale therapeutics, an opportunity to engage in conversations about better ways of living together in the shadow of the looming sustainability crisis.

This underscores languaging as the means by which our consensual realities<sup>5</sup> are maintained. Our consensual realities are composed of multiple and nested embodied contracts of reciprocal and recurring agreements emerging from the complex network of linguistic domains woven together in countless interfaces of neurophenomenological structural coupling with the world (Di Paolo, Cuffari, & de Jaegher, 2018). Arguably, describing our ‘orchestrated patterns of living in contractual terms rather than simply in terms of expectations, understandings, belief systems, or assumptive structures’ actually ‘conveys the active, urgent nature of these arrangements’ that we rely upon to ‘sustain the social order’ (Efran, Lukens, & Lukens, 1990, pp. 116–117). As noted above, for humans, we know ourselves and others in language, and contracts are expressed in language as a demand for conserving ways of being, given as a declaration of how our systems operate within the context of an explanation for how the world works and our attributions of punctuated causality.

From the vantage point of local sustainability initiatives as community therapeutic spaces, how might theories of change drawing on enactive theory be modelled? Who determines what is important and what changes, why and to what degree? How do the conversations among stakeholders about such issues shape and inform the coordination of coordinations of behaviours, which cohere participants as a community? As referred to above, structural coupling suggests that, over time and prolonged interaction, a unity and its medium become increasingly ‘fitted’ to each other. An initiative cannot be too different from the language community, or it will likely be rejected; but if it is too similar to the community, it will exert little influence. To be effective then, an initiative needs to continually break up patterns of thinking in order to facilitate the emergence of novel meanings (learning) while maintaining a careful balance between difference and sameness. But, for an initiative to remain

<sup>5</sup>It should be noted here that in this context, ‘consensual’ pertains to ‘the domain of interlocked conducts [behaviours] that results from ontogenic reciprocal structural coupling between structurally plastic organisms’ (Maturana, 1978, p. 47). It is not a description of consent or homogeneity.

<sup>4</sup>The first reviewer is thanked for bringing this article to my attention.

effective, it also has to keep reinventing itself because the processes of learning are not about the methods used but the coupling between initiative and the participating public, which gives initiatives plenty of scope to experiment. It is worth being aware that members of the public and members of the initiative interact in languaging accounts of how the world is, how it could be and means of inducing change. These are activities of participatory sense-making, a view that understands individuals as both related (structurally coupled) and simultaneously self-organizing and conserving their autonomy (de Jaegher, 2013; de Jaegher & Di Paolo, 2007). For a local initiative to engage members of the public, it may be necessary for it to provide a third space within which to facilitate conversations around what is valued locally and why. How these priorities are subsequently associated with any of the initiative's own funded objectives depends on the skilful conservation of autonomy on the part of the initiative, which maintains its viability with respect to its medium—the local host community.

What this means then is that theories of change as applied in local sustainability initiatives do not reduce to a collection of transferable methods. When informed by an enactive cognitive account, at best, they offer sites for continual renewal and experimentation. They do so by creating opportunities for orthogonal interactions, which break down existing patterns of languaging to allow for the creation of new meanings as a process of learning. The initiative might define the parameters of interest for sustainability in terms of supplies and sinks—energy, food, economics, waste and governance—and engage host communities to evaluate how such challenges are already being resolved. The initiative engages members of a local community in conversations, which explore and test how these extant approaches might be linked to more sustainable outcomes. Indeed, an enactive account of cognition reorients the relation between human thought and the world away from representations of the world (the Cartesian theatre) towards an active engagement in the generation and maintenance of a world. This is immediately an ethical positioning because we are all each responsible for the worlds we bring forth with others, and these are maintained through the ongoing consensual coordination of coordinations of behaviours. Change happens when participating members of that linguistic community (or 'club') are engaged in languaging their worlds in ways that have dissolved the original problem construction.

