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Making a Difference that Matters:

*A New Materialist Approach to Environmental Education in
the Age of Algorithms*

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*A thesis submitted in partial fulfillment of the requirements for the degree of
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Abstract

Civic environmental education has promoted agentic citizenship that drives institutional change to tackle complex socio-ecological problems. Therefore, it matters whether or not this education itself allows for agency and change, and what type of ontology and ethics it entails. As agents of educational, civic and institutional change, New Materialist and Deleuzoguattarian ontologies and ethics reveal the relational power of collective agencies that are never only human – in particular, everyday practices – to make a real world difference that matters. In short, they allow for the power of micropolitical non-resistance, embedded with the creative potential of everyday recalcitrance, to alter the on-going implementation of institutions and their constraining effects. But this is a choice to adopt relational ontology as ethics in action.

In this study, I develop and argue for a New Materialist approach to environmental education in the age of algorithms. I do this by exploring and analysing how complex real world agencies and changes come to matter from within the on-going transitions to energy-reliant algorithmic capitalism, algorithmic governmentality, and societies of volunteered civic ‘control’ (Deleuze 1995: 174), or self-regulation to others’ ends. To this end, I interviewed independent game developers based in Finland, and applied relational ontoepistemology, or onto-ethico-epistemology, that functions as not only a conceptual approach for understanding agentic phenomena, but also a methodology for finding out about the intra-actions they entail. My findings show that the transition to smart grids for electricity distribution holds out the promise of civic energy autarchies, namely, self-sufficient local electricity networks based on renewable sources, low demand and citizen participation, but it has served to deliver so-called ‘civic climate resilience’ as a means of self-regulation to others’ ends, or control. 21st century control can best be countered not by oppositional resistance, but by relational non-resistance, which makes a difference that matters from within cramped civic existence as part of algorithmic capitalisms and societies of control.

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1 Introduction: Environmental education in the age of algorithms

1.1 The real world problem of agency and change

In this study, I develop and argue for a New Materialist approach to environmental education in the age of algorithms. I do this by exploring and analysing how complex real world agencies and changes come to matter from within the on-going transitions to energy-reliant algorithmic capitalism and societies of volunteered civic ‘control’ (Deleuze 1995: 174), or self-regulation to others’ ends. Algorithmic capitalism entails data and algorithms that can be executed by energy-reliant binary computing, (the contemporary material-discursive practice underlying any ICTs), which brings about the algorithmic operation it executes. Algorithmic capitalism privileges ‘higher-order production’ (Deleuze 1992: 6), (such as markets of algorithmic measurability, notably including stock markets and markets for financial products akin to energy futures), over markets of production, (such as energy markets). The market thus becomes an ‘instrument of social control’ (Deleuze 1992: 6) through complex intra-connections that entail far-reaching risk and loss for nation states reliant on markets of production (such as energy markets) and money, which is ‘the invention of the State, primarily for the purposes of taxation’ (Buchanan 2008: 28).

To facilitate the on-going transitions to energy-reliant algorithmic capitalism and control societies, commercial entities are increasingly investing both in their own electricity production resources and in resources that facilitate unequal control over data, (such as server-end resources located in ‘clouds’). To learn everyday insights into these transitions, I discussed with independent game developers about their hands-on practices with global algorithmic systems and the electricity-reliance of those as closely related to the field of gaming and the ICTs (information and communication technologies) underlying it. But throughout my post-qualitative inquiry, I suspended ‘categorisation and comprehension of the other’ (Bogue 2007: 13) for being affected by collective agencies, which are highly distributed and never only ‘human’ (Deleuze and Guattari 1987). I anticipated that the participants’ insights provide me with a wealth of examples on learning and alternative practices, such as ‘hacks’, that may tweak algorithmic lifestyles towards more environmentally friendly practices. Instead, they volunteered their insights into markets of algorithmic, or ‘surveillance’, capitalism; like others, also gaming communities have become a target of algorithmic surveillance, because the online behaviour of these citizens has been suspected to be predictive of their in-person behaviour (Stevens 2015).

Firstly, the participants’ insights allowed me to re-think the orthodox civic education that urges learners to transform themselves into conscious competent agents of socio-ecological change (Ferreira 2009). With its predetermined divide, individualised ‘idiots’ *versus* educationally transformed citizens, this education has largely left it untheorised how communally oriented control works for

communally-oriented nation states, whose regulations instantiate the axioms of global capitalism. Secondly, the participants' insights into surveillance capitalism prompted me to re-theorise capitalism as a profound institutional constrain for radical socio-ecological change. 21st century capitalism is a problem, because conversions of value to real world money in large quantities feed on the collective finances of every nation state and re-distribute wealth. But if we fully address the relations of 21st century capitalism we find no outside: the cramped civic existence is part of it. How then, can we, and the participants of this study, act now to change the on-going transitions algorithmic capitalism while being part of them?

New Materialist and Deleuzoguattarian ontologies as ethics entail micropolitical power of relational non-resistance that makes a difference that matters, because it changes institutions and their constraining effects from within them. With the concept of relational non-resistance, I mean tactics, non-tactics and practices that entail existence without representation and account for the limits of control, that is, volunteered self-regulation of citizens to others' ends. In short, we can embed our relational ontoepistemological agency of choosing to choose into collective agencies, including those of practices, actions and work. By the concept of choosing to choose, I mean that one can adopt a minotarian position to neither adopt nor resist that which algorithmic, macro-political and other agencies have decided on our behalf.

For instance, transitions to 'smart' energy grids, which function as emergent networks of networks, exemplify transitions to infrastructures, technologies, and practices embedded with algorithmic agencies. But they are part of an economic and ecological, econological, drive to civic energy accountability as a precondition for civic energy resilience as they drive the pooling of civic energy resources. Civic energy-resilience exemplifies the civic debt of existence to the 21st century control society that regulates for capitalism, because energy-reliant citizens are indebted to the state that guarantees the energy grid and the other socio-economic-ecological institutions it entails. Though citizens cannot opt out from energy-reliance, they can change their practices, for instance store that energy their microgrid generates so that their energy-reliance becomes unmeasurable. Also, they can ethically experiment with algorithmic systems, such as algorithmic learning about learning, in order to push these systems beyond some thresholds that were previously unknown. Both these choices to choose exemplify how citizens can neither oppose nor promote the essentialist power hierarchies that facilitate their volunteered control for the ends of algorithmic capitalism. The consequent institutional change happens akin to 'cracking', 'folding', or 'rupturing' (Deleuze and Guattari 1987). New Materialist environmental education and learning to this end makes a difference that matters as it enables citizens at least to admit their 'debt of existence' (Deleuze and Guattari 2004: 197) to societies of control in the age of algorithms.

Ontoepistemology is a New Materialist concept and methodology that draws from Deleuze and Guattari for understanding and studying agentic phenomena that entail co-causality, or intra-actions, and defy clear-cut distinctions, such as those between subjects and objects. (In short, the concept of ‘intra-action’ draws on the fact that in quantum physics, quantum probability defies clear-cut distinctions and distinct boundaries between entities in spacetime (Barad 2014: 168).) Neither can we fully understand how our own positionalities have been co-constituted throughout all the registers, from institutional to molecular. For example, instead of the dichotomy of observer and observed, there is a mutual relationship of becoming-observation that does not fully separate knowing-being and matter-discourse. As a post-qualitative methodology, relational ontoepistemology allowed me to read, and re-read, multiple scholarly insights through one another and with my participants’ insights. It also allowed me to embed my ethical agency to make a difference into my theorising and the enactment of this study, which gave rise to new concepts. Accordingly, the content, style and structure of this study embody an academic intervention that performs both exploratory learning (Sturm 2012) and different understanding of agency and change that entail agentic matter (Barad 2014, Deleuze and Guattari 1987).

From Deleuzoguattarian perspective, the relational ontoepistemological theorising and enactment of this study co-construct my argument that micropolitics of relational non-resistance changes complex agentic phenomena from within them. This understanding rejects the essentialist idea of sovereign agents who act change for making a difference through ontology as ethics. From New Materialist perspective, the agentic intra-actions of content, style and structure make this study to emerge as an interventionist phenomenon that does not pre-exist these intra-actions. In short, the organisation of this study embodies relational understanding and learning (Sturm 2012) of agentic phenomena without predetermining where the difference between agency and change lies. I conclude, rather than begin, with emergent phenomena that entail New Materialist environmental education for destabilising algorithmic capitalism and control societies by neither adopting nor resisting the everyday essentialist hierarchies. This education replicates the micropolitical power of relational non-resistance to change from within cramped civic existence that which algorithmic, macro-political and other agencies have decided on our behalf. In doing so, it changes from within them the on-going transitions to the algorithmically enhanced future and control.

The real world problem of energy-reliant algorithmic capitalism and societies of control

Information and communication technologies (ICTs) are estimated to have used 8% of global electricity consumption in 2008, and this corresponds to about 2.6% of worldwide primary energy consumption (Pickavet et al. 2008: 2). The complete life cycle (production, use and end-of-life) of ICTs was estimated to be responsible for about 4% of worldwide primary energy consumption

(Pickavet et al. 2008: 2). Therefore, electricity consumption is the most obvious energy demand of ICT equipment. The total electricity consumption of ICTs is expected to continue its growth (Anastasi et al. 2010, Christensen and George 2008, Goth 2008, Pickavet et al. 2008, Van Heddeghem et al. 2009). Also contributing to global electricity consumption is internet traffic, the growth potential of which is significant (Raghavan and Ma 2011), especially due to the on-going investments in transitions to algorithmic capitalisms. Notably, these investments have embedded ‘smart’ infrastructures, technologies and practices with algorithmic agencies that can be executed by energy-reliant binary computing, the contemporary material-discursive practice which underlies any ICTs. But these on-going investments promote a drastic shift from civic reliance on user-end algorithmic resources (like microcomputers) to reliance on ubiquitous access to (like data over mobile network), and on-demand availability of (like Internet traffic between user- and server-end), server-end resources (like clouds) with a consequent rise in on-demand energy consumption. This shift allows third parties the opportunity to draw profits from access to data no longer confined to the user-end infrastructures, technologies and practices such as microcomputers or communal intranets. Therefore, investments in algorithmically enhanced, or ‘smart’, contexts serve the markets of algorithmic ‘surveillance’ capitalisms (Benkler 2016, Benkler and Clark 2016) reliant on algorithmic ‘surveillance’ data (like that data a smartphone application is obtaining because the user has granted the application an access to microphone).

Simultaneously, investments in ‘smart’ energy grids, embedded with algorithmic agencies, have facilitated civic investments in communal self-regulatory and self-sufficient control, ‘autarkic’ control for short, as the basis of civic climate resilience. Notably, communal ‘autarkic’ control has recently turned into communal management of pooled energy resources, including energy microgrids. But these investments serve civic control and management for communally oriented capitalisms and nation states with patchworks of pocketed inter- and intra-communal inequality (Carvalho 2015, Datta 2015, Luque-Ayala and Marvin 2015, McNeill 2015, Sheltona et al. 2015, Viitanen and Kingston 2014, Wiig 2015, Wu 2012). Civic communities may not step outside of their participation in capitalist nation states, but sustain everyday social reproduction of civic divide and self-rule and the consequent crises of democracy.

Therefore, all these investments contribute to a transition to communally oriented ‘societies of control’ (Deleuze 1992: 6) that are algorithmically enhanced. The agentic strategy to this end is known as algorithmic governmentality, which entails economic practices of

detection, classification and forward-looking evaluation of human behaviours, attitudes, preferences, propensities, etc. [...] smooth[ing] human experiences and interactions in unprecedented ways. (Rouvroy 2016: 219)

In short, the transitions to infrastructures, technologies and practices embedded with algorithmic agencies insures the profitability of ‘crisis-ridden’ (Colebrook 2015: 142) capitalisms against excessive risk and loss with pre-emptive and other future-oriented measures, including those of algorithmic and communal control of energy-reliant practices.

But the agentic phenomenon of on-demand ‘smart’, algorithmically enhanced, practices that rely on on-demand access to energy reveals a profound problem of agency and change. As part of the transitions to algorithmically enhanced contexts, what power do citizens’ practices have to ‘act on evidence for climate change’ (Colebrook 2015: 146-7)? Most authors who have addressed institutional constraints and opportunities for citizens to achieve positive environmental changes have argued for collective agencies to enact change. Commonly, the ontologies and methodologies of these studies have replicated the essentialist Cartesian divisions, including mind/matter, subject/object, conscious/unconscious, transcendence/immanence, by necessitating that the educationally transformed citizenship acts change for the environment (Ferreira 2009) and against nation states and capitalisms to this end. Hence, environmental educators have mobilised citizens of ‘Western’ ‘liberal’ democracies to obtain transformative ‘action competences’ by investing their resources, actions and desires in a communal turn inwards, joint socio-environmental actions and transformative civic education to these ends (Jickling and Wals 2008, Mogensen and Schnack 2010). Further, proactive resistant citizenship has been framed as the solution to wicked environmental problems such as changes in climate, which are seen to ‘arise from the cumulative unintended effects of a vast amount of seemingly insignificant decisions and actions by individuals who are unknown to each other and distant from each other’ (Sandler 2010: 167). Illustrating the communal turn inwards are civic investments in control for managing energy pools, which have been framed as civic resistance to capitalism (Cubitt 2013), even though a transition to ‘smart’ energy grids ensures that communities remain net consumers of energy resources rather than sustain real world self-regulatory self-sufficiency, ‘autarky’ for short. But a ‘smart grid’ functions as an emergent network of networks because its constituent parts, including civic microgrids, intra-act; in doing so, they defy clear-cut distinctions and distinct boundaries between entities in spacetime. Neither do these civic investments advance full civic control over ‘smart’ infrastructures, technologies and practices that ensure a tree-like control hierarchy over algorithmic data for the ends of state surveillance and surveillance capitalism. But this resistance would need to act globally to secure resources spread across the globe, (such as cloud-based server-end resources), and ensure that civic reliance on algorithmic resources did not result in an increase in algorithmic surveillance. For instance, Rouvroy and Stiegler (2016: 9) note that algorithmic surveillance ‘data generates absolutely no recalcitrance. [...] Even if you never go online, even if you are absolutely disconnected from everything, which is not very plausible perspective today, it only takes your neighbour to be online to infer a lot of information on you: the fact that you live next to this person and so on’. Conversely, studies on mobilising resistant

citizenship against capitalisms and states have agreed that it is difficult to achieve sought-after civic actions amongst heterogeneous groups with a minimal sense of communality (Kennedy et al. 2009). What then, can be done?

A relational understanding of agency and change allows for the power of practices to transform agentic intra-actions of material-discursive phenomena that entail civic implementation of institutions and their socio-ecological effects. These intra-actions are cutting together-apart, that is, they are ‘differencing’ as they are entangling. The concept of an ‘intra-action’ draws attention to ‘ontological inseparability [...] of intra-acting agencies’ (Kleinmann 2012: 77), implying a material-discursive real world constructed of agentic phenomena beyond the logic of subjects, objects and representation. Intra-actions neither divide nor fully separate agencies from changes. In short, the agency of a practice is never individual, but makes a micropolitical difference from within the processes that create or sustain institutions. In contrast, civic competence education has commonly framed the agency of practices as individual for the purposes of juxtaposing transformative communities with individualised citizens. Individualised agents of change have then been held responsible for social reproduction and for blocking the transformation of states and capitalisms.

The collective agency of practices can be made visible by adopting relational philosophies and civic education for relational ethics and micropolitical non-resistance that neither adopts nor resists the divisive comparisons, such as subject-object, but inflects power. This can be done to destabilise from within the everyday civic control that rigidifies power hierarchies. The personal recalcitrance at play in this non-resistance entails a potential to ‘feel, perceive and think’ (Colebrook 2015: 126) that is embedded in collective agencies of practices. It embodies the micropolitical power of choosing to choose to neither adopt nor resist the projected future that algorithmic, political and other agencies have decided on our behalf. This collective capacity for change entails a relational ethical question: what can we do (Bogue 2007: 12)? But it necessitates that we reject essentialist ontologies and adopt New Materialist analyses of an ontoepistemological real world for which we can never provide ‘objective’ evidence because the evidence itself is partially constructed by what we set to find out. In short, this relational ontoepistemology functions as not only a conceptual approach for understanding agentic phenomena, but also a methodology for finding out about the intra-actions they entail. Like Deleuzoguattarian ontologies and research inquiries, it explicitly rejects Cartesian ontologies and methodologies, or ‘Cartesian cuts’ that subjectify/objectify, for making an ethical and responsible, or ‘agentic’, cut of material-discursive spacetime (Barad 2014). This ontological and methodological choice eschews essentialist binaries, such as ‘human/nature—culture/nature, human/other, human/material, mind/body’ (St. Pierre 2016b: 9), which assume that the power of non-human-human agencies originates in that of persons (Bennett 2005: 455). By doing this, it passes the alleged ‘science wars’ between humanist and science inquiries by accounting for how agentic matter matters and practices assemble real world changes (Barad 2007: 90-91). Unlike Cartesian matter, agentic matter is

in a continuous process of becoming something else; it acts, it is not an ‘inert, passive, and dead’ object of our practices, but our intra-actions with it can destroy the current populations on Earth (St. Pierre et al. 2016: 101). Neither are agencies individual or only human, but always collective, co-constituted and highly distributed through a range of material-discursive registers, including the physical, chemical, biological, neural and social. Nor does any material-discursive practice assume any ‘thing’ or object, such as ‘data’ or ‘evidence’, which can be fully disentangled from a scholarly insight and analysis (van der Tuin 2009, 2011). Instead, agentic cuts experiment for a more ethical existence – and refute the ‘natural’ Cartesian existence (St. Pierre et al. 2016: 102), including stabilisation of everyday power hierarchies. But all the material-discursive practices, including those which enact everyday Cartesian hierarchies, both intra-act and embody a collective and highly distributed agency with no predetermined divisions. These material-discursive practices include, but are not limited to, theorising, experimenting, curiosity, writing, enactment of a research inquiry, and so on.

New Materialist understanding and studying of agencies and changes conforms to those of Deleuze and Guattari (1987): real world changes non-deterministically through intra-connected agentic networks, or rhizomatic collective agencies: rhizomatic *agencement*. These entail decentred, dynamic and heterogeneous *ad hoc* connections without an agreed-upon intentionality that could be fully subsumed to algorithmic or similar control (Deleuze and Guattari 1987). Unlike the concept of civic education that traces civic projects back to action competences, values and meanings, the concept of the rhizomatic network challenges the assumption that creative connections can be grounded in intentionality. Neither does it connote network theories, which assume connections resembling railroad networks between ‘facts’, but allows for agentic phenomena made up of intra-connected social, economic and ecological systems. But it entails collective and highly distributed agencies, such as practices that can be considered as collective environmental actions but are never only human.

Consequently, we cannot analyse the power of practices to alter institutions and their concurrent effects by adopting a methodology that traces institutional change back to a civic divide, for and against projected transformation. Rather, our methodological approaches need to rely on relational understanding and ontologies that do not predetermine the outcome of the research inquiry through predetermining where the difference between agency and change lies. To subsume a phenomenon to be analysed to a logic of subjects, objects and representation only replicates these divisions (Deleuze and Guattari 1987: 13).

It [tracing] is ... like a photograph or X ray that begins by selecting or isolating, by artificial means such as colorations or other restrictive procedures, what it intends to reproduce. The imitator always creates the model, and attracts it. [... Tracing] has organized, stabilized, neutralized the multiplicities according to the axes of significance

and subjectification belonging to it. It has generated, structuralized the rhizome, and when it thinks it is reproducing something else it is in fact only reproducing itself. That is why the tracing is so dangerous. It injects redundancies and propagates them.

(Deleuze and Guattari 1987: 13)

In short, the collective power of practices to change institutions entails messy changes because it does not pre-exist its intra-actions with material-discursive settings, or ‘milieux’ (Deleuze and Guattari 1987), that may be embedded with algorithmic agencies, ‘smart’. Neither does the institutional change of an agentic phenomenon emerge prior to the power of practices to enact relational change. But the recalcitrant potential of embodied persons and non-human agencies makes, to borrow a phrase from Bozalek and Zembylas (2017: 124), ‘differences that matter’, because these recalcitrances are embedded in the collective agency of a practice. Consequently, non-revolutionary changes are continually transforming capitalist control societies from within (Colebrook 2015). But how to make one’s understanding and studying of emergent agencies and changes matter from within, and for the positive socio-ecological change of, 21st century capitalisms and nation states?