When cognition is construed as effective action within a specific domain, it becomes apparent that as humans, we have not engaged effectively with our world, which has culminated in the current existential threat and underscores the prescience of

Bateson's (1972) critique of science as neglecting to factor in the influences of our epistemology on our ways of living. Of course, introducing a new model of cognition introduces a series of challenges to how sustainability initiatives might operationalize this to develop theories of change. The challenge is exacerbated by its own theoretical basis in autopoietic and neurobiology and how it eschews formulating a set of techniques to be employed regardless of context. Nevertheless, what is of paramount importance is the coupling between the unity and its medium. Over time, between unity and medium, a linguistic domain coheres as a viable space (a niche) within which the unity conserves its autonomy. If we are to conserve our own autonomy going forward, then the introduction to an alternative model of cognition may be necessary to get us out of the crisis of our own making, and the foregoing is a necessarily brief overview of a rich and complex theory base, and there remains much to do to develop this work further as a way of thinking about the doing of sustainability.

#### ACKNOWLEDGEMENTS

I wish to acknowledge the thoughtful and constructive insights of the two anonymous reviewers whose comments have contributed to making this a stronger paper as a result.

For Sharon.

#### ORCID

Andrew S. Mitchell  <https://orcid.org/0000-0002-3946-4094>

#### REFERENCES

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179–211.
- Anderson, H., & Goolishian, H. A. (1988). Human systems as linguistic systems: Preliminary and evolving ideas about the implications for clinical theory. *Family Process*, 27(4), 371–393. <https://doi.org/10.1111/j.1545-5300.1988.00371.x>
- Armitage, C., & Christian, J. (2003). From attitudes to behaviour: Basic and applied research on the theory of planned behaviour. *Current Psychology*, 22, 187–195.
- Arvesen, A., Bright, R. M., & Hertwich, E. G. (2011). Considering only first-order effects? How simplifications lead to unrealistic technology optimism in climate change mitigation. *Energy Policy*, 39(11), 7448–7454. <https://doi.org/10.1016/j.enpol.2011.09.013>
- General Assembly. (2015). Resolution adopted by the General Assembly on 25 September 2015. United Nations.
- Bamburg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A New Meta-Analysis of Psycho-Social Determinants of pro-Environmental Behaviour. *Journal of Environmental Psychology*, 27, 14–25.
- Bass, S., Dalal-Clayton, B., & Pretty, J. (1995). *Participation in strategies for sustainable development*. London: Environmental



- Planning Group, International Institute for Environment and Development.
- Bateson, G. (1972). *Steps to an ecology of mind*. Toronto: Chandler Publishing.
- Baumer, F. L. (1977). *Modern European thought: Continuity and change in ideas, 1600–1950*. New York: MacMillan Publishing.
- de Best-Waldhober, M., & Daamen, D. (2009). Informed and uninformed public opinions on CO<sub>2</sub> capture and storage technologies in the Netherlands. *International Journal of Greenhouse Gas Control*, 3, 322–332. <https://doi.org/10.1016/j.ijggc.2008.09.001>
- Blancke, S. (2018, August). Why people oppose GMOs even though science says they are safe: Intuition can encourage opinions that are contrary to the facts. *Scientific American*. Retrieved from <https://www.scientificamerican.com/article/why-people-oppose-gmos-even-though-science-says-they-are-safe/>
- Bopry, J. (2001). Convergence toward enaction within educational technology: Design for learners and learning. *Cybernetics and Human Knowing*, 8(4), 47–63.
- Burns, D., & Worsley, S. (2015). *Navigating complexity in international development: Facilitating sustainable change at scale*. Rugby: Practical Action Publishing Ltd.
- Chen, H.-T. (1990). *Theory-drive evaluations*. Newbury Park, CA: Sage Publications.
- Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. *Advances in Experimental Social Psychology*, 24, 201–234.
- Cinderby, S., Haq, G., Cambridge, H., & Lock, K. (2014). Practical action to build community resilience: The Good Life Initiative in New Earswick. On-line: <http://www.jrf.org.uk> Accessed April 11, 2014.
- Clayton, S., & Myers, G. (2009). *Conservation psychology: Understanding and promoting human care for nature*. Chichester: Wiley-Blackwell.
- Colombetti, G. (2010). Enaction, sense-making, and emotion. In J. Stewart, O. Gapenne, & E. A. Di Paolo (Eds.), *Enaction: Toward a new paradigm for cognitive science* (pp. 145–164). Cambridge, Mass: MIT Press.
- Connors, P., & McDonald, P. (2010). Transitioning communities: Community, participation and the Transition Town Movement. *Community Development Journal*, 46, 558–572.
- Crompton, T., Brewer, J., Chilton, P., Kasser, T. (2010). Common cause: The case for working with our cultural values. Godalming: WWF-UK. On-Line: <http://www.wwf.org.uk/change> Accessed March 11, 2014.
- Crompton, T., & Kasser, T. (2009). *Meeting environmental challenges: The role of human identity*. Totnes: Green Books.
- de Jaegher, H. (2013). Rigid and fluid interactions with institutions. *Cognitive Systems Research*, 25–26, 19–25. <https://doi.org/10.1016/j.cogsys.2013.03.002>
- de Jaegher, H., & Di Paolo, E. A. (2007). Participatory sense-making: An enactive approach to social cognition. *Phenomenology and the Cognitive Sciences*, 6(4), 485–507. <https://doi.org/10.1007/s11097-007-9076-9>
- Dennett, D. C. (1991). *Consciousness explained*. New York: Little, Brown and Company.
- Di Paolo, E. A. (2009). Overcoming autopoiesis: An enactive detour on the way from life to society. In R. Magalhães, & R. Sanchez (Eds.), *Autopoiesis in organization theory and practice: Advanced series in management* (pp. 43–68). Bingley: Emerald Group Publishing Limited.
- Di Paolo, E. A., Cuffari, E. C., & de Jaegher, H. (2018). *Linguistic bodies: The continuity between life and language*. Cambridge, Mass: MIT Press.
- Dunlap, R. E., van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the new ecological paradigm—A revised NEP scale. *Journal of Social Issues*, 56, 425–442.
- Dunlap, R. E. (2008). The new environmental paradigm scale: From marginality to worldwide use. *Journal of Environmental Education*, 40, 3–18.
- Efran, J. S., Lukens, M. D., & Lukens, R. J. (1990). *Language, structure and change: Frameworks of meaning in psychotherapy*. New York: W.W. Norton.
- Fodor, J. A., & Pylyshyn, Z. W. (1981). How direct is visual perception? Some reflections on Gibson's 'ecological approach'. *Cognition*, 9, 139–196. [https://doi.org/10.1016/0010-0277\(81\)90009-3](https://doi.org/10.1016/0010-0277(81)90009-3)
- Funtowicz, S., & Ravetz, J. R. (1993). Science for the post-normal age. *Futures*, 25, 735–755.
- Gardner, G. T., & Stern, P. C. (2002). *Environmental problems and human behavior* (2nd ed.). Boston, MA: Pearson Custom Publishing.
- Goolishian, H., & Anderson, H. (1987). Language systems and therapy: An evolving idea. *Psychotherapy: Theory, Research, Practice, Training*, 24(3S), 529–538. <https://doi.org/10.1037/h0085750>
- Green, A. O., & Hunton-Clarke, L. (2003). A typology of stakeholder participation for company environmental decision-making. *Business Strategy and the Environment*, 12(5), 292–299.
- Heeren, A. J., Singh, A. S., Zwickle, A., Koontz, T. M., Slagle, K. M., & McCreery, A. C. (2016). Is sustainability knowledge half the battle? An examination of sustainability knowledge, attitudes, norms, and efficacy to understand sustainable behaviours. *International Journal of Sustainability in Higher Education*, 17(5), 613–632. <https://doi.org/10.1108/IJSHE-02-2015-0014>
- Hopkins, R. (2008). *The transition handbook: From oil dependency to local resilience*. White River Junction, VT: Chelsea Green Publishing.
- Hukkinen, J. I. (2014). Model of the social-ecological system depends on model of the mind: Contrasting information-processing and embodied views of cognition. *Ecological Economics*, 99, 100–109.
- Ika, L. A. (2012). Project management for development in Africa: Why projects are failing and what can be done about it. *Project Management Journal*, 43(4), 27–41. <http://doi.org/10.1002/pmj>
- Irwin, A. (1995). *Citizen science: A study of people, expertise and sustainable development*. London: Routledge.
- Jeffrey, P., & Seaton, R. A. F. (2004). A conceptual model of 'receptivity' applied to the design and deployment of water policy mechanisms. *Environmental Sciences (Journal of Integrative Environmental Research)*, 1(3), 277–300.
- Kaiser, F. G., Woelfing, S., & Fuhrer, U. (1999). Environmental attitude and ecological behavior. *Journal of Environmental Psychology*, 19, 1–19.
- Klößner, C. A. (2013). A comprehensive model of the psychology of environmental behaviour—A meta-analysis. *Global Environmental Change*, 23, 1028–1038.