Relational ontoepistemological ways of making a difference by understanding and studying non-deterministic agencies and changes

In this study, I put in practice a relational ontoepistemological analysis as ethics for both understanding and studying how difference can be made from within algorithmically enhanced control societies. Commonly, New Materialists have drawn from Deleuze’s and Deleuzoguattarian ontologies to understand and study phenomena that entail both the agency of participants and making a difference amidst material-discursive Cartesian world in the making. To this end, I, like for instance Jackson and Mazzei (2013) and Lenz Taguchi (2012), included a discussion-based inquiry into my study, and talked with independent game developers based in Finland. I wished to hear their insights into the institutional constraints and opportunities for them to transform 21st century real world embedded with algorithmic agencies, which necessitate on-demand electricity consumption. These participants were developing computer games for all kinds of user-end devices, most commonly microcomputers, handheld computers (including tablets and smartphones) and gaming consoles. During the group-based discussions, they assembled their ‘cramped’ (Colebrook 2015) existence, that is to say, their participation in the algorithmic markets that sustain societies of control. Firstly, the socio-economic-ecological world for the 21st citizens, such as the participants, to change – the infrastructures, technologies and practices that undergird algorithmic markets of control societies – entails institutional constraints and opportunities for creative civic change. States’ and capitalist investments in hierarchical control structures constrain these changes, but the complex agentic networks that undergird control societies are non-deterministically changing (Chapter 2). But

orthodox civic education (Ferreira 2009) has assumed that resistant citizenship can profoundly transform capitalist and nation states' agencies if citizens framed themselves as citizens of social transformation (Chapter 3). Unlike orthodox agendas of civic education and learning, relational understanding of collective agencies that change institutions does not trace these changes back to human action competence (Chapter 4). Therefore, it becomes possible to understand transformations from within machinic capitalism without any illusion of stepping outside everyday social reproduction – or outside of money, which is the foundational institutional constraint on the projected transformative change (Chapter 5). But participants' choices to choose show how collective agencies of practices can be embedded with everyday ethical and micropolitical recalcitrance to transform algorithmically enhanced control societies from within (Chapter 6). Finally, relational ontoepistemological education changes the real world problem of agency and change from within it (Chapter 7). In short, relational ontoepistemological education entails an ontological choice to actualise the relational ethics and micropolitics of non-resistant change. My analysis embodies this choice, as I read and re-read the multiple scholarly 'insights through one another' (Barad 2007: 25) as well as with the participants' insights (Jackson and Mazzei 2013). This reading defies clear-cut distinctions and distinct boundaries between entities in spacetime in order to make an ethical and responsible cut of material-discursive spacetime (Barad 2014). I have done this cut by embedding, the best I can, both Deleuzoguattarian ontology as ethics, and my own ethical agency of choosing to choose into to the collective agency of this study. By choosing to choose, I mean that I adopted a minotarian position to neither adopt nor resist that which algorithmic, macro-political and other agencies have decided on our behalf. This choice allowed new concepts, to follow my theorising of non-deterministic, emergent, and possibly turbulent, transitions to algorithmic capitalisms and societies of control. Most notably, I developed argued for New Materialist environmental education and understanding or civic agency and change from within their cramped existence as part of algorithmic capitalisms and control societies.

Firstly, ontoepistemology as methodology allowed me to theorise perspectives of New Materialist education without juxtaposing them with those of transformative education (Bozalek and Zembylas 2017). This choice matters because civic education has been framed as the prime agency for achieving positive socio-ecological changes globally (Jickling and Wals 2008). It allowed me to develop and argue for New Materialist approach to environmental education in the age of algorithms: making a difference that matters. This education fully accounts for the need for civic ethical responsibility (Bogue 2007: 7-15) amidst complex socio-economic-ecological concerns, such as algorithmic capitalisms and changing climate. Yet, it does not reinforce civic control and its attendant harm, injustice and hierarchisations.

Transformative education defines what the participants should do; they should frame themselves as educationally transformed citizens (Ferreira 2009). Deleuzoguattarian and New Materialist ontologies

as ethics ask what the participants can do; they can act change from within machinic capitalisms (Colebrook 2015). These two ontoepistemological stances frame two understandings of civic education as an agent of institutional change. Transformative civic education assumes a dichotomous citizenship: those who, in their essence, are/are not citizens of social transformation who act change. Deleuzoguattarian and New Materialist perspectives reject this civic divide for relational collective agencies that act change without subject-object divide: there is no 'I am' who acts change. But human–non-human collective agencies, including everyday practices, act material-discursive change. In short, power of micropolitical non-resistance entails relational ethics and creative potential of everyday recalcitrance. This ontoepistemological understanding of agency and change entails education and learning with, and within, agentic relational networks, rhizomatic *agencement*, embedded with non-human recalcitrance.

Secondly, I read Deleuze's and Guattari's (1983, 1987) philosophy of relational ontoepistemology as ethics, which allowed me to critique machinic capitalisms without collapsing this critique with the indeterminacy of an actual relational change. This is because their ontoepistemology explicitly rejects the originally Aristotelian concept of essence for understanding and studying non-deterministic relational agencies and how the actualisations of relational changes might and might not happen. Hence, it rejects divisive ontologies and methodologies that underpin dichotomous categorisations – such as is/is not, one/many, subject/object, transformative communities/individualised citizens – for relational questions including how?, where?, when?, how much?, and so on. But both Deleuzoguattarian and New Materialist ontoepistemologies entail fuzzy, not exact, such as vectored or linear, agencies and changes that transform real world from within it, because they are part of it. By rejecting Cartesian ontologies and methodologies, these relational ontoepistemologies refuse to trace real world transformations back to subject-object divisions and consequent civic in/competences. We cannot co-opt the concept of 'non-deterministic actual change' to denote the projected transformation of capitalism, which happens as soon as most 'idiots' have been turned into the educationally transformed citizenship with all the apt 'resources': civic action competence. Neither can we assume that subjectifiable humans know and learn about, and act for and against, socio-economic-ecological worlds akin to Cartesian objects of analysis, which 'exist frozen in time like little statues positioned in the world' (Barad 2007: 90). But our matter-discourse, that is, our intra-actions with and from within socio-economic-ecological milieux, can destabilise, 'crack', 'rupture', and 'fold' (Deleuze and Guattari 1987), the emergence, or becoming-of, everyday material-discursive hierarchies, including capitalisms. The everyday emergence of immanent spacetime-matter-discourse embedded with these hierarchies, including capitalisms, is not natural, inert, or predetermined, but becoming something else as it diverges into unknown. To use Barad's (2007: 90) terminology, material-discursive hierarchies, including capitalisms, do not connote a frozen Cartesian universe that is the destined becoming-of the real world. But Cartesian material-discursive hierarchies, including socio-economic-ecological

capitalisms, contain their own seeds of destruction and transformation, because there is no outside to immanent matter-discourse of the world's becoming. That is, ontoepistemological relational cuts that neither resist nor adopt these hierarchies are actualising becoming-of democracy and equality from within them. In Deleuzoguattarian (1987) terms, these agentic cuts are actualising the creative connections of virtual real.

Take, for instance, the on-going the investments in algorithmic governmentality, that is, in insuring the material-discursive 'value' and money drawn from algorithmic markets against volatile cascading changes on the markets of production, including energy markets. These investments imply that the 21st century capitalisms entail vulnerabilities to everyday ramifications that diverge into unknown, because the intra-connected complexity of capitalist hierarchies exceeds the sum of its constituent parts. But they also imply that we should fully account for how regulation of nation states sustain these markets and maintain their unaccountability by rewarding excessive financial risk-taking with public safeguards, most notably bail-outs, subsidies, and regulation that advance international tax planning (Colebrook 2015). As part of these investments, the transition to 'smart grids' for electricity distribution holds out the promise of civic energy autarchies, namely, self-sufficient local electricity networks based on renewable sources, low demand and citizen participation but has served to deliver so-called 'civic climate resilience' as a means of self-regulation to others' ends, or control. In short, through control, smart grids produce not energy autarchies, but hierarchies. This control can best be countered not by oppositional resistance, but by tactics of 'nonexistence' (acting 'unaccountably' by, for example, avoiding being tracked or using the grid to network) that replicate across the smart grid and reveal an energy commons at work. Such tactics rely on their feeling for the inflections of power that emerges by 'intra-action' from smart grids and reveals the limits of control. Such relational non-resistance implies that smart grids are potentially not energy hierarchies, but heterarchies, namely, dynamic, relational networks of power – and an arena of participatory energy democracy. Hereto, everyday human-non-human recalcitrance at work embedded in the collective agency of practices alters material-discursive institutions and their constraining effects as it destabilises them from within for the ends of a real world with democracy and equality that do not exist yet. It embodies material-discursive agency of immanent ethics in action and our relational micropolitical non-resistance in choosing to choose to enact becoming-of real world. This can be done by neither resisting nor adopting the predetermined agencies and changes that entail volunteered civic self-regulation and that of communally-oriented nation states for the ends of 21st century capitalisms.

During the 21st century, studies that have drawn from Deleuzoguattarian and New Materialist ontoepistemologies, alongside various ontological (re)turns in relational science studies, feminisms and queer theories, have extensively theorised the 'how' of research inquiries, often under the rubrics of post-qualitative inquiries, post-humanism, new empiricism, or ontological turn in methodologies (St. Pierre 2013). This theorising has critiqued qualitative methodologies that induce predetermined

Cartesian cuts between knower (subject) and known (object) into inquiries, analyses and understanding. Supported by the ‘tyranny of evidence’ (Mazzei 2016: 151), ‘data’, and method-centrism of qualitative research, these cuts have predetermined the Cartesian practices of ‘how do we do research’ and what counts as research, ‘evidence’ and ‘data’ (St. Pierre 2013). Thus, ‘ready-made research methodologies’, implementation of ‘pre-given’ processes, and stabilisation of disciplinary uniqueness, necessity, ‘content’, structure and boundaries have ruled research inquiries, and pushed disciplinary trajectories into non- and interdisciplinary fields, including education (Pierre 2016b). But by doing all this, they have served predetermined epistemic hierarchies whereby accountability and ‘value’ drawn from qualitative studies can and should emulate those of sciences and quantitative studies. Neither are ‘the ontologies and empiricisms’ of these inquiries ‘incommensurable with’ both New Materialist and Deleuzoguattarian ontoepistemologies, notably including ‘experimental ontology and transcendental empiricism that enable’ ‘DeleuzoGuattarian concepts like *assemblage* or *rhizome* or *body-without-organ*’ (St. Pierre 2016b: 9, emphases in original). ‘It is ironic that qualitative methodology, which was invented as an interpretive critique of logical empiricism, should now be shot through with positivist concepts and practices’ (St. Pierre 2016a: 118). Consequently, non-disciplinary and/or interdisciplinary research, including educational research and this study, could become something else ‘if it were free of the hegemonic pretensions of methods, if it were methodology-free’ (St. Pierre 2016b: 10). This would make post-qualitative inquiries more, not less, qualitative, (if we wish to keep the term qualitative).

Unlike post-qualitative ontoepistemologies, epistemological approaches to qualitative analyses have reinforced Cartesian axes of significance and subjectification, and implemented ‘[c]lassifications or taxonomies’ predetermining how ‘x is not y, and y is not z, and z is to be preferred to x and y’ (van der Tuin 2009: 28). But these predetermined differences only serve to replicate what they sought to find (Deleuze and Guattari 1987: 13). They have also brought about the impasses of ‘God trick as well as the (multiple) standpoint(s) of feminist standpoint theory and identity politics’ (van der Tuin 2011: 37). Unlike ontological turn in methodologies, epistemological approaches to methodologies have assumed that a relational phenomenon ‘looks messy because it means different things to different people’ (Donaldson et al. 2010: 1526). They have hence made possible the scholarly choice to describe and interpret human perspectives, opinions and experiences in order to discover what a relational sociotechnical context means to different people (Law and Singleton 2005). For instance, authors such as Fuchs (2009: 84) have established that, in the socio-economic-ecological context of ICTs, there is a lack of an actual meaningful change because those individualised persons subjectified as citizens of social reproduction conform to ‘the ideology of individualization’. Hence, contemporary scholars like Fuchs (2009: 84) trace practices back to individualised intentional characters who are in/competent im/moral agents of civic-led change. This perspective suggests that our practice is less accountable if we frame ourselves as competent moral characters who resist the ideology of

individualisation; that it hardly matters the material-discursive agency of practices is ‘re-ordering’ (Law and Mol 2008: 141) material-discursive connections. Likewise, the educationally preferred socio-ecological citizens – against their responsabilised counter-citizens of social reproduction – have been subjectified as those who have put aside their vested interests and ‘move[d] beyond self-interest to the common good’ (Dobson 2003).

The popular scholarly calls for the ‘conscious’ collective actions of the joint ‘proactive’ citizens have been grounded on ontological divide: pro/against the projected transformation of capitalisms and states. Therefore, had the purpose of my study been to advance the educational transformation of citizenships’ volition and cognition, there would also have been a need to subjectify the participants of this study as those who are/are not the citizens of social transformation. The traditional understanding of agency and change conforms to epistemological approaches to methodologies. But agency and change need to be re-conceptualised and analysed for understanding and changing 21st century capitalisms and communally oriented control societies that are increasingly algorithmically enhanced.

1.2 The traditional understanding of agency and change: civic environmental education

Most literature on bringing about positive environmental change shares the view that there is a need to make the connections visible between actions and their environmental consequences (see e.g. Barr 2006, Dobson 2007, Gross 2007, Kaplan and Kaplan 2009, Kennedy et al. 2009, Hobson 2006a, Jackson 2005, Shove and Walker 2007, Upham 2009, White et al. 2009). These connections have been approached at different scales, starting with individual choices (e.g. Barr 2007, Hobson 2006b, Kaplan and Kaplan 2009, Upham 2009, White et al. 2009) and ranging up to discussion of the structures that define individual choices (e.g. Jackson 2005, Shove and Walker 2007). Irrespective of scale, the question of environmental responsibility has been central to these analyses. Debates about responsibility have covered a broad variety of approaches ranging from, on the one hand, questioning the economic push for ever-increasing consumption to, on the other hand, searching for the possibilities for consumers to achieve wider scale positive environmental change through different kinds of actions (Kennedy et al. 2009). These actions have been commonly mobilised for pursuing a double agenda: changing the regulations for political and economic systems that benefit from and sustain the social practice of consumption, and assessing the responsibility of individual choices (e.g. Dobson 2007: 281, Kennedy et al. 2009: 151-152). That is, positive change at all scales, from individual to institutional, has been traced back to mobilisations of joint environmental actions that entail civic environmental responsibility. The power of these actions to change institutions is based on the argument that citizens are an inseparable part of the processes comprising and creating institutional settings (Kennedy et al. 2009: 159).

The justification for conceptualising proactive citizens as the leading force in environmental change commonly juxtaposes their civic-minded actions with the privatisation of environmental regulation, sometimes to the extent that it is assumed that environmental concerns can be resolved merely by the internal processes of nation states' governance and businesses (e.g. Dobson 2007: 285, Kennedy et al. 2009: 159). This juxtaposition has been replicated in an educational dichotomy between anti-capitalist socio-ecological communities and citizens of social reproduction only capable of pursuing individualist changes and actions of environmental responsibility (Jickling and Wals 2008: 8).

Therefore, orthodox civic education has urged atomised citizens to change their senses of subjectivity, from 'idiots' to educationally transformed citizens (Ferreira 2009, Mogensen and Schnack 2010), and this global transformation has also been projected to bring about the demise of capitalisms and nation states (Räthzel and Uzzell 2009: 272). Engaging adult learners in this process has mobilised them to invest their resources, desires and actions in their communities. Conversely, the non-'idiots' of social transformation have been framed as communal citizens whose joint environmental actions accumulate essential action competence that can contribute to this demise (Jickling and Wals 2008, Wals 2010a, 2010b). 'Idiots', on the other hand, are those who, by definition, are yet to learn 'how to think' in a deconstructive manner (Jickling and Wals 2008: 12), and hence need to be taught to understand and challenge societal relations, relations of production, consumption and political relations (Räthzel and Uzzell 2009: 272).

The earliest models of environmental behaviour conceptualised knowledge as the source from which environmental beliefs were formed and behaviour manifested (e.g. Kollmuss and Agyeman 2002). However, intra-connected civic actions and their environmental effects entail complex agentic phenomena. As Kennedy et al. (2009: 154) write, 'The debate over incineration versus land-filling of waste, and idling versus restarting your engine while waiting in your vehicle represent a few examples where the environmentally responsible choice is not always intuitive'. Citizens have been presented with a constantly shifting constellation of scenarios and trade-offs, which have emphasised a lack of knowledge or an abundance of contradictory information (Gross 2007, Kaplan and Kaplan 2009: 329, Kennedy et al. 2009: 154). This invisibility of connections between environmentally responsible choices and their effects means it is not easy for proactive or resistant citizenship to effect change (e.g. Dobson 2007, Kennedy et al. 2009). But complex agentic phenomena with environmental effects, such as changing climate, mean that there is a need for civic education for understanding and changing these intra-active phenomena.

According to most authors who view citizens as possessing the power to perform positive environmental change, responsible civic choices are based on awareness, knowledge and understanding that entail moral values, attitudes and meaning-making (e.g. Bull et al. 2008, Dobson 2007, Wals 2010a: 148, 2010b: 385). Such authors have framed it as essential to achieve conscious and continuous learning processes that stabilise intra-personal communal structures to be passed on to

the following generations (Peters and Wals 2016). Communal learning to this end has enforced the power of communication: it encompasses, at one level, learning how to conceive of a problem relative to others and, at another level, how to cooperate with others to solve collective problems (see Bull et al. 2008: 713). Further, these learning processes have reinvigorated a moral high ground for those who have framed themselves as characters who pursue the 'common good' because they can claim to have put aside their vested interests (Hobson and Niemeyer 2011: 966). Moral learning is considered valuable because any questioning of moral positions helps citizens to subsume their civic responsibility to change institutional structures beyond their control (Dobson 2007: 283-285). Notably, educationally transformed citizenship with adept meaning and values has been framed as the vanguard of projected profound change because they are to develop action competences (Mogensen and Schnack 2010, Wals 2010a, 2010b). To promote this end, the most common strategy has been to juxtapose 'consumers' with collective civic agencies that promote the projected demise of capitalisms and states. For this purpose, consumers have been framed as heterogeneous groups with a minimal sense of communality; consequently, it is difficult to achieve the sought-after collective environmental action amongst them. Further, citizens are complicit in wider scale environmental consequences, like climate change; therefore, their choices must be accounted for and they must consciously take part in institution-creating processes (e.g. Dobson 2007, Kennedy et al. 2009). Neither can it be disguised that also educationally transformed communities are complicit in performing machinic capitalisms and nation states' regulation for their ends; there is no outside to our cramped existence as part of them (Colebrook 2015).

But while worldwide studies have shown increased personal adherence to environmental commitments and beliefs over the past four decades (Kennedy et al. 2009: 151, White et al. 2009), action competent citizenship remains as a goal (Mogensen and Schnack 2010). Therefore, communal civic learning may have led to conscious changes in values and attitudes, but this change is yet to come to fruition in transformed states and capitalisms. Despite this gap, traditional civic education continues to urge transformation in citizens' senses of subjectivity because this transformation has been framed as entailing self-determined civic actions that meaningfully transform capitalisms and states. Conversely, self-determined civic actions that meaningfully transform capitalisms and states do not do that. Consequently, global educational transformation continues to serve as a future solution to lack of changes on multiple fronts, all of which have been defined as capitalist shallow sustainability (Jickling and Wals 2008). These include, firstly, the conclusion that change in behaviour is not achieved based solely on awareness of environmental knowledge (e.g. Gross 2007, Hobson 2006b); secondly, the conclusion that expression of values and attitudes through behaviour cannot be explained solely by either individual factors or forms of interaction between individuals (e.g. Kaplan and Kaplan 2009, Kennedy et al. 2009); and thirdly, the conclusion that social interaction and a strong sense of community do not always lead to the social learning of collective environmental

responsibility (e.g. Miller and Buys 2008:237-238). Finally, orthodox civic education individualises the agency of citizens who have minimal sense of belonging to a collective, and who are unlikely to take part in collective learning exercises or joint civic actions. Consequently, mobilising dichotomous citizenship to take collective actions has also been considered to respond to complex environmental questions that are seen to ‘arise from the cumulative unintended effects of a vast amount of seemingly insignificant decisions and actions by individuals who are unknown to each other and distant from each other’ (Sandler 2010: 167). But could there be another way of conceptualising how collective agencies make a difference that matters?

Take, for example, a disjoint of pro-environmental values and environmentally responsible practices that has been of a growing concern for both academics and practitioners (e.g. Kennedy et al. 2009: 151). Dolnicar and Grün’s (2009) study shows how citizens express the same pro-environmental values both at home and on holiday, but their practices were less environmentally responsible on holiday. In short, practices do not exist independently from contexts but intra-act with them.

1.3 An alternative way to conceptualise agency and change

Even though the emphasis of environmental citizenship literature and studies of environmental practices is on questioning the connection between actions and their relational consequences, little advice is given on how to make these connections visible. One oft-utilised way of revealing heterogeneous connections is Deleuze and Guattari’s (1987) concept of an agentic network akin to a rhizome, which ‘shoots out in all directions at once’ (Johnston 2008b: 111). They call the distributed agency that exists in a decentred rhizome-network an *agencement*, which is often translated as an ‘assemblage’ (Deleuze and Guattari 1987). New Materialist understanding of intra-actions that change relational phenomena from within adopt these concepts ‘to think, within difference, of a difference that makes a difference’ (Colebrook 2015: 139).

A rhizomatic network ‘ceaselessly and seamlessly establishes connections between semiotic chains, organizations of power, and circumstances relative to the arts, sciences, and social struggles’ (Deleuze and Guattari 1987:7). Hence, a rhizome as a network is decentred, dynamic and heterogeneous. In order to make visible the connections that give rise to the institutional constraints and opportunities for actions that matter, we need to reveal the potential power practices to make a difference, or lack thereof; Deleuze and Guattari (1987) call this power *puissance*. The distributed agency within a decentred rhizome-network is considered by outlining the collective agency as an entity in itself (Deleuze and Guattari 1987). But an *agencement* is also a process of assembling in which the elements put together are not fixed, but are constructed at least in part as they become entangled. An *agencement* is not the ‘intentional construction of an individual or a collectivity’, but ‘a functional

arrangement of material-discursive flows, with no other meaning than the fact that it “works” ’ (Johnston 2008b: 117). The directions that flows of material-discursive connections take in a rhizome due to the collective action of an *agencement* can therefore be seen as unintentional and suggestive of the ad hoc contingency of a collage or ‘mashup’.

In this study, I adopt the Deleuzoguattarian ontology of rhizome-networks and rhizomatic *agencement*. Such an ontology is relational since it considers an *agencement* to be a rhizomatic arrangement of material-discursive flows constantly under ad hoc construction without agreed-upon intentionality. Further, relational ontologies are needed for discussing environmental questions that are ‘ontologically multifaceted, involving the interpenetration of socio-cultural, economic and ecological systems; each of which are individually complex, but when taken together the emergent complexity far exceeds the sum of its parts’ (Carolan 2008b: 71). This ontological coalescence of socio-cultural, economic and ecological systems justifies the need to discuss the interaction of economic practices and environmental strategies as a complex arrangement of material-discursive flows. These socio-cultural, economic and ecological systems intra-act because various practices within an *agencement* arrange material-discursive flows.

The power of practices to destabilise relational phenomena from within them is emergent (Deleuze and Guattari 1987: 220, 221, 505). This concept of power makes it conceivable that even though citizens form a group with a minimal sense of communality, their practices entail a collective agency with this power even when unintentional. This power of a rhizomatic *agencement* consists of internal heterogeneity and impurity: ‘singular’ practices and personal positions do not need to be compatible with each other and can collide (Deleuze and Guattari 1987: 358). Therefore, the conception of an *agencement* is able to connote heterogeneity as an inseparable part of civic collectives with practices that are never simply localisable. This heterogeneity can entail the creation of counter-networks among people with situated and partial knowledges, the politics of heterogeneity and impurity and the changes in situatedness of consumer-citizens during these projects (e.g. Carolan 2009, Dolnicar and Grün 2009, Haraway 1997, Kaplan and Kaplan 2009, Latour 2005). Both the power of an *agencement* as an entity and its capacity to transform the relational real world are based on its ability to perform ‘creative connections’ (Deleuze and Guattari 1987: 513). An *agencement*’s creativity in changing rhizomatic networks of connections stems from its heterogeneity, since heterogeneity within an *agencement* makes possible ad hoc connections between once-distant, but now close, material-discursive flows. These connections alter the projected futures because of an *agencement*’s ‘power to actualize a virtual process’ (Johnston 2008b: 120), where the virtual is understood as ‘real without being concrete, actual although not effectuated’ (Johnston 2008b: 120).

The virtual is like a seed in time, but unlike a plant seed, its actualization can take any number of forms or directions.... Thus the virtual is what enables and ensures the

creative aspect of time – instead of cyclic repetition, the creation of new lines of actualization in positive acts. What is actualized does not resemble the virtuality it embodies; rather, it is differentiated as it ramifies into divergent series in a becoming other or hetero-genesis. (Johnston 2008b: 120)

The practices of a rhizomatic *agencement* actualise some of the virtual connections that arrange material-discursive flows. But a human person as part of collective agencies ‘appears not in the image of a godlike creator, but as a participant in a larger process’ of assembling (Johnston 2008b: 21). Rather, practices differ and destabilise relational phenomena from within because the complexity of a rhizomatic network far exceeds the sum of its parts. However, personal agencies as part of collective agencies of practices matter because practices intra-weave a rhizomatic network of connections between the cultural, economic and ecological systems within the dynamic processes of transforming the real world.

Therefore, as a collective agency, the practices of individualised citizens unintentionally utilise the power of a rhizomatic *agencement* to change institutions. In the specific context of computer game development, the practices of programming provide to the users of a program, the gamers, meaningful experiences of online gaming. The practices of programming are performed with the help of a series of layered programming languages, which ‘allow the user to manipulate data, expressions, processes, and – thanks to object-oriented programming languages – virtual objects and structures in complex new configurations’ (Johnston 2008a: 753-754). These practices actualise some of the virtual connections within the processes of that intra-weave agentic phenomena. Likewise, some of the virtual connections are actualised by the practices of consuming these games, by the economic practices based on the production and consumption of these games, and by the infrastructures, technologies and practices undergirding gaming practices. These and all the other material-discursive connections within the process of assembling define how the material computing systems perform and cause the environmental consequences of online gaming. However, the environmentally responsible choices of how to intra-act with agentic phenomena, including electricity consumption/production, are not always intuitive, and the connections between actions and their environmental consequences are not always visible. I now turn to relational ontoepistemological theorising on how a post-qualitative inquiry can diverge from essentialist understanding and studying of agencies and changes.

1.4 The ‘how’ of a post-qualitative inquiry

‘Does it work, and how does it work?’ [...] There is nothing to explain, nothing to understand, nothing to interpret. It is like plugging in to an electric circuit’
(Deleuze, 1995: 8).

Post-qualitative inquiries may resemble philosophy, but ‘the idea that one can design a study using Deleuzian concepts appears nonsensical’ (St. Pierre 2016a: 122). Neither can a post-qualitative inquirer choose a ready-made qualitative methodology, learn to apply it correctly, and draw the legitimisation from the process of applying (Childers 2013). This is because the Cartesian ontologies of ready-made qualitative methodologies preclude post-qualitative ontoepistemologies. For this study, this means to enact becoming-of immanent ontology as ethics embedded with real world micropolitics of relational non-resistance, which account for becoming-imperceptible of ‘dividuals’, or bundles of capacities (Deleuze 1992: 5). But becoming-of relational non-resistance, neither resists nor replicates the divisive logic of algorithmic, civic, political and other comparisons that enact micro- and macropolitics to co-opt a predestined future. Through everyday recalcitrance at play the becoming-of this micropolitics destabilises from within those Cartesian hierarchies which ground transitions to algorithmic capitalisms and societies of volunteered civic control. Notably, these transitions entail becoming-of Cartesian ‘data’ and ‘evidence’ as the basis of predetermined everyday differences and hierarchies of control.

For short, we can begin a post-qualitative inquiry, such as this one, with the concept that it is difficult to learn about world’s becoming because one is part of it. But amidst everyday becoming of Cartesian hierarchies that entail control, our practices can, and should, ‘act on evidence for climate change’ (Colebrook 2015: 146-7). To this end, Deleuze and Guattari (1987) give an example of a grass stem that grows from the middle, (or ‘margins’ if you wish), of agentic world’s, (or ‘mechanosphere’s’), becoming. Neither can we know in detail what can a rhizomatic *agencement*, a body for short, do (Deleuze and Guattari 1987). But we can direct our curiosity and ethical experimentation so that it tips our understanding and studying of ontoepistemological phenomena towards ‘pure difference’ (St. Pierre et al. 2016: 103), or ‘an abstract machine’ (a non-essentialist chaotic attractor), or a Body Without Organs (Deleuze and Guattari 1987). In short, any material-discursive system, or phenomenon, can be understood, studied and changed from within by plugging into the material-discursive becoming-of its intra-actions. This can be done, as I have done, by giving the participants an opportunity to assemble, or cut together-apart, relational phenomena by volunteering their insights. But no post-qualitative inquiry can seek to deliver an essentialist discovery of the underlying reality; neither is there objectifiable ‘data’ or ‘evidence’ that researcher can ‘elevate into other, more abstract, levels’ (Johansson 2016: 451) to this end. Nor can a post-qualitative inquiry purport to draw, or tease, out some hidden or external meanings in order for a scholar to interpret, categorize, and represent to verify and legitimise their categorisations and judgements on how the subjectified/objectified ‘characters’ convey meanings. If a post-qualitative inquiry withdraws from enacting these predetermined essentialist divisions and hierarchies, it can perform and embody different becoming-of the real world. Neither does it have to perform a Cartesian cut: to either resist or adopt that which algorithmic, political, educational and other agencies have projected for citizens to enact. It can

perform and embody that understanding and studying of non-deterministic agencies and changes which entails a potential to feel, perceive and think: the collective agency of human-non-human recalitrance at play. It can, and should, embody relational ontoepistemology as immanent ethics and micropolitical power of choosing to choose to neither adopt nor resist the essentialist power hierarchies that enact the projected futures with algorithmic, political, educational and other divisions that underlie essentialist civic struggle and failure. But how then, to account for the relational power, *puissance*, of material-discursive practices to assemble, or cut together-apart, world's becoming from the middle of it?

Post-qualitative ontoepistemological ways of understanding and studying practices can learn from the well-established critique to those studies on practices which have not involved discussion in their research inquiry. These studies have been critiqued for their failure to give participants an opportunity to express their insights through their own words. As a practical response to this critique, Carolan (2008: 412) suggests that to learn about practices one can involve discussion-based inquiries, which may 'at least get a taste of [the participants'] world through their words', even though 'we cannot literally feel in these pages what respondents truly experienced in their lived experience'. But the challenge in studying practices through discussion-based inquiries is that 'what is of analytic concern ultimately dies the moment we try to talk (and write) about it' (Carolan 2008: 412). This loss of the intangible dimensions of practices takes place both when the participants discuss their practices and when the scholars write about them. Further, those scholars who have not simplified their analyses involving relational sociotechnical changes have been warned that any arguments emphasising 'complexity, contingency, local situatedness, and messiness may become repetitious and unsurprising' (Geels 2007: 631). But rather than letting the real world complexity to compel them to search for the 'correct' method, they should concentrate on new theoretical framings (Dixon and Whitehead 2008). How then, can a post-qualitative study best involve discussion-based inquiries, material-discursive practices and emergent sociotechnical changes that matter?

Firstly, post-qualitative inquiries can plug into discussion-based inquiries for 're-imagining of what method might do, rather than what it is or how to do it' (St. Pierre et al. 2016: 105). Secondly, these inquiries can embrace the ontoepistemological idea that there are only 'complex, diffuse and messy' (Law 2004: 2) real world intra-actions that bring about agentic phenomena. But these agencies and changes are only made messier by any attempts to simplify them as 'clear and definite' (Law 2004: 2). This understanding of scholarly agency allows ontoepistemological scholars, such as myself, to embed my reading of relational ontoepistemology as ethics into this study that fully accounts for relational agencies and changes that matter.

I have embedded my ethical and responsible choice to choose in the 'agentic cuts' (Barad 2014) of this study because I have chosen to read the participants' insights with theoretical insights that entail

civic agency for institutional changes. This choice has put in practice ethics as ontology because it attempts to understand agentic phenomena without seeking to stabilise them or linearise their complex changes (Bogue 2007: 9-15). Throughout the enactment of my research, including during my discussion-based inquiry, I have enacted my ethical responsibility to suspend ‘categorisation and comprehension of the other’ (Bogue 2007: 13), trading them for being affected by other bodies, which are never only ‘human’, without claiming that I can know what an agentic body, such as the collective agency of practices, can do. Rather, I take the power of practices to actualise creative connections from within capitalist societies of control to be emergent. This hopefully allows agentic intra-actions to transform the ontoepistemological real towards creative ‘possibilities for life’ (Bogue 2007: 15).

To enact this study, I put into practice my ‘heightened curiosity’ (St. Pierre et al. 2016) on 21st century agencies and changes, and experimented with ontoepistemological approach of reading and re-reading multiple theories through each other and with the participants’ insights (Jackson and Mazzei 2013). During this process of plugging all these in to each other, I experimented ‘in contact with the real’ (Deleuze & Guattari 1987: 12) and put in practice a post-qualitative process St. Pierre et al. (2016) have suggested. Contra to ‘know[ing] what to do next, and then next, and next’ (St. Pierre et al. 2016: 8) I did not let a Cartesian ontology of methodology, with a pre-set process and questions that predetermine the limits of answers, rule my post-qualitative inquiry. But I traded them for non-essentialist ontoepistemological experimentation with intra-acting practices of theorising, writing, inquiring and becoming-of real world curiosity. Had I let the predetermined ontological divisions to rule my inquiry, they would have served to bring about what they set to discover (Deleuze & Guattari 1987: 13), and my inquiry may not have allowed new concepts to emerge. But I experimented from within the on-going transitions to algorithmic capitalisms that necessitate on-demand access to energy – and outsource the civic climate resilience to control societies.

For this study, I learned about the insights of independent game developers based in Finland, and these allowed me to learn in-depth about the incompatibilities of the participants’ learning context, the algorithmic control society for short, with transformative civic education. During our discussions, I rejected the colonising tradition of characterising, categorising and judging ‘the non-I’ (Barad 2014: 169), and withdrew, the best I can, from making Cartesian cuts, including ‘what does s/he mean’; these would only have served to predetermine conclusions and causalities. But I learned with ‘a multiplicity’ that speaks (Deleuze and Guattari 1987), that is, with participants’ insights as ‘voice assemblage’ (Mazzei 2016) that does not enact from the outside of, but as part of, material-discursive phenomena that entail language. Importantly, my learning about the participants’ agency and institutional change made a difference to this study: it prompted me to re-theorise the ontoepistemological divide between transformative educational agendas and Deleuzoguattarian and New Materialist ontologies as ethics. This theorising of agency and non-deterministic change that matters gave rise to new concepts that entail education/learning and micropolitical power that matters

from within transitions to algorithmic capitalisms and control societies. For the convenience of my readership, I have kept ramifications from everyday terminology, including method, focus group, interview, discussion, setting, context, I, participant, and so on, to the minimum, and left it to future post-qualitative studies to theorise the limits of language. This choice is founded, because so far the major concern of post-qualitative theorists has been the opposite: that post-qualitative inquiries ‘reproduce the same methods with a different language’ (Mazzei 2016: 153). This choice also makes room for the complexity of my relational analysis to emerge and for the content, structure and style of this study to embody becoming-of something else, becoming-other(wise), maybe.

To (re)turn to my discussion-based inquiry, the focus group inquiry is theoretically anchored in understanding ‘the production of existing (everyday, institutional or more general, social) situations, milieus and social order’ (Flick 2007: 10-11). This premise does not preclude non-deterministic agencies and changes, neither the power of practices to change on-demand electricity consumption associated with algorithmically enhanced control societies. Originally, I wished to learn about the insights of non-professional game developers, who discussed, played and shared, computer games, experimented with game development, and learned with and from each other about it, on two online gaming sites¹. Hence, the most relevant setting for letting these participants’ to assemble ‘their’ relational world was as an online focus group discussion – a real-time synchronised online chat (Cameron 2005, Dixon and Whitehead 2008, Hopkins 2007, Howard and Jones 2004, Krueger 2000, Mann and Stewart 2000, McGregor 2005, Puchta and Potter 2004). Unexpectedly, one of the originally chosen online sites ceased to exist, and equally unexpectedly the final permission was not granted to recruit potential participants at the other site’s discussion forum. To resolve this situation, I made a trip to Finland to recruit participants, as I knew independent game development was becoming more known to the general public, after bubbling under the surface for several decades. Both my timing and my networking efforts succeeded and ensured successful participant recruitment; I also confirmed that the most relevant setting and situation for discussing with independent game developers was in person rather than online. Accordingly, I re-applied an ethics approval for this study based on focus group discussions (Appendix).

Traditional approaches to focus group inquiries have frame recruitment as the principal challenge (Flick 2007: 31-35). After the new ethics approval was granted, I was able to deliver the advertisement (Appendix) to multiple online fora the potential participants might be likely to follow, in order to the potential participants. They were offered as many opportunities as possible to fit one of the focus group sessions into their busy schedules, but the maximum number of participants for one

¹ The commercial and other practices of these online gaming sites differed from the major media companies’ sites or social networking sites, whose main function has been the playing – and promotion – of commercially produced games.

focus group session was kept to ten, and the maximum length of each discussion was kept to two hours (Frey and Fontana 1993, Reid and Reid 2005). Every discussion took place in full privacy in a room that was free of charge, available and convenient for the participants to access, most commonly we discussed inside public and private meeting rooms. These semi-structured discussions ramified into unknown, as is the focus group discussions are expected to work, and nearly all of them lasted for two hours. When seen through post-qualitative inquiry, these ramifications differed a discussion from within it and this becoming-other(wise) let the participants to assemble, or cut together-apart, their cramped civic existence as part of algorithmic capitalism and control societies.

To accommodate readability, I do not emulate the post-qualitative style of using several font and layout styles to denote excerpts of focus group discussions (see Kuby and Christ 2017). Instead, I used pseudo initials, akin to (N.N.); these subtly allow the becoming-imperceptible of the participants as individuals, bundles of capacities (Deleuze 1992: 5). They also account for relational non-deterministic change that does not prioritise the conscious collective agency of human exceptionalism, (like the agency of transformative civic communities), against other-than-human backgrounds, (like algorithmic energy infrastructures, technologies and practices). But the pseudo initials also serve my accountability as they provide the readership an opportunity to keep count on quotations. To this end, I now make Cartesian cuts that reinforce the ontologies of qualitative inquiries by making the most of the information I can infer about the participants; I did not ask their gender, age, socio-economic class and so on (see Appendix for Participant Information Sheets and Consent Forms). But the youngest participants were 18 years old, because this is the legal age in Finland to sign one's own Consent Form, neither did I discuss with participants from eastern and northern regions². Within these geographic and age limitations, it is possible that the focus group discussions may cover the multifaceted diversity of Finnish independent game development scene, but I do not make this Cartesian cut.

In total, I discussed with 21 focus groups in the capital, central, southern and western regions of Finland during November-December 2013 and April-May 2014, and I can predetermine Cartesian division between male first names and female first names, and categorise the participants accordingly. Based on the assumption that their first names may signify their gender, 84% (49) of the participants were likely males, 16% (9) were likely females. None of the discussions was likely an all-female discussion, and 29% of them likely involved both males and females. The largest discussion had five participants, most commonly they were three. If pushed, I could summarise that if there were three participants, within the time limit of two hours each of them had room to embed a wealth of details into the discussions that diverged into countless directions at once. This insight does not contribute to

² This decision was necessary due to departmental guidelines that materialised control over the research funding, which The University of Auckland had granted for this study.

the traditional qualitative understanding of a sought-after focus group discussion, which has focussed on minimising the sample ‘bias’ through careful implementation of predetermined processes (Johansson 2016). But it may enrich post-qualitative non-Cartesian inquiries that preclude concepts such as bias or an ideal numbers of participants, yet can re-imagine what discussion-based methods and inquiries might do. More studies are needed to theorise what might a collective ‘body’ of a group discussion do as part of a post-qualitative inquiry in the process of becoming-other(wise). To this end, how can it let the everyday recalcitrance at play to make the most of its potential to actualise new ways to ‘feel, perceive and think’ (Colebrook 2015: 146-7) that refute the Cartesian ‘I am’? How can its divergent ramifications, which may actualise the creative connections of the virtual real, further non-disciplinary ontoepistemologies as ethics, including those of educational research?