- Kollmuss, A., & Julian, A. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8, 239–260.
- Lakoff, G. (2010). Why it matters how we frame the environment. *Environmental Communication*, 4, 70–81.
- Maturana, H., & Varela, F. (1980). *Autopoiesis and cognition: The realization of the living*. Boston: D. Reidel.
- Maturana, H. R. (1978). Biology of language: The epistemology of reality. In G. A. Miller, & E. Lenneberg (Eds.), *Psychology and biology of language and thought: Essays in honor of Eric Lenneberg* (pp. 27–63). New York: Academic Press.
- Maturana, H. R. (1988). Reality: The search for objectivity or the quest for a compelling argument. *The Irish Journal of Psychology*, 9, 25–82.
- Maturana, H. R., & Poerksen, B. (2004). *From being to doing: The origins of the biology of cognition* (Trans. W.K. Koeck & A.R. Koeck). Zutphen: Carl-Auer Verlag.
- Maturana, H.R. and Varela, F.J. (1992). *The tree of knowledge: The biological roots of human understanding* (Trans. R. Paolucci). Boston: Shambhala
- Mayne, R., Darby, S., & Hamilton, J. (2012). Individual and social influences on energy use. On-line [http://media.wix.com/ugd/caf2de\\_9ca788a582346d11201af07ba0443ac3.pdf](http://media.wix.com/ugd/caf2de_9ca788a582346d11201af07ba0443ac3.pdf) Accessed: November 17, 2013.
- McDonough, W., & Braungart, M. (2002). *Cradle to cradle: Remaking the way we make things*. New York: North Point Press.
- McFarlane, C. (2006). Knowledge, learning and development: A post-rationalist approach. *Progress in Development Studies*, 6(4), 287–305. <https://doi.org/10.1191/1464993406ps144oa>
- Mingers, J. (1992). The problems of social autopoiesis. *International Journal of General Systems*, 21, 229–236. <https://doi.org/10.1080/03081079208945073>
- Mingers, J. (2002). Can social systems be autopoietic? Assessing Luhmann's social theory. *The Sociological Review*, 50(2), 278–299. <https://doi.org/10.1111/1467-954X.00367>
- Mingers, J. (2004). Can social systems be autopoietic? Bhaskar's and Giddens' social theories. *Journal for the Theory of Social Behaviour*, 34(4), 403–427. Retrieved from <https://doi.org/10.1111/j.1468-5914.2004.00256.x>
- Mitchell, A. S. (2017). Uncertainty and hope: Community therapeutics for the Anthropocene. *Clinical Psychology Forum*, 296(August), 2–9.
- Morra Imas, L. G., & Rist, R. C. (2009). *The road to results: Designing and conducting effective development evaluations*. Washington, D.C.: The World Bank.
- Parry, A. (1982). Maturanation in Milan: Recent developments in systemic therapy. *Journal of Strategic and Systemic Therapies*, 21(2), 35–43. <https://doi.org/10.1521/jsst19843135>
- Parsons, D. (2017). *Demystifying evaluation: Practical approaches for researchers and users*. Bristol: Policy Press.
- Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change. Applications to addictive behaviors. *American Psychologist*, 47, 1102–1113.
- Ramalingam, B. (2013). *Aid on the edge of chaos: Rethinking international development in a complex world*. Oxford: Oxford University Press.
- Reed, M. S. (2008). Stakeholder participation for environmental management: A literature review. *Biological Conservation*, 141(10), 2417–2431. <https://doi.org/10.1016/j.biocon.2008.07.014>