My post-qualitative experimentation with intra-actions that make a difference gave rise to both new concepts and my re-theorising of agency and change from within the becoming-of algorithmic capitalisms and control societies. These followed my agentic cut that plugged my reading of multiple scholarly insights in to each other and in to the insights of independent Finnish game developers. They allowed me to develop and argue for New Materialist environmental education fit for 21st century world’s becoming. Civic environmental education has promoted agentic citizenship that drives institutional change to tackle complex socio-ecological problems. Therefore, it matters whether or not this education itself allows for agency and change, and what type of ontology and ethics it entails. As agents of educational, civic and institutional change, New Materialist and Deleuzoguattarian ontologies and ethics reveal the relational power of collective agencies that are never only human – in particular, everyday practices – to make a real world difference that matters. In short, they allow for the power of micropolitical non-resistance, embedded with the creative potential of everyday recalcitrance, to alter the on-going implementation of institutions and their constraining effects. But this is a choice to adopt relational ontology as ethics in action.

Both New Materialist and Deleuzoguattarian relational ontoepistemologies as ethics act as part of immanent matter-discourse of world’s becoming; they destabilise from within Cartesian hierarchies that hinder democracy, equality and profound pro-climate practices. But these ontoepistemologies have not subsumed real world agencies and changes to Cartesian exceptionalism of human *cognito* and consequent binary ontologies, which include the alleged civic divide: citizens of social reproduction *versus* citizens of social transformation. In turn, orthodox socio-ecological education assumes human senses of subjectivity and frames them as objects of educational transformations (Ferreira 2009). To this end, education for civic investments in communal turn inwards has predetermined civic divide; characterised and individualised some citizens as ‘idiots’; held them publicly accountable for social reproduction; pitted them against educationally transformed communities; and defined that this education itself urges the projected transformation of capitalism by both transforming ‘idiots’ and by creating civic action competencies for this projected transformation

(Jickling and Wals 2007, Mogensen and Schnack 2010, Räthzel and Uzzell 2009). But agendas of socio-ecological education have largely left it untheorised how civic investments in communal turn inwards sustain explicitly, rather than indirectly, communally oriented control for the ends of communally oriented states, whose regulation instantiates the axioms of capitalism. They have done this though they have acknowledged that through money, taxation and regulations ‘authorities of all kinds’, not the transformed ‘autarkic’ communities, ‘remain in control’ (Jickling and Wals 2007: 10), and this applies notably to resources such as water, waste, electricity and on-demand algorithmic computing – all of which sustain energy-reliant lifestyles. Neither can we collapse the projected demise of capitalisms with the predetermined action competence, nor co-opt the concept of non-deterministic change to this end. This essentialist logic would only serve to privilege markets of projected futures, including projected algorithmic futures, and the predetermined measurability and ‘data’ to these markets ends. But we can, and should, destabilise from within the essentialist co-optations of real world’s becoming, which have, even if unwittingly, reinforced the on-going investments in projected algorithmic futures. These investments have embedded the 21st century capitalisms and communally-oriented states with algorithmic measurability – and outsourced civic climate resilience to communal self-management and hierarchies of control that work for others ends.

In short, we can, and should, fully account for non-human participation in collective agencies, none of which is ever merely human, but rather co-constituted and highly distributed through a range of material-discursive registers, including the physical, chemical, biological, neural and social registers. In comparison, traditional qualitative understanding has promoted communities as centres of stability, notwithstanding that ‘many of these structures and routines have been oppressive for various groups of people’ (Brinkman 2016: 126). Consequently, rules, norms and sanctions that implement biopolitical control of community members’ bodies have been framed as a dichotomous battle against global capitalism. This means to argue that power of biopolitical control in the service of epistemic privileges does not present a primordial problem; Deleuze and Guattari (1987) call this relational power *pouvoir* in contrast to *puissance*, the relational power or capacity for a creative change. With its goal of citizenship that invests its resources, actions and desires in communal turn inwards, transformative education does not primordially support the New Materialists’ critique of biopolitical control that simultaneously implements both institutional constraints and the control of bodies conditioned by them (Youngblood and Mazzei 2011). Therefore, this education is yet to fully account for that the 21st century control of bodies is explicitly working for ‘smart’, algorithmically enhanced, management of nation states with unequal communal pockets (Datta 2015, Luque-Ayala and Marvin 2015, Viitanen and Kingston 2014, Wu 2012). Rather, transformative citizens have been educated to invest their resources, actions and desires in the communal turn inwards.

But material-discursive civic investments in communal divide and self-rule reinforce nation states’ and capitalist investments in transitions to societies of control embedded with algorithmic agencies

that can be executed by energy-reliant binary computing. These investments ensure stabilisation of communally oriented nation states and capitalisms with algorithmic markets feeding on ‘smart’ lifestyles, communities and environments. Under the rubric of algorithmic governmentality, ‘smart’ urbanism, with the help of a ubiquitous online resources, also sustains volunteered civic control for the ends of good management. Notably, this means the biopolitical self-control of embodied citizens for the purposes of the smooth functioning of everyday energy-reliant lives that increasingly engender algorithmic surveillance data. Therefore, biopolitical power, in the service of communally oriented states and capitalisms needs to be understood and changed. Relational ontoepistemological education for embedding the ethics and micropolitical non-resistance of choosing to choose, including personal recalcitrance, into everyday practices, answers this need. This is because it puts into practice the relational micropolitics of non-resistance towards a more equal world. In doing this, it neither resists, nor adopts the essentialist predictable world algorithmic, political, educational and other projections have urged citizens, us, to enact. In short, it destabilises from within the intra-actions of algorithmic, qualitative and other traditional ‘data’ and the Cartesian hierarchies that facilitate this ‘data’. But it does not subsume to the ontologies and education that predetermine the civic divide, project the demise of capitalism, and urge the moral hierarchies of communally-oriented control to this end.

In what follows, I let this study to emerge, or become-other(wise), and embody its exploratory (Sturm 2012) understanding and studying of non-deterministic agencies and changes that intra-act. In doing so, my relational ontoepistemological inquiry destabilises from within them the becoming-of everyday Cartesian hierarchies of communally-oriented civic control and self-management, which work as, and work for, investments towards algorithmic capitalisms and control societies. It does this by making an agentic cut in spacetime-matter-discourse, and embedding my reading of Deleuzoguattarian ontoepistemologies as immanent material-discursive ethics into my post-qualitative inquiry. This choice to choose neither adopts nor resists the projected Cartesian futures, but enacts micropolitics of relational non-resistance as part of world’s material-discursive becoming. I replicate this choice to choose throughout my ‘ethical experiments’ (St. Pierre et al. 2016) with ontoepistemological (re-)theorising, which allowed new concepts to follow its intra-actions with the enactment of this research, including the participants’ insights. For making a difference that matters from within the on-going transitions to algorithmic capitalisms and control societies, I develop and argue for New Materialist environmental education in the age of algorithms. Next, I turn to material-discursive investments in infrastructures, technologies and practices that facilitate transitions to algorithmic control societies, capitalisms and governmentality.

2 Investments in algorithmically enhanced control societies matter

2.1 Investments in material-discursive developments for unequal control over data

Investments in algorithmic markets characterise algorithmic control societies with algorithmic capitalism and algorithmic governmentality, which works for ensuring the profitability of algorithmic capitalisms at communities' expense. Past investments in these markets have contributed to capitalisms that do not privilege production of new media content, including games, as sources of profitable value. Firstly, investments in profitable algorithmic markets have fed on civic access to actions with algorithmic agencies, such as on hardware, software and subscriptions. But more profoundly, investments in these markets have drawn profits from the 'surveillance' data related to citizens' actions with algorithmic agencies. This algorithmic data has served the ends of algorithmic surveillance capitalisms and algorithmic state surveillance. Investments in material-discursive developments for unequal control over data have therefore been a central concern that characterises algorithmically enhanced control societies. The following discussion identifies non-linear material-discursive developments and investments of this type. Together, they qualify a partially disconnected network with agentic complexity that exceeds the sum of its constituent parts. In short, we cannot in detail what can this rhizomatic material-discursive 'body' do. Neither can we access all the 'relevant secondary data' nor has 'the elusive and complex technical nature' of ICTs' (Tranos et al. 2013: 59) helped us in this task.

But investments in material-discursive practices of energy-reliant binary computing and emergent algorithmic markets matter; most notably they have facilitated transitions to algorithmic capitalisms and control societies. In what follows, I outline non-linear material-discursive developments to their ends, and I return to analysing transitions to algorithmic governmentality in section 6.3. Notably, investments in material-discursive networks also facilitate markets for data packet connections that promote an unequal control over data. Despite this, investments in material-discursive practices of algorithmic surveillance have remained nebulous. Alongside surveillance markets, this has benefited subscription and advertisement markets, which have facilitated public access to the internet. More recent investments on this front have merged online with citizens' intra-actions with algorithmic agencies, and investments in operating systems show how markets for hardware, software, and access are intra-connected. They also point out how investments in material-discursive clouds explicitly promote an unequal control over data (see section 2.2). Further, the investments in centralisation of server-end resources to clouds exemplify ecological drive, because cloud-based resources have been framed beneficial for both the profit and the planet through energy-efficiency on global scale. To discuss the role of 'people' as part of the ecological transitions for profit and planet, the last section, 2.3, outlines the role of climate governance in promoting accountability of complex sociotechnical transitions and proactive civic changes. In short, the overwhelming complexity of these material-

discursive agencies at play has not meant that the investors have dictated citizens' intra-actions with algorithmic agencies. Rather, the past development exemplifies how institutional change in disconnected and indeterminate social, economic and environmental relationships has been non-linear. This matters because all these investments have facilitated the on-going transitions to algorithmically enhanced, 'smart', contexts and ways of living.

Intra-connected investments in infrastructures, technologies, practices, and algorithmic markets feature algorithmically enhanced control societies that are material-discursive. They do this because an unequal control over surveillance data has been embedded in them. But it is not easy for proactive communities online to implement resistance and obtain 'a core common infrastructure, a set of resources necessary for information production and exchange' (Benkler (2006: 470)). This kind of resistance would entail these communities co-opting or re-creating proprietary resources, discussed in detail in this chapter, that allow unequal control over data. This strategy is unlikely to succeed in the near future, because such resources are always material-discursive and often hard to obtain. Further, actions on these fronts feed rich data for the ends of surveillance markets, regardless of whether or not citizens encrypt their lives online. But we, citizens, can destabilise the transitions to algorithmic societies of control with algorithmic capitalisms and governmentality while being part of them. Why and how this relational non-resistance makes a difference that matters is discussed in Chapters 4, 5 and 6.

Investments in material-discursive computers underlie contemporary algorithmic markets

Investments in material-discursive computers heralded binary computing for the capitalist and nation states' benefit. In particular, practices related to intellectual property (IP) rights, such as patenting, have encouraged competing investments in technologies, infrastructures and practices to the investing organisations' ends (Benkler 2006). As a result of past investments, most of the hardware and software contemporarily in use 'have been built and remain in the hands of thousands of private companies and universities' (Carr 2008: 181).

The investments in miniaturisation of material-discursive computers facilitated civic access to algorithmic agencies, and made them net-consumers on hardware and software markets. The simultaneous investments of nation states and of commercial organisations in developing practices of programming that are based on the syntax and words of the English language, alongside the miniaturisation of hardware, made possible the rise of the minicomputers of the early 1970s (Carr 2008: 53, Ryan 2010a: 53-61). Investments in hardware made possible both the replacement of vacuum tubes by transistors, and the manufacturing of cheap standardised components. Minicomputers are the direct predecessors of contemporary dominant microcomputers, and they succeeded the institutional machines called mainframe computers that had been (mass) manufactured since the late 1950s. Unlike mini- and microcomputers, the mainframe computers were operated by

staff members dedicated to running ‘batches’ for those who wanted to utilise these computers’ processing capacity. To this day, all of the more powerful mainframe computers are still made for specific computational needs; for instance, for processing transactions such as commercial exchange of goods, services or money. Since the 1960s, computers that are designed for high-performance computing, maximising the data processing capacity for scientific and engineering problems, have been referred to as supercomputers. The investments of nation states and commercial organisations in technologies, infrastructures and practices, (particularly those that further miniaturise the actual material systems of hardware and software participating in the practices of binary computing) have continued since the earliest mainframe computers. Because of this continued investment, the capacity of a common contemporary microcomputer is roughly equivalent to that of a supercomputer in use around 15 years ago (say, the T3E-750, a supercomputer of the late 1990s). The markets that facilitate server-end computing, nowadays referred to as clouds or server farms, stem largely from this branch of investments. In contrast, the first decade of handheld computers and their markets demonstrates how investors did not engineer either a profitable market, or an agentic network for their profitable ends. This is important because contemporarily, the majority of citizens worldwide participate in algorithmically enhanced control societies through their handheld computers, most commonly smartphones.

The first handheld computers were released in the mid-1990s,³ and were commonly known as ‘communicators’. Unlike nowadays, they relied on their own protocol suite (Wireless Application Protocol, or WAP) for online access. Investments in faster communication networks (notably the extremely high prices paid in auctions in Germany and the UK for UMTS 3G network licences) resulted in the demise of many telecommunications operators and contributed to the early 2000s downturn of many national economies. Intra-relatedly to both these developments, only ten years after the first handheld computers went on sale, the global consumer-market of handheld computers was proliferated and the worldwide sales figures on these end user devices have shown ‘impressive growth rates’ (Park et al. 2012a: 100).

The early market for java-based applications, such as independent games, for handheld computers was controlled by telecommunications operators and hence highly fragmented. Apple’s first version of a handheld computer, an iPhone, was launched in January 2007, and later commentators have particularly praised Apple’s unique insightfulness in successfully attracting media content, and succeeding in profiting from it, since Q2 2011 (Park et al. 2012b: 73). But its much-praised reliance on its ‘virtuous cycle’ of app production began only in early October 2008, 15 months after the first

³ Following the 1996 launch of its Communicator, Nokia was the market leader of the handheld computers’ worldwide shipments and sales, succeeded by Apple during Q2 and Q3 2011, and then Samsung Electronics from Q4 2011 onwards (Ahonen 2011a,b,c, 2012).

iPhones went on sale in late June 2007 (Park et al. 2012b: 73). Neither was it evident from the beginning that Apple's 'ingenious' strategy to build its exclusive application 'ecology' would succeed (Ryan 2010a: 183-5). Instead, the first release of iPhone SDK (software development kit) in March 2008 was followed by an online outburst. Potential programmers rebelled, because of the legal condition Apple had set: anyone who wanted to use the SDK needed first to agree to a Non-Disclosure Agreement which prevented programmers from discussing the SDK with anyone else (Ryan 2010a: 184). This non-linear development shows how practices of programming, software and hardware intra-act.

In contrast to its first decade, the handheld computer market has continued to boom, despite the overall slowing in the mobile phone and microcomputer markets, and the global economic difficulties since 2007 (Park et al. 2012a: 100). Nevertheless, the non-linear history of handheld computer markets exemplifies how institutional change from within algorithmically enhanced infrastructures, technologies and practices has not been engineered top-down. Neither have the material-discursive agencies of algorithms left many institutionalised practices of 'industry, communications, the sciences, medical and military technology, art, the entertainment industry and consumer society [...] untouched' (Johnston 2008b: 7).

Investments in material-discursive practices of binary computing matter

Past investments in practices of binary algorithmic computing have facilitated unequal control over data. That is, the replacement of the contemporary dominance of binary computing with any radically alternative practice is a question that is a lot more comprehensive than questions related to mathematics as a participant of binary computing (Johnston 2008b: 110-111) and executable algorithmic agencies. This is particularly true because replacing the practices of binary computing with any radically alternative practices would also necessitate radically alternative replacements for the current dominant practices of programming. Some scholars, however, have chosen to explain the existence of this computing by means of intentional human agency and adoption of moral values. Consequently, on their account, Alan Turing can and should be named and embarrassed for perpetuating both Descartes's ideas and the Cartesian ideal by adopting mathematics with history of the Enlightenment era as the basis for binary computing (Noble 1997). This understanding, first of all, disguises that mathematical concepts are also profoundly material-discursive (de Freitas 2016). Further, embedding the agencies of algorithmic computing in intentional human agencies and values may serve to disguise how civic learning may not be able to opt out from being an object of 21st century machine learning, but rather intra-acts with it. Neither does this understanding help proactive citizens in discerning how to profoundly change these material-discursive practices. In short, algorithmically enhanced control societies have built on material-discursive practices of binary

computing, but knowing this does not help in solving the harmful institutional effects of these practices.

Investments in material-discursive networks facilitate markets for data packet connections

The first investments in those technologies, infrastructures and practices, especially in the protocols and procedures that have made it possible to connect computers with each other, were made by the government of the USA in the 1960s. The aim was to create a fully functional data communications network, Arpanet, suitable for the military needs of the Cold War period (Sutton and Martin-Jones 2008: 31). Accordingly, this decentralised network was designed to facilitate robust, unreliable, communication between material-discursive end-devices on the fringes. In practice, this meant that material-discursive information to be communicated via network was encapsulated in packets to be passed through network nodes towards the network address of the recipient end-device, and a hierarchical protocol stack was designed to handle this task: a lower layer shows only a service interface to the upper layer. In the case of the Transmission Control Protocol / Internet Protocol pair, it was assumed that some of the packets never made their way through the network, whether the reason was some physical interference with the carrier signal, and the resultant loss of a data packet it carried, or anything else. Consequently, the end-devices were programmed to ensure any type of communication over the 'simple' decentralised network was successful, regardless of which protocol was used. Conversely, the analog telephone network was embedded with material-discursive technologies that facilitated continuous signal connections between 'stupid' end-devices on the fringes. And in the USA, for example, until 1975 the practitioners resorted to DIY practices because it was mainly illegal for telephone subscribers to modulate a data connection over the analog signal through the telephone network. This was because AT&T's predecessor, Bell, had protected its monopoly with an extensive portfolio of various inter-combinable patents (Ryan 2010a: 65-9). In comparison, nowadays, several frequencies of electromagnetic radiation,⁴ energy, serve as typical carrier waves for data packets. Most commonly, signals carrying these packets are modulated over radio waves, micro waves, and visible light, which is usually moving inside the medium of fibre optic cable. Further, Benkler (2016) argues that the private ownership of broadband fibre and mobile networks means that participatory and expressive collectives should conceive of those as points of control. Consequently, proactive civic communities are supposed to contrast the contemporary points of control with the material-discursive design of the early Internet contexts. This argument draws from the era when academics and government employees, followed by those of big businesses, acted for an 'original Internet' featuring 'openness, loose coupling, and continuous experimentation,

⁴ The spectrum of electromagnetic energy ranges from "AC power", the electric field (consisting of electromagnetic waves with a wavelength of ~1000km), to radio waves, microwaves, infrared, visible light, ultraviolet, X- rays, and gamma rays (in order of increasing frequency and decreasing wavelength).

learning, and adaptation' (Benkler 2016: 29). But this argument does not account for how material-discursive agencies of infrastructures, technologies, and practices do not connote thing-hood. In short, if 21st century communities emulate American DIY practices prior to 1975 as they send data packets over contemporary material-discursive networks, they are unlikely to act for a revolutionary resistance and co-opt these networked resources. But these practices matter because such networks are agentic, and collective change of them has not been deterministically engineered.

Investments in material-discursive practices of algorithmic surveillance remain nebulous

Citizens have been assumed to participate in algorithmically enhanced contexts, including markets, as if these were public shared spaces. For the purposes of surveillance capitalism and state surveillance, their actions have been regarded as associable with their subjectivities, and these can and should be characterised, categorised and judged. Further, some communities have produced data to this end as they have implemented civic economies of 'reputation, risk and opportunity' (Rouvrou 2016: 34) by characterising, categorising and judging other citizens. For instance, some participants of this study discussed material that causes undue negative experiences of harm and injustice, including the feeling that there is no privacy, because it can never be conclusively deleted if it has been online (D.A., K.I., K.L., L.M.)⁵. This discussion emphasises the need for the European Union's (EU) on-going work and leverage amidst the online enterprises for the civic right to be forgotten starting 2006. This work advances civic right to change as a person and to change one's mind amidst communally oriented online bullying, including hate speech and defamation, and its profound effects on in-person experiences of harm and injustice. But there remains an on-going demand for control of personal information, for instance, 'the freedom from unreasonable constraints on the construction of one's own identity' (Rouvroy 2016: 34). This, however, does not mean that one can know how, where, when and from what viewpoint one has been classified, characterised and judged. Rather, they can only assume that because they have 'exhibited similarly correlated biographical, behavioural, or other elements, the profiled individual will not necessarily be able to contest or resist the autonomic assignation of profiles and the practical consequences ensuing in terms of access to places, opportunities, and benefits' (Rouvroy 2016:

⁵ L.M.: [...] You might write an online comment based on your sincere opinion. Then, say, after five years Google search still finds that comment though you may have changed your opinion several times since. And then you are overwhelmingly ashamed of yourself for ever writing it.

D.A.: Yes. And Google functions as memory.

K.I.: I wouldn't even like to see my decade old photos, at the moment.

L.M.: But they are there nevertheless.

K.I.: Yes, and even if they are not in the Internet. So yes, true, everyone is changing, always. [...]

L.M.: And still, everything can be found in the cyberspace. Say, even if you delete your Facebook picture, it is there forever. It never goes away, you cannot destroy it.

K.L.: And other computers store it in their temp folders.

L.M.: That's one of the places, yes. And it remains in the Internet. [...] There is no privacy.

K.I.: There is no privacy.

122). In contrast, ‘few can hack the intranets of the corporate and government worlds to discover what is being plotted therein’ (Bonta 2009: 270), and practices like legally binding NDAs (non-disclosure agreements) prevent those who have participated in the internal processes of nation states’ governance and of commercial organisations from disclosing what they have learned.

The lack of ‘relevant secondary data’, in addition to ‘the elusive and complex technical nature’ of ICTs’, (Tranos et al. 2013: 59) have prevented citizens from knowing the detail of how algorithmically enhanced contexts function. Consequently, neither scholars nor mere practitioners have been able to identify intentional strategies that may have been embedded in the networked infrastructures, technologies, and practices for the purposes of algorithmic surveillance. For instance, one material-discursive surveillance practice became partially publicly visible in late 2005 and early 2006 as press reports suggested that the ‘shadowy National Security Agency’, (NSA), had conducted ‘a sweeping data-mining operation’ by utilising some previously publicly unknown functionalities (Carr 2008: 201). Whereas non-disclosed connections between the internal processes of states and commercial organisations have been typical, more recently these connections have been publicly framed as essential for boosting the so-called cyber security of nation states (Amoore 2009, Brighenti 2012: 411, Lawson 2011: 577-8). For instance, in 2002, Yahoo agreed to ‘monitor and censor the contents of its sites in China’ (Carr 2008: 200). Gaming communities have also become a target of algorithmic surveillance, because the online behaviour of these citizens has been suspected to be predictive of their in-person behaviour (Stevens 2015).

At the moment, the surveillance is already in place on two levels. That is, there is corporation surveillance, such as Apple, interested in what you are doing with your phone, and there is also the more or less legal state’s surveillance, i.e., NSA keeping an eye on what you are doing with your phone. We are far away from society without surveillance. (D.P.).

But surveillance as the basis for a civic ‘right to security’ (Rouvrou 2016: 136) only serves to obscure that not every citizen has an equal right to experience security. It does this because it assumes that to characterise, categorise and judge some citizens as a potential threat helps in diminishing the damage they may cause to others. In mobilising the danger of strangers, it discounts the type of insecurity citizens experience due to the in-person and online actions of community and household members who are not strangers to them for example. Adding to this, typical online ‘democracies’ have implemented ‘rough consensus’ (Benkler 2016: 19) and ‘anti-establishment values’ for the ends of online communities that ‘are not necessarily comfortable cultural environments for women to inhabit’ (Wajcman 2007: 292-3)⁶. Neither do the online communal

⁶ Notably, democratic decision-making online has implemented ‘anti-establishment’ communities uninhabitable for women by making them spaces with pornography as an everyday power institution (Wajcman 2007: 292-3). Further, according to public estimates, 30% of all Internet bandwidth is used to transfer pornography (The Guardian 2013). However, the intra-connections of in-person oppressive encounters with institutionalised online pornography have not attracted mainstream public critique from critical leftist scholars who continue to urge communal democracies to be centres of social justice for all (DeKeseredy 2015, 2016). Consequently, implementation of online communal democracies uninhabitable for

democracies uninhabitable for women leave in-person encounters intact but in-person and online intra-act (Bronson 2012: 602, Graham 2013: 181). Accordingly, the civic right to security cannot be framed as an issue of strangers; neither can it be dissociated from domestic and/or communally oriented oppression and bullying, online and in-person alike. It is left for future studies to discuss whether the implementation of online communal democracies uninhabitable for women could be publicly addressed as collective civic learning away from rather than towards a real world equality that does not yet exist.

Subscription and advertisement markets have facilitated the Internet as accessible to the practitioners

It took more than two decades before the Internet, which succeeded Arpanet, opened up to the wider population in 1989. This happened because the first commercial service providers started to offer subscriptions that enabled citizens, not only business entities, to access to the Internet at large (Ryan 2010a: 71, Sutton and Martin-Jones 2008: 31). The first banner advertisement appeared four years later, in 1993; Cern published its decision to make its World Wide Web (www) application free for everyone the same year; and the first spam campaign took place a year later, in 1994 (Carr 2008: 204, Ryan 2010a: 110).

The 1995 version of Netscape Navigator was the first mass scale investment publicly known to have been designed to make profit based on data gathered about citizens online (Ryan 2010a: 108-9). The contemporary market leader in profitable ‘profiling’ of citizens online is thought to be Google, which publicly ‘makes billions of dollars’ out of opportunities to ‘identify and monitor’ citizens online (Carr 2008: 204). Further, the medium of the Internet itself is notorious for being in a state of perpetual beta (Prüfer and Jahn 2007, Ryan 2010b), by which scholars mean that the actual material organisation and functioning of technologies, infrastructures and practices associated with the medium of the Internet have formed an elusive target for detailed analyses. But this elusive material-discursivity of the Internet has facilitated algorithmic advertising markets, a subset of surveillance economies. And these markets, alongside those of access subscriptions, have largely funded the ‘free’ Internet that has become the most fundamental global communications and knowledge infrastructure (Clarke 2016).

Investments have merged online and citizens’ intra-actions with algorithmic agencies

Algorithmic surveillance markets feed on fast and ubiquitous online access, as well as past investments in miniaturisation of material-discursive computers. Ubiquitous online that runs on material discursive computing also functions as a pervasive surveillance and control network. Further, as material-discursive, mobile, and inefficient devices, handheld computers have reinforced surveillance markets that rely on online access as the basis for citizens’ intra-action with algorithmic agencies. But the benefactors of these markets

women is yet to be publicly discussed as collective civic learning away from a real world equality that does not yet exist.

have also been piggybacking on the investments of other organisations, particularly in fibre optic cables preceding the stock market crash of the early 2000s. This crash resulted in the demise of many original investors (Devriendt et al. 2010, Hogendorn 2011, Tranos and Gillespie 2009). But prior to these investments, it was not profitable for benefactors of algorithmic surveillance to adopt this strategy of merging citizens' online access and their intra-actions with algorithmic agencies. Consequently, Carr (2008) argues, for example, that Google's rivalry is targeted against Microsoft, which has, since the early microcomputers, succeeded in profiting from MS Office, a contemporary de facto standard, and from its operating system, Windows. And much like their microcomputer counterparts, the handheld computer markets have built on the mutual incompatibility of competing operating systems.

Investments in operating systems facilitate intra-connected markets

All software, including operating systems (OS), is material-discursive - part of the 'real' world, and 21st century application markets facilitate third party access to algorithmic surveillance data. For instance, the users of handheld computers on Android OS, unlike the users of microcomputers, have been discouraged to manage their computing, neither to update their operating systems. Consequently, a new release of Android OS version has partially boosted the sales of new models, especially those of market leader Samsung, Google's main ally. A participant called this throw-away mobile phone culture, and concluded that the resultant toxic waste problem is significant (T.R.)⁷. Further, the majority of applications for Android OS have ended up supporting some, and not all, versions of Android OS. To assist content producers in addressing this fragmentation, the application 'Google Play Services' was released in September 2012. As a result, Google's app store (Google Play) became the sole, Google-controlled system to roll out new features to Android users (beyond OS version 2.2) without updating these users' Android OS. Thus, it became possible for Google to release new application programming interfaces (APIs) which are not tied to the Android OS versions, but can be used by an application. Also these serve as points of control. For instance, the purpose of the API 'Google Play Games Services' has been to allow the independent developers to publish new games, as well as update their previously published games, with selected new features for every OS version (beyond 2.2) simultaneously. This process exemplifies how investments in operating systems facilitate both hardware and software markets. But it also shows how investments in server-end material-discursive capacity and in ensuring data traffic online are inseparable from these markets.

⁷ '[...] To get back to energy – electricity production, ICTs – that's huge, and that's truly huge. But an even bigger problem is that we move on to a new user-end device every half a year, though they last for five years at least'. '[...] I mean, if we keep upgrading user-end devices that contain more or less toxins we are producing many other things in addition to carbon dioxide (CO₂). And ethically speaking, our waste is handled in India and Africa. [...] Not to deny the consequences of CO₂ production, but is it any better if we poison some part of human population...' '[...] The biggest problem is the throw-away mobile phone culture in comparison to, say, 5-10 year cycle; because of it we use ecological and social resources in a completely different way'. (T.P.).

Most notably, past investments in smartphone-reliance and in cloud-led centralisation of server-end resources for binary computing have promoted civic reliance on ubiquitous access to online as the way to surpass the dominant practices of binary computing dependent on microcomputers. These past investments in infrastructures, technologies and practices directly benefit surveillance capitalism and state surveillance because they reinforce the unequal control over algorithmic surveillance data. Accordingly, Apple and Google, alongside Amazon, have been notable investors in technologies, infrastructures and practices undergirding clouds.

2.2 Investments in material-discursive clouds promote an unequal control over data

Investments in material-discursive clouds explicitly promote an unequal control over data. The transition to these server-end resources means that citizens do not know the regulatory contexts for service providers to benefit from algorithmic surveillance regarding them. But neither can they know how much energy their algorithmic practices consume on-demand, or where this energy consumption happens.

For instance, electricity empowers all algorithmically enhanced infrastructures, technologies and practices, including user and server end devices, and is needed, alongside matter, to manufacture them. Therefore, the agency of electromagnetic energy, radiation, has been needed for material-discursive algorithms to function. For instance, the agency of AC power participates in charging a mobile phone; the agency of DC power in operating the transistors (in executing algorithms); and the agency of microwaves in connecting the phone to the wider data network. During this process some of the energy is in the continuous process of socio-ecological degradation: becoming heat, or waste heat, which entails energy loss due to inefficiencies. In short, communication is material-discursive and energy empowers it. But the transition to server-end practices renders this big picture unquantifiable to citizens.

The advocates of cloud practices have argued that electricity will be saved globally as a result of this top-led industry-wide change. This argument promotes efficiency that is primarily gained by further centralising the server-end hardware (Newton 2010, Munro 2010, Voorsluys et al. 2011 in Haugen and Musser 2013: 15). Contemporarily, the industrial organisation and functioning of client-server practices is diverse, because a server might or might not be owned by those who tap into its capacity; might or might not be physically located at the premises of the one who owns it; and might or might not be sustained by the employees of the one who owns the server. If the actual, materially existing client and server computers are not located close by each other, then material-discursive communications networks, most typically the Internet, are needed for data traffic between them.

Because servers have traditionally been configured to have reserve to meet the peak demand arising from the client side, they hardly ever use up their capacity on those occasions when only one materially existing software-based server-machine is run on one materially existing hardware-based server-machine. Starting in the 1960s (after IBM's pioneering work), so-called 'virtualisation' has been used as a practice for logically dividing the mainframe computers' resources for different applications (Newton 2010, Voorsluys et al. 2011, Wilshusen 2011). Since then, the term has been adopted for various uses, and also refers, nowadays, to a wide-spread practice that allows the bundling of several software-based server-machines, commonly termed 'virtual' or 'virtualised', even though they are no less materially existent than any other pieces of software, on top of only one materially existing hardware-based server-machine (Wilshusen 2011 in Haugen and Musser 2013: 98). Any software-based server-machine, virtualised or not, is always itself a materially existent entity, which runs on a materially existing hardware-based server-machine readily available and accessible on demand. The main advantage of virtualisation is that different operating systems can be run side-by-side in isolation from each other on one hardware-based server-machine, which means that virtualisation facilitates the popular commercial practice of dedicating one software-based server-machine to one particular role only (Ibid.). Additionally, it is easier to move a materially existing software-based server-machine from one materially existing hardware-based server-machine to another if this software-based server-machine is virtualised (Ibid.).

In particular, the argument that inside companies worldwide, there are millions of non-virtualised servers that never use up their capacity but are mainly sitting idle and consuming electricity while waiting for the clients' requests has been utilised to market the idea that the full effect of virtualisation would be best achieved if the systems of hardware and software were globally centralised, as in clouds. For instance, a theoretical conclusion has been drawn that, in order to make the context of ICTs globally electricity-efficient during the time of use, it could be possible to replace the approximately 40 million materially existing hardware-based server-machines contemporarily distributed worldwide with the global total of 2.4 million if the virtualised software-based server-machines were run on these centralised hardware-machines at the theoretical maximum capacity of 100% (Newton 2010). What has been omitted from the discussion promoting the efficiency of cloud practices (by comparison with the contemporary diverse client-server practices) is that by promoting a high degree of (global) centralisation, cloud practices also promote a shift towards an all-encompassing reliance on those practices that assemble the actual material presence of both an even more pervasive presence of online, and global data traffic. All these are needed if any client is to tap into the cloud-located systems of hardware and software; all these rely on electrical energy to function. This shift is noteworthy when it comes to the associated requisite for electricity, because it has not been possible for citizens who are not part of the relevant internal processes of state and

capitalism to learn the detail of the nebulous connections bringing their ICT-reliant lifestyles into their material-discursive presence.

Cloud practices have been promoted as more efficient than the contemporary client-server practices, especially due to their so-called 'elasticity'. By this, the promoters mean that a virtualised software-based server-machine's capacity can be scaled up without delays whenever the need from the client side may arise (possibly resulting in the peak demand) (Voorsluys et al. 2011). Further, the promoters have referred to the practices of managing early mainframe computers, the schedule of which was planned in advance to utilise these machines' capacity almost in full, in order to advance cloud practices that centralise the actual materially existing systems of hardware and software on global-basis (Voorsluys et al. 2011). Therefore, central to the efficiency of cloud practices has been the idea that once the actual material systems of hardware and software have been globally centralised, it becomes possible to provide, without delay and whenever needed, all the materially existing capacity the virtualised servers may need to access and, in addition, to benefit the global ecology, because the servers are not sitting idle and consuming electricity while waiting.

Cloud practices exemplify how control societies run on markets for selling services. The commercial efficiency of cloud practices has been marketed through three main categories: customers can tap into cloud-located infrastructures 'as a service', cloud-located platforms for software development 'as a service', and cloud-located software 'as a service' (Voorsluys et al. 2011 in Haugen and Musser 2013: 17-18). Customers' self-service in customising their cloud-located infrastructures, platforms for software development, and software provided 'as services' has taken place 'without intervention of human operators', and billing for cloud-located services has been on a per-usage basis (unless there have been other means for the providers of cloud-based services to fund the usage of these services) (Ibid.: 19). Central to the commercial efficiency of clouds has thus been the assumption that their customers own neither the resources needed for the cloud-located services to exist in the first place, nor the resources, such as communication networks, that are needed in order for anyone to tap into the cloud-located infrastructures, platforms for software development, and software 'as services'.

Alongside promoting the further centralisation as well as privatisation of resources as the way to make the context of ICTs more electricity-efficient on a global scale, the promoters of global reliance on cloud-located services have thus also promoted a shift in the practices of binary computing in such a way that the reliance on those practices assembling the actual material presence of global data traffic, as well as on those assembling the material presence of the online environment, becomes even more central in the context of ICTs.

Profitable surveillance markets sustain opportunities to identify, monitor and profile citizens who are enthusiastic about participating online. This aspect is important because more often than not, citizens have not had an opportunity to learn about the intentional strategies of state and capitalism that may

be embedded in the material-discursive presence of technologies, infrastructures and practices. But investments in clouds are unlikely to make it easier for citizens to find out about the nebulous connections between the internal processes of state and capitalism and the practices of algorithmic surveillance.

According to some promoters of cloud-led centralisation, contemporary investments in technologies, infrastructures and practices promote the ultimate goal of providing all the practices of binary computing as utility (Carr 2008: 63-83). Doing so would mean that these practices would be, by definition, 'black-boxed', and not available for citizens' conscious collective efforts to manage them through their self-determined control, including rules, norms and sanctions of biopolitical self-rule to this end. On the one hand, some promoters of utility practices have stated that to provide all the practices of binary computing as utility would reduce the inefficiencies in the context of ICTs in a similar beneficial way as the shift to the grid-based delivery of electricity as utility reduced inefficiencies in the production and consumption of electricity (Voorsluys et al. 2011). (Preceding the grid-enabled practices to provide electricity as utility, the production and consumption of electricity took place physically close to each other, and early factories' sites were chosen based on the opportunities to produce, usually hydro, electricity on the site.) On the other hand, other promoters of utility practices have proposed that to provide all the practices of binary computing as utility presents an essential goal, because centralisation of the actual materially existing systems of hardware and software enables major commercial organisations to possess more control over how, where and when the electricity for their needs is produced. Much-advertised examples of beneficial top-led industry-wide adoption of more eco-efficient practices have been the decisions of Google and Microsoft to establish their new server plants on sites next to hydro power stations with abundant fibre-optic infrastructure; these were followed by the more recent publicity given to Apple for its decision to invest in solar energy to supply electricity for its clouds (Newton 2010 in Haugen and Musser 2013: 67). Research on datacentre power management has suggested that the emergent topics with regard to intermittent renewable energy are the on-site *versus* off-site supply of green energy and the temporal and spatial distribution of servers as well as their loads across the globe (Bird et al. 2014, Chen et al. 2014b, Chonglin et al. 2014, Davies et al. 2016, Fanxin and Xue 2014: 30: 3, 30: 33, Wang et al. 2013). Major investors in surveillance capitalism are obtaining more complete sets of resources enabling them to provide all the practices of binary computing as utility. This seems to necessitate a strategic move away from their own reliance on electricity as a grid-delivered utility provided by someone else.

For promoters, the transition to clouds represents a similar beneficial shift as that from craftsmanship to the Ford-factories type of centralised and streamlined production in manufacturing cars (Newton 2010 in Haugen and Musser 2013: 63-4). The Fordian-like consequences of this shift are that more affordable practices of binary computing will be provided not only to the business-to-business types

of clients, but also to the consumer-citizens as end-users, and that those organisations that will further invest in making processes automatic will, once again, make more profit due to the savings made by not employing wage-earners (Ibid.: 66). The efficiency of centralised and streamlined practices of binary computing also reduces the requisite for electricity in the context of ICTs worldwide, and therefore profit can seemingly benefit the ecology of ‘our common planet’ on the condition that there are no investments in people, and this exemplifies an economic-ecological, or econological, drive to algorithmic capitalisms and societies of control. But to frame cloud practices as more efficient than the contemporary client-server practices actually promotes investments in technologies, infrastructures and practices that make it possible for major commercial organisations to further centralise and privatise the practices of binary computing worldwide. Notably, the agency of citizens’ practices to make a difference that matters has been omitted from the discussion. In these ways, investments in material-discursive clouds have primarily advanced an unequal control over data.

Finally, all the investments in embedding ubiquitous access to online resources into everyday lives facilitate a shift towards ‘smart’, algorithmically enhanced, environments, including communal contexts. These investments transform the material-discursive agencies underlying this access towards data and control networks for embedded ubiquitous computing. As major investment projects, transitions to algorithmic capitalism and societies of control also serve as capital sinks during a global downturn. Commonly, investments in ‘smart’ infrastructures, technologies and practices embedded with algorithmic agencies entail agentic measuring, presupposing and steering civic intra-actions with algorithmic agencies. These entail civic self-regulation for ensuring smooth everyday rhythms as part of mass phenomena, such as commuter traffic, electricity-reliance or on-demand access to server-end resources. These everyday phenomena may be estimated and observed by combining sets of big data, which might have been gathered with and without citizens’ consent from various sources, and which might be communicated through algorithmic agencies, (such as ‘urban apps’), to the citizens who are to react to ‘data’, (such as intermittent delays in services) (Kitchin 2014, Luque-Ayala and Marvin 2015, Shepard 2014).