- Richardson, K. A., & Tait, A. (2010). The death of the expert? In A. Tait, & K. A. Richardson (Eds.), *Complexity and knowledge management: Understanding the role of knowledge in the management of social networks* (pp. 23–39). Charlotte, NC: Information Age Publishing, Inc.
- Rittel, H. W. J., & Weber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4(2), 155–169.
- Rogers, P. (2014). *Theory of change. Methodological briefs: Impact evaluation 2*. Florence: UNICEF Office of Research.
- Rohde, M. (2010). *Enaction, embodiment, evolutionary robotics: Simulation models for a post-cognitivist science of mind*. Paris: Atlantis Press.
- Ruiz, A. B. (1996). The contribution of Humberto Maturana to the sciences of complexity and psychology. *Journal of Constructivist Psychology*, 9, 283–302.
- Schwartz, S. H. (1975). The justice of need and the activation of humanitarian norms. *Journal of Social Issues*, 31, 111–136.
- Schwartz, S. H. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (pp. 221–279). New York: Academic Press.
- Stame, N. (2004). Theory-based evaluation and types of complexity. *Evaluation*, 10(1), 58–76.
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29, 309–317.
- Stephens, A. (2013). *Ecofeminism and systems thinking*. New York: Routledge.
- Stern, P. C. (2000a). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56, 407–424.
- Stern, P. C. (2000b). Psychology and the science of human-environment interaction. *American Psychologist*, 55, 523–530.
- Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues*, 50, 65–84.
- Stets, J. E., & Biga, C. F. (2003). Bringing identity theory into environmental sociology. *Sociological Theory*, 21(4), 398–423.
- TESS. (2016). Success factors of community-based sustainability initiatives—Results from TESS. Potsdam. Retrieved from [http://www.tess-transition.eu/wp-content/uploads/2016/10/Tess\\_draft\\_Policy-Brief\\_success\\_1-1.pdf](http://www.tess-transition.eu/wp-content/uploads/2016/10/Tess_draft_Policy-Brief_success_1-1.pdf)
- Thompson, E. (2007). *Mind in life: Biology, phenomenology, and the sciences of mind*. Cambridge, Mass: Harvard University Press.
- Treasury, H. M. (2011). *The Magenta book: Guidance for evaluation*. London.
- von Uexküll, J. (1982). The theory of meaning. *Semiotica*, 42(1), 25–82.
- von Uexküll, J. (1992). A stroll through the worlds of animals and men: A picture book of invisible worlds. *Semiotica*, 89(4), 319–391.
- Vanderstraeten, R. (2005). System and environment: Notes on the autopoiesis of modern society. *Systems Research and Behavioral Science*, 22, 471–481.
- Varela, F., Thompson, E., & Rosch, E. (1991). *The embodied mind: Cognitive science and human experience*. Cambridge, MA: MIT Press.

Weiss, C. H. (1995). Nothing as practical as good theory: Exploring theory-based evaluation for comprehensive community initiatives for children and families. In J. Connell, A. Kubisch, L. Schorr, & C. Weiss (Eds.), *New approaches to evaluating community initiatives* (pp. 65–92). Washington, DC: Aspen Institute.

**How to cite this article:** Mitchell AS. Rethinking theories of change in the light of enactive cognitive science: Contributions to community-scale local sustainability initiatives. *Syst Res Behav Sci.* 2020; 1–11. <https://doi.org/10.1002/sres.2678>