Notably, the lack of access to the most famous network of networks, the Internet, in the New York area immediately after the hurricane Sandy relinquished the idea that a civic access to online resources (and consequent energy consumption), alongside the supply of water and food, is important to be sustained during the protection of civic bodies at times of intermittent climate crises (Viitanen and Kingston 2014: 804-5 12-14). This access has not typically been a public good, and commonly the private sector has owned and/or maintained those infrastructures, technologies, and practices that facilitate this access through algorithmic connectivity (Carvalho 2015, McNeill 2015, Sheltona et al. 2015, Wiig 2015). Accordingly, the early transitions to algorithmically enhanced contexts embedded with a ‘ubiquitous’ quotidian reliance on online resources have ended up emphasising the lack of civic networks beyond the intra-communal pockets, and according to critics the inequalities between and amongst the heterogeneous communally oriented societies cannot be mitigated by empowering a more inclusive ‘smart’ society (Ibid.).

Interestingly, the material-discursive investments towards ‘smart’ societies have recently been brought together with the power [pouvoir] of ‘kill switches’ to disconnect, and the consequent infrastructure-based approaches to targeted civic control via the disconnected civic access resources (DeNardis 2012: 731, Viitanen and Kingston 2014: 812). For instance, DeNardis (2012) depicts ‘kill switches’ that provide ultimate control points over both algorithmic ‘surveillance’ data and civic access to online resources; these facilitate highly targeted points of control during times of civic unrest. But the profound quotidian contexts of fresh and waste water tend already to rely on electrical energy to be present (Albino et al. 2015), which makes the ‘kill switch’ of electrical energy alone a powerful opportunity for an infrastructure-based control – notwithstanding whether this switch is manual, algorithmic, or of other type. Thus, ‘kill switches’ of electrical energy provide highly targeted points of control over civic, and communal, access to water, electricity and online resources, and this infrastructure-based control matters especially during times of all the types of crises, including civic unrest. Additionally, the so called Internet of Things (IoT) is expected to provide an algorithmic energy-reliant access to profound quotidian contexts (Mahmood et al. 2014, Sindhuja and Balamurugan 2015, Teich et al. 2014, Wilson et al. 2015), which does not make it difficult to imagine some easily hackable, and thus triply dystopian, ‘kill switches’ (that facilitate infrastructure-based control of state, commercial entities and other citizens over data and communal accesses to resources). At the moment, IoT denotes intra-connected algorithmic agencies, starting from simplest sensors, which send and receive data over the Internet to ‘self-regulate’ algorithmically enhanced mundane items (like toothbrushes or toys). Thus, also the investments in transitions to IoT exemplify investments in transitions to algorithmic capitalisms and societies of control with algorithmically enhanced infrastructures, technologies and practices, which let anyone with an access to algorithmic ‘surveillance’ data to feed on the ‘value’ this data entails. It exemplifies how citizens self-regulate and manage their algorithmically enhanced contexts for the profitable ends of wider algorithmic systems that necessitate on-demand access to both energy and ubiquitous online resources.

The lack of obvious determinacy that characterises the transitions to algorithmically enhanced contexts may or may not inhibit citizens from meaningfully changing collective practices of algorithmic reliance. To do this is to change institutionalised, disconnected and indeterminate social, economic and environmental relationships, which are well-beyond the direct influence of communities. But to do this does not mean to conform to civic education for projected socio-ecological transformation and communal turn inwards in order for them to accumulate ‘action competence’ to this end; I turn to analysing this education in Chapter 3. In short, this education disguises how communal investments in their ‘democratic’ self-regulation and self-sufficiency instantiate volunteered civic control that works and creates value for the benefit of communally oriented states and capitalisms. Neither has it accounted for the on-going investments in transitions to algorithmically enhanced communal contexts, nor to algorithmic governmentality, which works for ensuring the profitability of algorithmic capitalisms at communities’ expense. But there is a need to account for the investments in transitions to algorithmically enhanced infrastructures, technologies and practices. These are

embedding communally oriented control societies with energy-reliant algorithmic agencies that facilitate unequal control over both algorithmic data and networks underlying communally oriented civic access to quotidian resources, such as water, electricity and online resources. To this end, investments in centralised and streamlined algorithmic resources, such as cloud-based resources accessible as on-demand services, have exemplified an econological drive, which frames these investments beneficial for both the profit and the planet through energy-efficiency on global scale. But what, then, has the role of ‘people’ been as part of these econological transitions for profit and planet? Next, I discuss the role of climate governance in promoting accountability of complex sociotechnical transitions and proactive civic changes.

2.3 The complex phenomenon of climate governance and proactive civic changes

Wasteful consumption and production of resources have resulted in ‘high-carbon economies/societies’ with daily dependence on access to energy (Urry 2010), most notably oil. As a response to this situation, both official global governance, such as post-Kyoto protocol treaties, and volunteered civic actions for climate protection, are on-going (Bulkeley and Moser 2007: 9). However, developing collective civic actions in response to the warming climate is not a simple matter of lobbying government authorities to take action (Dilling 2007). Instead, actions for climate protection involve both the governed and the governors in defining the problem, setting policy agendas, and implementing action (Dilling 2007). For instance, Bulkeley and Moser (2007: 9) observe several simultaneous framings to this end, such as those that link climate to sustainability, and those that link it with social justice. These framings result from the multiplication of pro-climate agencies that are not affiliated with the state, and they have a non-linear impact on how climate protection is being conceptualised and debated by civic practitioners at large, and for the purposes of both official and unofficial actions aiming at pro-climate governance (Bulkeley and Moser 2007: 7-9).

According to Walker et al. (2007), the central question of climate protection is what the balance should be between evaluating the plethora of dispersed actions in terms of resultant emission reductions, and evaluating them in terms of other, wider goals they might seek to address. Hence, there is a need to understand which tangible changes, such as emission reductions, and which other changes, such as the global demise of capitalism, collective civic actions have aimed to achieve under the rubric of climate protection. But the intra-connected and complex phenomenon of proactive climate protection is yet to manifest a dichotomous citizenship with identifiable competences to bring about some kind of meaningful and causal change. Therefore, there is also a need to understand institutional constraints and opportunities for voluntary civic pro-climate self-regulation without resorting to dichotomous citizenship as the chief requirement for any change that matters. Rather, complex phenomena that bind material-discursive effects of and effects on climate exceed the sum of their constituent parts. Neither does a civic ability to change real world institutions exist outside of the

global capitalism that prevents civic actions from changing global inaction on tangible pro-climate changes. Hence, there is a need to understand institutional constraints and opportunities for on-going collective changes from within communally-oriented nation states and capitalisms that sustain global profits. Notably, the on-going transition to algorithmically enhanced civic resilience, such as communal management of pooled energy production-consumption, exemplifies how voluntary pro-climate self-regulation directly benefits global algorithmic markets for related financial derivatives.

In spite of this, wasteful consumption and related production need to be profoundly changed for tangible climate protection (Urry 2010). Commonly, public emphasis has mainly been on the extent to which wasteful societies may consume in a more ethical and/or sustainable manner – whether they are socially aware, frugal or environmentally concerned. According to most authors who view consumer-citizens as possessing the power to perform positive environmental change, environmentally responsible choices build on environmentally conscious values and attitudes (e.g., Bull et al. 2008, Dobson 2007). Further, education that traces global transformation of capitalisms and states to volition and cognition of educationally transformed citizenship (Ferreira 2009) has commonly juxtaposed individualised citizens, ‘idiots’ of social transformation, with ideal transformative communities, which are obtaining full resources to bring about the projected communally oriented societies, (most notably akin to those John Dewey imagined) (Jickling and Wals 2008). However, among others, Walker et al. (2007) have openly questioned whether all the activity towards changes in civic values and attitudes actually translates to profound positive change in favour of the society-wide common good this activity claims to pursue.

Bulkeley and Moser (2007: 7, 8) express the explicit concern that because climate protection is already everyone’s responsibility, it might end up being no one’s. Therefore, they warn that proliferation of global ‘multi-scale’, ‘multi-actor’ systems might hamper the governance of climate protection processes (Bulkeley and Moser 2007: 8, 9). They also resent ad hoc development of multiple schemes and initiatives – even though they acknowledge that multiplication and diversification of actors and sites of action might increase the chance of ‘policy surprises’, and lead to quicker policy progress and change (Bulkeley and Moser 2007: 6, 8, 9). What is proposed instead is a more complex understanding: that the climate protection policy can originate at any level of pro-climate action and governance, but requires a certain degree of integration with efforts at other levels (Bulkeley and Moser 2007: 6). In order to assert the responsibility of climate protection – which is, according to them, already beyond the capability of international negotiators – Bulkeley and Moser (2007: 8) ask what role nation-states play in being held to account for their actions or inactions and in monitoring and enforcing accountability in other initiatives undertaken by actors outside the state.

The need for a more complex understanding of climate protection initiatives is highlighted by the need to address emissions from sources that are obscured on the national and international scale

(Bulkeley and Moser 2007: 5). These emissions arise, for instance, from the planning of urban areas for car dependence, or from the general acceptance of ideas about what is comfortable, convenient and hygienic (e.g. Shove and Walker 2010). The problem of these emissions captures the global, multi-faceted nature of several simultaneous climate protection agendas, and entails opportunities for free-riding and exploiting to excess the common pool resources, such as energy commons. The responsibility of the commercial production sector for production of these emissions has traditionally been addressed by national environmental policies (Bulkeley and Moser 2007: 5). Further, the responsibilities of many institutional structures which contribute to wasteful consumption and production, and the related need for climate protection, remain largely unaddressed. This is partly because the connections between these structures and the unaddressed emissions are obscured. Consequently, neither economic instruments nor technological solutions adequately address the institutional changes that are needed from within global machinic economies. But climate protection has become an intra-connected non-linear phenomenon that is not reducible to the collisions and resonances between underlying values. Rather, simultaneous pursuit of intra-connected agendas, which enmesh an on-going complex change, characterises it.

Those promoting positive environmental change of 'Western' democratic decision-making, capitalisms and communally oriented nation states argue that institutional change happens when a citizenship collectively and intentionally demands changes (Räthzel and Uzzell 2009: 272). This literature urges collective mobilisations of joint environmental action in order to make individuals consciously motivated to take part in institutional change that builds up to the projected demise of global capitalism (e.g. Räthzel and Uzzell 2009). Typically, this change is projected to happen because idealised communities, most notably those projected by John Dewey and Elinor Ostrom, take back control of how we live with each other on Earth; they have been projected to achieve this by accumulating the full civic resources, (i.e., action competence) to instantiate the communal self-regulatory and self-sufficient control, 'autarkic' control for short (Jickling and Wals 2008, Mogensen and Schnack 2010). But the mobilisations of collective actions that enforce communal turn inwards have perpetuated the idea of Cartesian civic divide, transformative communities *versus* individualised 'idiots'. This approach discounts the complex and intra-connected effects of capitalisms that arise from 'cumulative unintended effects of a vast amount of seemingly insignificant decisions and actions by individuals' (Sandler 2010: 167).

Some of those authors who consider simultaneous individual and institutional change as a multi-actor and multi-level sociotechnical transition process argue that they are able to depict the complex problem of framing the intra-connected production and consumption (Smith et al. 2010: 436). This transition perspective draws upon theories at the interface of innovation studies and science and technology studies (STS), and concentrates on patterns of culture, organisation, markets, regulation and infrastructures that are intra-connected with processes that construct technologies (Raven et al. 2010). Since large-scale sociotechnical systems present persistent sustainability challenges, the

novelties⁸ of practice⁹ that have an effect on the dynamics of these systems are seen as one possibility for achieving transitions to sustainability (Smith et al. 2010: 436).

Earlier, some authors (Rotmans et al. 2001) interpreted complex sociotechnical transitions to sustainability as traceable to environmental policies and governance. However, Shove and Walker (2007) question the manageability of such transitions and, like Smith and Stirling (2007), call for a more reflexive and politically informed appreciation of the way these systems are socially constructed. In addition, they question a further tendency in transition policies, which is to make an *a priori* us-them distinction between the governors and the governed (Shove and Walker 2010). This tendency neglects the role of both sides in explaining the changes in sociotechnical transitions.

The more recent perspective on sociotechnical transitions emphasises that certain actors possess institutional power to make forceful changes to multi-level dynamics, but the resources needed to induce a significant sociotechnical change are widely distributed (Smith et al. 2010: 445). Some institutional structures, like rules, incentives and norms, can be altered by those governing the changes, but it is the collective agency of practices at play in these alterations that partially result in the positive (or negative) environmental change. For instance, Shove and Walker (2010) illustrate this when they argue that tourists' and inhabitants' practices in response to (or despite) the congestion charge in London changes the sociotechnical transitions these entail (that is, it is the collective agency of these practices that matters). Lauridsen and Jørgensen (2010) reinforce the same argument in their study of responses to The European Union's Waste Electrical and Electronic Equipment Directive.

Bulkeley and Moser (2007: 8, 9) conclude that the biggest challenges faced by successful transformations from governed changes to pro-climate behaviours.

[...] the very real danger of waning long-term commitment given the multi-generational challenge that warming climate is; realizing a sufficiently comprehensive system of climate governance and associated societal transformations in time to prevent catastrophic warming climate; and managing the turbulent changes that accompany such deep societal transformations without major negative unintended side-effects. (Bulkeley and Moser 2007: 8, 9).

⁸ Here, novelty is a relative term, and, as such, includes ideas taken from one context and adapted to another, combining existing ideas in a new way, or finding new ways of making existing solutions work better. Innovations need be neither technical nor scientific, but might instead involve re-organising processes or the ways people interact.

⁹ The use of the term practice is intended to draw attention to the embedded nature of action, whereby 'performances (are) shaped by and constitutive of the complex relations – of materials, knowledges, norms, meanings and so on ...' (Shove et al. 2007: 13) as opposed to being the result of an individual's decision making processes.

Hence, even though the need for profound changes for climate protection is collective, highly distributed and global, all the difficulties in governing these changes that are addressed by Bulkeley and Moser (2007) are partially dependent on changes in collective civic practices. In order to find ways to destabilise entrenched consumption and its related environmental consequences, any sustainability analysis must include the counter-veiling effects of unsustainable transitions in the making, even though a plural framework fails to capture the sheer complexity and contingency of sustainable and unsustainable developments (Shove and Walker 2010). Although Shove and Walker do not make this point, their argument is exemplified by the studies that have found that across a society, cheaper overall electricity bills mean that consumers have more money to spend on other activities, which potentially raise their total energy use (e.g. Barker et al. 2009). Further, as discussed in section 2.2, investments in centralised and streamlined algorithmic resources, such as cloud-based resources accessible to ‘people’ as on-demand services, have exemplified an economical drive, which frames these investments beneficial for both the profit and the planet through energy-efficiency on global scale. But as also discussed in this chapter, the on-going investments in embedding energy-reliant algorithmic agencies into infrastructures, technologies and practices entail transitions to algorithmic capitalisms and control societies with unequal control over both algorithmic data and networks underlying communally oriented civic access to quotidian resources, such as electricity and online resources. Neither can we know in detail what the material-discursive ‘body’ of an algorithmically enhanced milieu can do. Therefore, there is a need to conceptualise the enmeshed complexity of material-discursive connections that result in all environmental consequences. But the global leaders of civic environmental education, transformative education (Peters and Wals 2016) have not mobilised citizenry to this end.

3 Transformative civic environmental education – critical reading

3.1 Institutionalised lack of citizens' full resources

In this chapter, the perspectives of what is known as transformative education and its opponents, the 'un-' and 'mis-educative' forms of civic education, are analysed based on the need to transform the status quo of political and ethical practices (of who it is that should hold power and how we should live with each other) – the status quo, for short (Jickling and Wals 2008: 12). Section 3.1 gives an overview of the institutionalised lack of resources available to citizens to enact change in their daily lives, even on occasions when citizens might be willing so to do. Section 3.2 reviews the literature of 'un-' and 'mis-educative' forms of civic education by moving from the earliest perspectives of 'awareness to action' to the concurrent practices of moralising networked citizens into making individual 'choices' to 'fight for' 'our common future'. Section 3.3 begins with transformative educators' deconstruction of civic education and continues with an analysis of transformative education's approaches to the development of citizens' competences for social transformation. Section 3.4 concludes the chapter by reviewing the importance of experiments and experiences as mechanisms of fashioning collective non-monolithic capacities [*puissance*] for non-deterministic change.

Critics have identified that the collective operations and claims of those people who wish 'to deal with their 'existential questions about the way human beings and other species live on this Earth' 'in a self-determined, relatively autonomous, and contextually grounded way' are less likely to promote self-determined governance, self-regulation and self-enforcement, if nation states and capitalism do not fully support these processes (Jickling and Wals 2008: 18, see also Bickerstaff et al. 2009: 597, Johnson and Nelson 2004: 724, Læssøe 2010: 50, Swyngedouw 2009: 609-10, Turner 2004). Thus, the current conditions for people to enact long-enduring best practices of self-determination are far from ideal. The ideal conditions would connote socio-ecological communities John Dewey envisioned, and authors have drawn from Elinor Ostrom's work have concluded these conditions as follows.

- (i) the resources and use of the resources by humans can be monitored, and the information can be verified and understood at relatively low cost [...]
- (ii) rates of change in resources, resource-user populations, technology, and economic and social conditions are moderate [...]
- (iii) communities maintain frequent face-to-face communication and dense social networks [...]
- (iv) outsiders can be excluded at relatively low cost from using the resource[...]
- (v) users support effective monitoring and rule enforcement (Dietz et al. 2003: 1908).

Based on these conditions, the lack of institutionalised support hinders the long-enduring best practices in maintaining socio-environmental relations – the so called common property regimes. After Elinor Ostrom’s work, these best practices have been characterised as follows.

1. Clearly defined boundaries for the resource and for the people/communities which have beneficial rights to those resources;
2. Congruence or agreement and consistency between management rules/rights and local conditions;
3. Collective choice arrangements, whereby end-users have the capacity to participate in rule formation and implementation;
4. Monitoring and active auditing of users for accountability;
5. Graduated sanctions which are appropriate to the offence when users contravene group rules;
6. Conflict resolution mechanisms amongst users;
7. Recognition of rights to organise – where external agencies/the nation state do not challenge the right of users to establish their own institutions of management (Dietz *et al.* 2003, Gibson *et al.* 2005).

For educators who urge the predetermined ideal conditions for, and best practices of, communal socio-ecological existence, these present the preconditions for both individuals and communities to bring about the ideal biopolitical existence. This fully addresses ‘existential questions about the way human beings and other species live on this Earth’ ‘in a self-determined, relatively autonomous, and contextually grounded way’ (Jickling and Wals 2008: 18). But profound change in current ethical and political practices is needed for this projected ideal future to happen.

In response to this challenge, some academics maintain that ‘education can [...] be thought of as a process that can enable social transformation’ (Jickling and Wals 2008: 11, see also *Ibid.*: 8). Thus, these authors of ‘transformative education’ conclude that citizens are capable of developing capacities for social transformation, notwithstanding the institutionalised constraints on change (Jickling and Wals 2008: 7-8). They identify that the key debate in education ‘has turned on whether education is about social reproduction or about enabling social transformation’ (Jickling and Wals 2008: 8). Jickling and Wals (2008: 8) frame their concept of ‘educated citizens’ in the following way.

According to Jickling and Wals (2008: 17), social transformation requires the existence of ‘educated citizens’ who enact democratic practices in the sense that democracy is ‘a mode of associated living, of conjoint communicated experience.’ Accordingly, their ideal citizenship resembles that of John Dewey. The concept of social reproduction on the other hand, is based on the assumption that ‘educated citizens’ participate in society as practitioners of representative and consultative decision-making exercises, as hierarchies of educated workforce, and as consumers. Thus, educated citizens of

social reproduction are those who are complicit in maintaining the institutionalised inertia of pertinent practices (of who should have power and how we should live with each other) – that is, social reproduction.

‘Educated citizens’ become complicit in maintaining the institutionalised inertia of pertinent practices if ‘they are obedient, deferential, and compliant’ ‘as they accept their role’ ‘within existing frameworks’ (Jickling and Wals 2008: 8). Namely, ‘educated citizens’ of social reproduction have developed those individualised human competences which enable them to ‘take their place within hierarchical and authoritative social structures and power relationships’ (Jickling and Wals 2008: 8). Other authors (including Deleuze & Guattari 1987, Read 2008: 151) have made the observation that the initial assumption of individualised human competences has perpetuated the subsumption of every aspect of one’s human existence, knowledge, communicative abilities and desires to the institutionalised lack of change of the power of the authority.

If ‘social reproduction is the inherent expectation [of education]’, then the daily choices of ‘educated citizens’ become outsourced to decision-makers and their supporting bureaucracies in ways that are not fully transparent (Jickling and Wals 2008: 8). Thus, citizens, who are expected to adapt to existing frameworks, come to lack the resources to enact change in their daily existence, even if they are willing to do so. Or, as Žižek (1999: 324ff) concludes, everybody knows that people are oppressed; that they live under the yoke of external powers.

It is something of a cliché that – unlike in tribal societies where the affiliations and alliances were the relationships between people in groups – existence today can be conceived of as machinic enslavement (Deleuze and Guattari 2004: 167, Deleuze and Guattari 1987: 458). This is because citizens are indefinitely indebted to nation states. However, because ‘repaying is a duty but lending is an option’, ‘the creditor has not yet lent while the debtor never quits repaying’ (Deleuze and Guattari 2004: 215). Thus, citizens’ indefinite debt of existence results in Jickling and Wals’ (2008: 8) formulation that ‘educated citizens’ of social reproduction are expected to be ‘well prepared to accept their role within society and the workforce’. Yet, because the interest of a nation state beyond its ‘biopolitics’ is its financial status, it is the regulation of the State that enables (some type of) capitalist system of axioms (Buchanan 2008: 33), including material-discursive money. As Buchanan (2008: 32) concludes, the catch cry of ‘economic necessities’ has both mystified economics as the ultimate determining agency, and de-politicised politics.

Because capitalist systems have long outlived their social, political and ecological contradictions, some critics have come to doubt whether the reforms of capitalism can add up to the projected demise of those systems: ‘You say you want an axiom for wage earners, for the working class and the unions? Well then, let us see what we can do – and thereafter profit will flow alongside wages, side by side, reflux and afflux’ (Deleuze and Guattari 1983: 238, cited in Read 2008: 153). Nothing less than a

profound change in those practices through which the nation states indebt their citizens is needed to free people from the machinic enslavement that maintains the status quo. Perhaps this is what transformative educators mean when they indicate that it is one thing to criticise the *status quo* (which causes the quotidian existence of humans to become ‘outsourced’), and another to claim to know what it would take to transform the status quo (Wals et al. 2008: 57-58, Wals 2010b: 387).

3.2 Un- and mis-educative approaches to civic education: A critical perspective

Environmental policy and education have generally been based on the false assumption that a shared (often expertise-based) worldview of ‘sustainability’ is applicable (Jickling and Wals 2008: 7, 8, 11, 13, Reid et al. 2010). Some authors have specifically pointed out that the ‘globalizing language and discourse’ have been developed and disseminated through education for the development of sustainability, and that the United Nations’ decision to declare that a Decade of Education for Sustainable Development began in 2005 was an important part of this process (Payne 2010: 155, see also Jickling and Wals 2008). According to the critics, there is no consensus on what sustainability is; neither is there any implementation of environmental policy. They also suggest that education should be based on privileging education for sustainability development, thus giving an *a priori* disadvantage to other forms of civic education (Jickling and Wals 2008: 5-6, 12). Yet, for the United Nations (2005: 2, 13), ‘economic, social and environmental aspects’ form sustainable development. Its objectives for implementing our common future are sustained economic growth and the eradication of poverty and hunger, in addition to sustainable development and civic education *for* sustainable development. Thus, education for sustainable development has been critiqued for assuming that what is best for people and the planet can be inculcated in citizens while ‘den[ying] diverging perspective[s] and negat[ing] contextual differences’ (Jickling and Wals 2008: 13).

According to the Jickling and Wals’ (2008: 3) analysis, ‘the coupling of globalisation and neo-liberalism’ has an effect on all education, not least because of the globalizing language and discourse of education for sustainability development. To illustrate the imbalance between this coupling and the ‘good and important work’ of some environmental educators, Jickling and Wals (2008: 3) have reinvigorated Orr’s (2003) visualisation of an accelerating train and its passengers. The work of the environmental educators has been like the action taken by those passengers who are walking in the opposite direction from the accelerating train. Thus, Jickling and Wals (2008: 3) posit that the efforts of those educators may be for nothing, because the ‘economic forces of consumerism are so much bigger’.

In their writing, Jickling and Wals have been concerned that the coupling of globalisation and neo-liberalism may ‘engulf education and make it a contributor to, or even a catalyst for, further

exploitation of ‘human’ and ‘natural resources’ (2008: 3). They also suggest that it has become possible to ‘silently’ omit the concept of profit as an ‘undisputed component’ of our common future and that this has happened under the guise of sustainability, sustainable development, and education for sustainable development (Jickling and Wals 2008). Further, these authors critique education for sustainable development for enabling governments, special-interest groups, and industry to use education as an instrument (in order to ‘implant a specific message, agenda, ideology or consumer preference’ into the minds of impressionable citizens) (Jickling and Wals 2008: 7, see also *Ibid*: 11). In short, according to Jickling and Wals (2008: 3) the ‘drive to consume’ is greater than the ‘drive to sustain [sic]’ – especially ‘for [sic] the 10% of the Earth’s population that uses well over 90% of its resources’. They have also defined that those who have not subsumed to their educational agendas, need to learn ‘how to think’ (Jickling and Wals 2008: 12).

To enforce the predetermined transformation *for* the environment (Ferreira 2009, emphasis in original), civic educators have commonly subjected individualised learners to educational transformation that predisposes them to invest their resources, actions and desires in communal turn inwards. To this end, authors of ‘transformative’ socio-ecological education have juxtaposed individualised citizens with ‘conscious’ communal actors who accumulate ‘full’ civic resources, or ‘action competence’, for the projected transformation of capitalist nation states. Further, based on this predetermined civic divide, for instance Jickling and Wals (2008) have defined that their educational transformation creates civic action competence akin to that of ideal Deweyan communities, and juxtaposed it with education that communicates sustainability to masses of individualised citizens. To this end, the critics have concluded that (inter)national statements on environmental policy and education have generally been based on a false assumption that a shared (often expertise-based) worldview of ‘sustainability’ is applicable (Reid *et al.* 2010). By ‘mass environmental communication’, scholars imply that the environment is being framed into the discourses of government, the media and of non-governmental organisations (NGOs) (Macnaghten 2003). Media framings have been part of the legitimisation of environment-related politics by negotiating access, shaping meanings and circulating symbols – and they have more often than not disseminated the diverse agendas of ‘sustainability’ (Bocking 2010, Gillespie and O’Loughlin 2009, Lester and Hutchins 2009). In addition to criticising the sustainability agendas of NGOs, including their civic education, scholars have pointed out that while NGOs have framed the development of local capacities for change as essential, they have not clearly confronted the ‘fundamental underlying processes’ of nation states and capitalism (Holifield 2009: 642, see also Blum 2009: 716). Thus, the practices of public framing (as part of the government, media, and NGO discourses) have been criticised for reproducing the institutionalised inertia of pertinent practices (of who should have power and how we should live with each other) by functioning as transmissive education. By transmissive education, the critics mean the predetermined, prescribed and closed mode of civic education, which

is based on disseminating pre-established, and often expertise-based, framings of phenomena (Jickling and Wals 2008, Wals et al. 2008: 56).

Transmissive education, the expertise-based (hierarchical) structures of knowledge creation (Jickling and Wals 2008: 7), has, historically, been interpreted as the inherent assumption of transmissive civic education, that is, the provision of more and better information (to the ignorant headline-reading public) that will cure citizens' information deficit (Arnstein 1969, Barben 2010: 276, Barnett 2010, Kollmuss and Agyeman 2002, Reid et al. 2010). The guiding principle is that citizens behave 'irrationally' in response to (especially environmental) risks on those occasions when they lack 'scientific literacy' (Barben 2010: 276-7, Barnett 2010, Kollmuss and Agyeman 2002, Reid et al. 2010). Moreover, transmissive educators have assumed that education is needed because of citizens' 'inability or unwillingness to acknowledge superior knowledge' (Barben 2010: 276). Educated citizens, on the other hand, are those whose '[u]nderstanding [...] lead[s] directly' to their fully conscious choices to take action: 'individual action, pressure for action from the appropriate authorities, or consent to actions taken by leadership on behalf of citizens' (Stamm et al. 2000: 221). Under the rubric of 'sustainability, sustainable development, and education for sustainable development, these conscious actions of a well-educated and conscious citizenship have been assumed to bring about our common future (Barnett 2010, Kaplan and Kaplan 2008, 2009, Macnaghten 2003, Reid et al. 2010). The critics have noted that education is more reminiscent of manipulation and indoctrination if informed citizens' ability to understand and willingness to accept 'superior knowledge' is assumed to bring about more and better conscious actions (for our common future) (Wals et al. 2008: 56).

Provided that some enlightened citizens are able to understand but unwilling to accept 'superior knowledge', the well-used 'educational' strategy has been to invigorate citizens' 'values, attitudes, beliefs, and subjective norms' to instil a sense of a meaning behind citizens' actions and inactions (Barben 2010: 276, Barnett 2010, Reid et al. 2010, Stamm et al. 2000: 221). Consequently, sustainability educators have been taking measures to educate citizens' volition alongside their cognition in order to educate educated citizens who take actions for our common future (Barnett 2010, Reid et al. 2010). The inherent moralism built into civic education hence makes it possible for ('educational') agendas to put the blame on those individual citizens who choose not to act for our common future.

The critics have noted that it is possible for individual citizens to fight for not just the specific conditions of one's existence, but for anything citizens might want to change, only because citizens are subsumed to the processes of the nation states and capitalism (Read 2008: 154). Yet, more often than not, the agendas of civic education have short-circuited a first person moral agency (of a citizen's individualised 'choice' to take action) with a citizen's willingness and capacity to take action as part

of (usually global) 'networks' (Dobson 2007, Hobson and Niemeyer 2011: 965-6, Macnaghten 2003). The educational primacy of citizens' willingness and capacity to act as 'networks' (of conjoint moral agency) is problematic, because although ethics is immanent in any situation of machinic enslavement, any model of morality is transcendent as it is a judgement with regard to pre-established standards (Herzogenerath 2009: 8).

The tendency of sustainability agendas has been to frame 'networked' citizens' individualised 'choices' to take actions as emblems that these citizens have made a conscious choice to mobilise their first person moral agency in order to fight, not just for the specific conditions of one's existence, but for anything citizens might want to change. As Kaplan and Kaplan (2008: 828; 2009: 335, 338) explain, if a 'realistic basis for hope exists', some citizens are willing to participate in (globally) 'networked' aspirations in order to 'achieve tangible results'. For instance, Kaplan and Kaplan discovered that some citizens have been willing to participate in 'networked' moral efforts to try to salvage an ecosystem or a community which is not their own (2008: 828). But to impose any predetermined agendas about what works best for both the people and the planet does not respect the wish of 'individuals and communities' to address their questions about the way human beings and other species live on this Earth in a 'self-determined, relatively autonomous, and contextually grounded' manner (Jickling and Wals 2008: 18).

The moralising agendas of sustainability have tended to rely on crises and threats to elicit individualised responses from those 'educated citizens' who are framed as responsible members of a networked (usually global) community (Dobson 2007: 281, Macnaghten 2003). In the following example, the socio-environmental crises and threats are caused by an increase in human emissions to the atmosphere, and they are framed as a uniting common cause which mobilises citizens' individualised 'choices' to take action as 'networked' moral agents of change.

[P]eople drive less in general because they know that car driving contributes to global warming, that global warming affects poor people more than rich ones, and that too much car-driving leaves too big an ecological footprint (Dobson 2007: 282).

Thus, Dobson suggests that these citizens have made their individualised 'choices' to act *because* they are able to understand the socio-environmental crises and threats as relational effects of interconnected human impacts. Therefore, the coalition of these citizens' volition and cognition gives these 'networked' citizens the moral high ground of those who have put aside their vested interests and 'move[d] beyond self-interest to the common good' (Dobson 2003 cited in Hobson and Niemeyer 2011: 966).

Mueller has concluded that an 'increasing awareness of ecological degradation' has mobilised 'the magnitude of movements when organized around a doctrine of crisis, fear, and urgency' (2009: 1032).

However, the reliance on crises and threats as a justification for civic action and education has not only created a worldwide interest in environmentalism, but has also resulted in cases of deception in the markets, as well as the normalisation of anthropocentrism and the excesses of scientism: science as justified or applicable in all fields of inquiry (Mueller 2009: 1032, 1037, 1038). Consequently, as long as the ‘networked’ moral agents of change do not have the full resources to radically change the (globalised) root causes of their subsumption to the processes of nation states and capitalism, crises and threats underlying civic education might serve to obscure why citizens should make individualised choices to fight for our common future in the first place (Halsey 2009: 247-8, Macnaghten 2003: 79, Mueller 2009).

Those scholars who criticise the use of transmissive education as a communicative policy instrument have established that citizens’ individualised actions of ‘doing good’, ‘doing your bit’, and ‘doing the right thing’ have been framed as conscious choices to behave as conspicuously responsible educated citizens (Barnett 2010, Dolnicar and Grün 2009, Hobson 2006: 318, 323, 325, 330, 331, Jackson 2005, Kennedy *et al.* 2009, Owens 2000: 1444, Reid *et al.* 2010, Wals *et al.* 2008: 60). Accordingly, the strategies of civic education have moved on from the earlier models of ‘awareness to action’, into factorising citizens’ individualised existence with educational purposes in mind (Barben 2010: 277, Reid *et al.* 2010, Wals *et al.* 2008: 56.). As Wals *et al.* (2008: 62) define it, the term ‘target group’ is to be used when criticising the ‘instrumental’ use of education to affect the behaviour of the factorised learners. However, the words ‘participants’, ‘actors’, and ‘stakeholders’, can be used when describing emancipatory civic education, the purpose of which is, according to Wals *et al.* (2008: 62), the opposite of the civic education for individual behaviour change. ‘An important precondition [for emancipatory civic education] is that a project builds on actors’ existing perceptions and knowledge with regard to the issue and/or challenge at stake’ (Wals *et al.* 2008: 62). In addition, a successful project is relevant to the ‘perceptions, lifestyles, and interests’ of the learners (Wals *et al.* 2008: 60). Whereas those who participate in emancipatory learning begin to get benefits from the ‘improved relationships between citizens and stakeholder groups’, the education and communication strategies of civic education for individual behaviour change have framed an actual change as a joint effect of ‘networked’ citizens’ individualised actions (Wals *et al.* 2008: 62). Therefore, the messages of mass environmental communication have appealed to the ‘target groups’ of (factorised) citizens to take individualised actions of ‘doing the right thing’ as networked moral agents of change (Wals *et al.* 2008: 62, see also Barnett 2010, Hobson 2006: 318, 323, 325, 330, 331, Jackson 2005, Owens 2000: 1444, Reid *et al.* 2010, Wals *et al.* 2008: 60).

More often than not, the messages of ‘sustainability’, ‘sustainable development’ and ‘education for sustainable development’ have disseminated the idea that citizens’ individualised actions (doing one’s bit) can and do make the difference when the ‘networked’ citizens take actions as joint consumers who pursue socio-environmental civic responsibility (Barnett 2010, Hobson 2006: 295, Jackson 2005,

Lovell et al. 2009, Reid et al. 2010, Soper 2004, Urry 2010). An underlying assumption behind the ideal of ‘the hegemony of individualised consumer agency’ has been that the (globally) ‘networked’ effects of citizens’ individual choices (about how to live their lives) can be made traceable to the degree that they can be claimed to be linear (Barnett 2010: 1882, Lovell et al. 2009). Thus, for over twenty years, ‘educational’ messages, often led by sustainability agendas, have encouraged citizens to participate in practices that seek to use market mechanisms for the pursuit of a wide variety of ‘responsible’ socio-environmental objectives – whether socially aware, frugal, or environmentally concerned (Barnett 2010, Urry 2010). Because the agendas of, and education for, ‘the hegemony of individualised consumer agency’ have relied on the pertinent practice of money, critics have dismantled the idea that any individualised choices of ‘networked’ citizens can have a significant effect on resource management (Barr 2006: 43, Buenstorf and Cordes 2008: 649). Instead, critics have wanted to draw attention to those discursive practices of sustainability, including the related education, which are utilised to moralise and make responsible the individualised actions of citizens – and therefore to divert the emphasis from the institutionalised inertia of pertinent practices of power and social interaction (Lovell et al. 2009, Payne 2010).

The critics have maintained that the pertinent practice of money is one of the prominent preconditions for the lack of change in the institutionalised inertia of the *status quo* (Deleuze and Guattari 2004: 249 cited in Buchanan 2008: 30). As Žižek (1989: 31 cited in Read 2008: 148) has concluded, even though people do understand that ‘money is just a social convention’, this understanding does not help them, in their daily existence, to break free from those pertinent practices which make them ‘act as if [money] is the physical embodiment of value’. What Žižek (1989: 31 cited in Read 2008: 148) seems to suggest is that citizens can discern not only the institutionalised inertia of pertinent practices but also the limitations on an intermingled collective agency of humans whose existence is machinically enslaved. Moreover, this understanding does not provide citizens with any opportunities for developing a capacity to break free from their collective subsumption to the processes of the nation states and capitalism. Thus, those individuals and communities who have thought critically for themselves about the relationships between the existence of money and their ‘existential questions about life on Earth’ also lack opportunities to develop those competences which would enable them to ‘deal with such questions in a self-determined, relatively autonomous, and contextually grounded way’ (Jickling and Wals 2008: 18). Consequently, an individualised human ‘choice’ to fight not just for the specific conditions of one’s existence, but for anything citizens might want to change, may serve to imply that the scope for any actual agency – ethical or otherwise – is very restrained.

Critics have noted that, whereas the moralising education at least purports to respect citizens’ willingness and capacity to ‘do the right thing’, the prospect of policy and governance is in seeking to circumvent or circumscribe the ‘choices’ available to citizens (Barnett 2010: 1883-1884, see also Barnett 2008, Thrift 2008a,b, 2009). This perspective is based on the idea that the rise of ‘an

arrogation of voice by specific paternalistic experts (not least, certain strains of social science) can, and should, be embedded in practices, technologies, and infrastructures in order to manipulate citizens' 'choices' (Barnett 2010: 1884, see also Hobson 2006, Thrift 2008 a,b, 2009). Hence, on those occasions where there are insufficient means for the citizens to distinguish the practices, technologies, and infrastructures from the embedded manipulative agendas, the citizens might not be able to successfully target their conscious collective actions for change. But provided that citizens' involuntary submission to the will of others has taken on the 'character of a political strategy in its own right', what has remained unexplored is how and when citizens might posit actual opportunities to discern the embedded agendas, 'or even what reconfigured understanding of criteria might help in this task' (Barnett 2008: 198, see also *Ibid*: 191-2, 196, Thrift 2008a: 19, 235-54).

3.3 'Transformative' perspectives on the development of citizens' competences for actual change

Some critics have concluded that the institutionalised inertia of pertinent practices (of who should have power and how we should live with each other) has been sustained by the privatisation of decision making to the degree that it is assumed that socio-environmental practices can be resolved solely through the internal processes of the nation states and the major players of capitalism (Læssøe 2010: 50). The critics of this *status quo* have expressed their worry that the participatory deliberative practices of current 'democracy', and, in particular, citizens' public participation in deliberative consultation exercises, have been framed as civic pluralism, even though these practices have been co-opted to those of *laissez faire* (Bickerstaff et al. 2009: 597, see also Læssøe 2010: 50, Swyngedouw 2009: 609-10, Wals 2010a: 145). According to the 'transformative' educators, pluralism of citizens' public participation is beneficial for enhancing civic competences for social transformation, because 'the dissonance created by exposing learners to a wide range of perspectives is what triggers reflection and meaningful learning' (Jickling and Wals 2008: 12, see also Wals 2010b, Wals et al. 2008: 62). Yet, simultaneously, these authors have been concerned that pleas for pluralism may reinforce so-called 'crude relativism', which does not result in the dissonance that triggers 'transformative' learning: it 'will not lead to dialogue and will always keep us from legitimately criticizing another person for being wrong' (Wals 2010a: 145). By 'crude relativism', critics mean that 'any perspective or position [...] is a[s] good as any other one, that your view [...] is as true as mine and that I would be wrong to critique yours, and while it might be wrong from my perspective, it might be right from yours' (Wals 2010a: 145). In addition to hindering transformative learning for civic competences, this makes it difficult for the citizens to critique both 'marshalling science in the service of politics' and the 'interest group pluralist theory of democracy where the

loudest voice wins and it is assumed that the common good is served by this vector addition of competing interests' (Briggle 2008: 469).

According to the proponents of 'transformative education', the key debate in education 'has turned on whether education is about social reproduction or about enabling social transformation' (Jickling and Wals 2008: 8). Thus, there is a need for educators to engage in current academic debates and to show support to non-conformism in those arenas that facilitate 'hegemonic discourses' (Jickling and Wals 2008: 18-19, see also Wals 2010b: 387-8). The main arguments of transformative education literature support this need, countering what they see as 'un-' and 'mis-educative' forms of civic education (reviewed in section 3.2) by critiquing the globalising language used by the forms of education referred to (Jickling and Wals 2008: 12, see also Payne 2010: 155). Because the authors of transformative education have maintained that education can be considered capable of enabling social transformation, the focus of their perspectives on education has been on the development of citizens' competences for social transformation (Jickling and Wals 2008, Mogensen and Schnack 2010, Wals 2010a,b). This section, 3.3, begins with the transformative educators' deconstructive perspectives on civic education and moves on to a review of the development of civic competences for social transformation (primarily resulting from citizens' participation in transformative education). The subsequent section, 3.4, concentrates on experiments and experiences as mechanisms of fashioning collective (non-monolithic) capacities [*puissance*] for non-deterministic actual changes.

Social transformation is the inherent expectation in Jickling and Wals' (2008: 8) framings of education and educated citizens, and thereafter these authors determine that the function of education is to create citizens' 'ability to critique and transcend social norms, patterns of behaviour, and lifestyles without authoritatively prescribing alternative norms, behaviours, and lifestyles' (Jickling and Wals 2008: 7). Hence, those educated citizens who are not content to accept their roles within existing frameworks need to develop an ability to articulate their criticism and transcend the institutionalised inertia of pertinent practices of power and social interaction that is responsible for outsourcing citizens' quotidian existence (Jickling and Wals 2008: 8, see also R  thzel and Uzzell 2009: 272 after Moscovici 1976). However, the chief constraint on any group of citizens attempting to transcend the 'social norms, patterns of behaviour, and lifestyles' of their outsourced human existence is that they do not have adequate resources to actualise change, even if they are willing to do so (Jickling and Wals 2008: 8). Therefore, there is a risk that those individuals and communities wishing to deal with their existential questions about life on Earth 'in a self-determined, relatively autonomous, and contextually grounded way', might become marginalised or excluded (Jickling and Wals 2008: 18-19). To prevent this, Jickling and Wals (2008: 18-19) suggest that educators need to engage in on-going academic debate and show support to non-conformism in those arenas which facilitate 'hegemonic discourses' (see also Wals 2010b: 387-8).

Educators, by definition, can and do make the difference by showing non-conformism as they participate in academic debate. Further, Wals (2010b: 385) suggests that a citizen's participation in his/her own long-standing variation on a deconstruction exercise has enabled the development of a whole range of citizens' competences (see also Wals 2010b: 387-8). An educational deconstruction exercise takes place when (usually adult) learners participate in deconstructive group discussions about the multiple ways in which citizens' quotidian lives are subsumed to the processes of nation states and capitalism (Wals 2010b: 382-5). Proponents of deconstruction exercises argue that the beneficial educational outcome of citizen participation in these exercises is 'raising awareness and developing knowledge and understanding of real world issues' (Wals 2010b: 385). A new educational outcome of citizen participation in Wals' (2010b: 385) exercise is that this exercise 'also creates opportunities for self-determined changes and actions' which add up to the more established educational outcomes of enhancing citizens' awareness, knowledge and understanding. Thus, Wals' (2010b: 385) variation on a deconstruction exercise contributes to the creation of citizens' 'ability to critique and transcend social norms, patterns of behaviour, and lifestyles' (Jickling and Wals 2008: 7).

In Wals' (2010b) deconstruction exercise, the 'real world issue' to be discursively deconstructed is a 'Happy Meal'. Citizens' opportunities for self-determined changes and actions are created because Wals' (2010b: 385) exercise contains a new educational feature: a pluralistic group of participants co-designs some relative alternatives to a 'Happy Meal'. Thus, Wals' variation exemplifies how learning processes and learning environments can 'become more authentic, inspiring, and driven by existential issues' (2010b: 382). Furthermore, it breaks down the 'disciplinary structures that block more systemic and holistic ways of looking at the world' – while simultaneously holding on to disciplinary academic knowledge (Wals 2010b: 382).

As a deconstructive educator, Wals (2010b: 385) has observed that a pluralistic group of participants co-designs better relative alternatives to a 'Happy Meal' than a group with little diversity. Based on his observations, he argues that his variation of a deconstructive learning exercise promotes those educational agendas that promote the diversity of the so called community of learners, but within the limitations the social cohesion of this group sets to diversity. Educational facilitation and design are an important part of this learning process, because 'the dissonance created by exposing learners to a wide range of perspectives is what triggers reflection and meaningful learning' (Jickling and Wals 2008: 12, see also Wals 2010a: 148). An educational precaution thus consists of nourishing respectful disagreement in order to avoid harmful group cohesion (Jickling and Wals 2008: 12, 13-14, 15 see also Wals 2010a: 148, 2010b: 382, 385). As a beneficial outcome of an educational mediation, learners' initial experiences become successfully subsumed to 'shared viewpoints or ways of thinking and feeling give the learner a sense of competence and belonging to the community of learners' (Wals 2010b: 387).

In addition to refining his academic stance as an educator who promotes deconstruction exercises, Wals (2010b: 385) is explicit in framing his educational contribution to citizens' learning, *including participation in his own exercise* in terms of advancing the development of a whole range of citizens' competences. This is essential because these competences support the inherent expectation of social transformation, and are developed throughout the learners' completion of Wals' exercise. Critics have pointed out that some promoters of discursive deconstruction have downplayed the institutionalised inertia of pertinent practices, and hence made it possible for citizens to become discursive idealists –to whom there is no distinction between what actually exists and what they discourse about (DeLanda 2008: 176-7). Therefore, it is essential that Wals (2010b: 385) frames the educational outcomes of citizens' participation in his deconstruction exercise in terms of developing 'a whole range of' citizens' competences.

Proponents of 'transformative' education identify the key debate in education as 'whether education is about social reproduction or social transformation', and for them, the inherent expectation of education is the development of citizens' competences for social transformation (Jickling and Wals 2008: 8). Many of the educators to focus on developing citizens' competences for social transformation have put the premium on the citizens' public participation, alongside citizens' ability to articulate their discontent with the institutionalised inertia of pertinent practices (Fien and Skoien 2002, Jickling and Wals 2008: 7-8, Mogensen and Schnack 2010, Rätzzel and Uzzell 2009, Wals 2010a: 147, Wals 2010b). As Rätzzel and Uzzell (2009: 272, after Moscovici 1976) explain that when citizens participate in conscious collective actions, they not only learn to 'understand and challenge societal relations, relations of production, [and] consumption and political relations', but also develop competences for social transformation. Furthermore, scholars have established that citizens' individualised choices to participate in these actions in order to fight for whatever they might want to change can be taken as indications that these citizens have chosen to put aside their vested interests for the 'common good' (Dobson 2003 cited in Hobson and Niemeyer 2011: 966). Thus, factorised citizens' individualised choices have been framed as the basis for developing citizens' competences for social transformation, but the aim of transformative education is to actualise a non-deterministic social transformation with the help of 'improved relationships between citizens and stakeholder groups' (Wals et al 2008: 62). Namely, while objectives and activities are jointly established, the 'likelihood of actual implementation of the results or plans of action is increased (Wals et al 2008: 62).

From the transformative perspective on civic education, citizens' 'forward-looking ability to modify and model the future of the societies in which [they] live' consists of 'the kinds of qualities, competences, and attributes learners need to develop when engaging in' active participation (Wals 2010b: 385-6). 'Transformative' is intended to mean 'a shift to 'a new way of being and seeing' (Wals 2010b: 385), and the perspectives of transformative education's proponents on the development

of citizens' competences for social transformation have been inspired by 'cognitive and socio-constructive learning theories' (Jickling and Wals 2008: 7). A successful transformative shift in citizens' ways of being and seeing hence enables the learners to develop the ability to critically analyse 'how they [themselves] perceive the world with a view to fostering citizen engagement with social and environmental issues and participation in decision-making processes' (Jickling and Wals 2008: 7, see also *Ibid*: 8, Wals 2010a: 148, Wals 2010b: 385-7).

A transformative shift in citizens' ways of being and seeing is supposed to be triggered when educational dissonance is 'created by exposing learners to a wide range of perspectives' (Jickling and Wals 2008: 12). In order to illustrate a transformative educator's role in this process, Wals (2010b: 382) reflected on the 'transparent world without hidden agendas' found in kindergartens, where the group dynamics of the learners and the 'real world issues' at hand can be used to create teachable moments. Thus, the emphasis is on educational moments, which are utilised to give rise to learners' transformative self-development and self-expression (Wals 2010b: 382). Because the aim of transformative adult education is to enable groups of citizens to develop competences for social transformation, there is a need for educational moments that serve this aim. Therefore, Wals (2010b: 385) states that a transformative educator needs to create 'transformative disruptions' in citizens' ways of being and seeing, by using learners own analyses of real world issues. 'After all, from a transformative perspective, education is more about teaching students how to think than what to think' (Jickling and Wals 2008: 12).

Mogensen and Schnack (2010: 64, 67) have concluded that beneficial transformative disruptions are those which, alongside the development of citizens' competences for social transformation, enable the learners to repudiate a sense of subjectivity of an 'idiot'. Non-'idiots', according to Mogensen and Schnack (2010: 64), are those who 'base their lives, [...] decisions and choices' on community and dialogue. In this sense, the way in which Mogensen and Schnack (2010: 64) frame non-'idiots' is close to how Jickling and Wals frame their educated citizens of social transformation as 'democratic practitioners'. Because 'democracy is [...] a mode of associated living, of conjoint communicated experience', educated citizens of social transformation enact 'democratic practices in a caring community that shares features with other communities but is also unique' (Jickling and Wals (2008: 8). Therefore, the role of a transformative educator is to help the learners to alter their sense of subjectivity in such a way that 'transformative disruptions' both enable citizens' development of competences for social transformation, and also to think like a non-'idiot' (Jickling and Wals 2008, Mogensen and Schnack 2010: 64, Wals 2010b).

Even though neither Agrawal (2005) nor Surin (2010) have been directly allied with those authors who promote transformative education for citizens' development, they have promoted education as a means of altering the sense of subjectivity of the citizens. Agrawal (2005: 163) has discovered that

learners who acquired power over environmental management procedures transformed their sense of subjectivity to conform to their new roles. Thus, for him, the role of education has been to help create what he calls ‘environmental subjects’ (Agrawal 2005). Surin has suggested that, in order to enable social transformation, the role of civic pedagogies is to alter citizens’ sense of subjectivity and to ‘produce’ transformed action citizens ‘who strive to emulate Rosa Luxemburg or C. L. R. James’ (2010: 457).

Some educational success stories have also been told about how citizens’ collective transformation into capable organisers of neighbourhood activism was enabled by their public participation in inclusive collective activities in the social context of their neighbourhood (Armstrong 2000). As discussed earlier, some scholars of transformative education have promoted pluralism and heterogeneity as preconditions for citizens’ beneficial development (compared to citizens’ learning, which takes place within a relatively non-diverse group) (Jickling and Wals 2008, Wals 2010b). In addition, the focus of transformative educators has been on ‘caring’ communities as social contexts for the groups of non-‘idiots’ to enact democratic practices (Jickling and Wals 2008, Mogensen and Schnack 2010: 64). This focus facilitates education that subsumes communities to the predetermined civic divide and, accordingly, to turn the alleged individualised ‘idiots’ into their counter-citizens: educationally transformed non-‘idiots’ by definition prone to accumulate the action competence for the projected profound transformation of capitalism and states. Provided that there are different preconditions for different social contexts, there hence seems to be an *a priori* difference in opportunities for groups of citizens to participate in education that develops their competences for social transformation. Ferris et al. (2001) have noted that opportunities for citizens to participate in public activities of inclusive group learning in their neighbourhood mirror the pluralism and diversity of the neighbourhoods themselves.

Notwithstanding the diverse opportunities for citizens to participate in learning within their social context, the scholarly debates have established that it is beneficial for the development of citizens’ competences for social transformation when their daily environments and phenomena are utilised as sites of education (Blewitt 2006: 99, 114, Fernandez-Gimenez et al. 2008). When transformative teaching and learning takes place in these environments, ‘knowledge and understanding are co-constructed within a social context...by transacting with prior tacit knowledge, the curriculum, and other learners’ (Jickling and Wals 2008: 7). In addition, the promoters of transformative education say that there is also ‘some space for autonomy and self-determination on the part of the learner’ (Jickling and Wals 2008: 7). Because it is important for participants to ‘see the immediate [‘tangible’] results of their efforts’, a transformative educator needs to mediate learning ‘by continuously creating positive feedback loops showing that [actual] change is occurring even when it seems that nothing is changing’ (Wals et al. 2008: 62). Thus, educational facilitation and design shows participants that when ‘objectives and activities are jointly established [the process of jointly establishing them] this

increases the likelihood of the results or plans of action actually being implemented' (Wals et al. 2008: 62). Consequently, citizens' participation in the transformative teaching and learning that takes place in their daily environments provides them with an opportunity to develop their competences for social transformation within their social context.

A popular educational strategy has been to mobilise the social and environmental 'icons' of citizens' daily environments, such as flora to be protected, in order to attract widespread participation in collective actions and activities which have been established to facilitate citizens' learning (Lawrence 2006: 291, Mueller 2009: 1051, Rätzl and Uzzell 2009). This reflects the educational emphasis on public participation of non-'idiots' in their social context, which is the way in which they develop competences for social transformation. In addition to these 'icons', since the 1980s, transformative educators have framed community gardens as educational sites for 'cultivating cultivators', because such environments provide a social context for collective participation in public activities (Armstrong 2000, Ferris et al. (2001), Holland 2004, Monroe et al. 2007, Pudup 2008). Since more than half the global population inhabits non-rural areas, 'urban' opportunities for the educational development of citizens' competences for social transformation are of notable academic concern (Wals 2010a: 148, see also Yli-Pelkonen 2008). Consequently, scholars of transformative and other types of environmental education, have also promoted the less pristine green areas as important sites for developing urban citizens' competences, including 'food sovereignty', for the projected social transformation (Davila and Dyball 2015).

Kollmuss and Agyeman (2002: 242) have argued that citizens' group learning for social transformation in their social context might take place on those occasions when participants directly experience environments. This perspective can be supported with the proposition that 'less pristine' green areas need to be given an educational role as environments for citizens' development of competences for social transformation. Notably, Wals (2010a: 148), one of the main authors of transformative education, has also been concerned that those who have an opportunity to directly experience 'more pristine' forests in the social context of their living and use, might not associate their initial experiences with the need to accumulate the predetermined action competences for the projected transformation of capitalist nation states. He has stated that citizens' direct experiences with environments might need to be educationally facilitated and designed in order for these experiences to bring about the transformative development of citizens' competences, and thus the inherent expectation of education: the projected social transformation (Wals 2010a: 148).

In order to establish the importance of educational facilitation and design, Wals (2010a: 148) has criticised Sandell and Öhman's (2010) study on group learning of radical outdoor practices; he has criticised them because he perceives that they lack transformative mediation. Whereas, because the participants of Sandell and Öhman's study directly experienced the 'more pristine' environments,

Wals (2010a: 148) surmised that these learners' initial experiences 'might very well lead to a narrowing of perspectives or a romanticizing of the outdoors if these experiences 'lack reflexivity and/or are disconnected from everyday life'. Thus, Wals (2010a: 148) has suggested that, because people might not be able to make educationally appropriate meanings out of their initial experiences, citizens' 'transformative disruptions' in their ways of being and seeing depend on how their experiences are mediated (see also Wals 2010b: 385). However, if facilitation and design of mediational education are able to create 'transformative disruptions', citizens' initial experiences might become 'significant and transformative life experience[s]' (Wals 2010a: 148, see also Wals 2010b: 385).

Wals' (2010a: 148) emphasis on educational facilitation and design leads him to propose that transformative educators might be able to create 'similar transformative experiences [...] without having to go to a pristine and relatively 'untouched' outdoor area' (Wals 2010a: 148). This proposition promotes the 'less pristine' urban green areas of local neighbourhoods on condition that citizens' 'transformative disruptions' in their ways of being and seeing 'will very much depend on how [...] these experiences are mediated' (Wals 2010a: 148, see also Wals 2010b: 385). However, whereas participants of Sandell and Öhman's (2010) study were directly experiencing environments, Wals' (2010a: 148) proposition also negates the presumed non-human agency of the environment the humans are experiencing. After all, according to Wals (2010a: 148) educational mediation might be able to create similar 'significant and transformative life experience[s]' regardless of whether the participants directly experience a 'more pristine' environment or a 'less pristine' urban one.

From the transformative perspective on education, citizens' daily environments fulfil their role as sites for transformative teaching and learning when they provide 'spaces for social learning' (Heymann and Wals 2002). The outcomes of social learning are likely to benefit transformative development of citizens' competences for social transformation in their social context, when a space for social learning includes:

space for alternative paths of development, but also alternatives to 'development' itself; space for new ways of thinking, valuing and doing; space for participation minimally distorted by power relations; space for pluralism, diversity and minority perspectives; space for deep consensus, but also for respectful dissensus (Koppen et al. 2002); space for autonomous, deviant, disruptive and counter hegemonic thinking; space for self-determination; and, finally, space for contextual differences (Wals 2010a: 147).

Thus, Wals' space for citizens' development of competences for social transformation is framed in such a way that it supports his emphasis on educational facilitation and design (2010a: 147-148), and is consistent with the arguments Jickling and Wals (2008) make when they critique 'the globalizing language and discourse of [education for sustainability development]' (Payne 2010: 155).

According to the foremost authors of transformative education, citizens are likely to experience ‘false freedom’, if their experiences are dissociated from the inherent expectation of social transformation, including the need for their transformative development of competences (Jickling and Wals 2008: 10). These scholars have identified that (mechanically enslaved) citizens’ experiences of false freedom consist of ‘a limited, or false, sense of control over their future and their ability to shape the future while in fact authorities of all kinds remain in control’ (Jickling and Wals 2008: 10). Thus those citizens who experience false freedom are like prisoners who imagine that they are already free (Holloway 2002: 167). Although it is ‘an attractive and stimulating idea’, imagined freedom is nevertheless ‘a fiction that easily leads on to other fictions, to the construction of a whole fictional world’ (Holloway 2002: 167). In order not to mediate experiences of false freedom, a transformative educator needs to create those ‘transformative disruptions’ which contribute to the function of education; that is, to create citizens’ ability to critique and transcend the institutionalised inertia of pertinent practices of power and social interaction (Wals 2010b: 385, see also Jickling and Wals 2008: 7).

The inherent promise of educational strategies that tie up citizens’ public participation with citizens’ educational development of competences (to critique and to transcend), has been that the ‘struggle and failure’ of an active citizenship sustains an accumulation of competences for social transformation, and this process keeps a ‘long revolution’ going (Surin 2010: 456-7, see also Rätzl and Uzzell 2009: 272 after Moscovici 1976). A radical socio-environmental change in the long term – a ‘long revolution’ through incremental steps of slow iterative learning (not unlike a spiral staircase) – is possible via the accumulation of citizens’ competences for social transformation, because these competences reside in citizens’ collective ‘norms and networks’ (Kilpatrick and Falk 2003: 501 see also Bull et al. 2008, Fien and Skoien 2002: 270, Miller and Buys 2008, Wals et al. 2008: 57-58, White et al. 2009). Because the relations of socio-cultural, economic and ecological systems are changing in such a way that the complexity of the institutionalised inertia of pertinent practices well exceeds its dimensions, some academics have estimated that the need for radical socio-environmental change provides a ‘multi-generational challenge’ of sustaining a momentum in accumulating citizens’ capacities for change (Bulkeley and Moser 2007). Thus, many educators have sought social transformation through empowerment of individualised choices to participate in (pro)active citizenship (Ferreira 2009: 612).

Some critics have observed that citizens need empowerment because they feel cynicism, fear and apathy, and there is a general plateauing of conscious collective actions instead of a collective awakening of those revolutionary passions that are tied up with citizens’ public participation in collective ‘struggles and failures’ (Macnaghten 2003, Mueller 2009). According to critics, these interconnected feelings and inactions take place when citizens can understand with their sober senses the ‘scope’ of their conjoint capacity for profound change amidst the pertinent (i.e., global) root

causes and the interconnected relations of human impacts (Macnaghten 2003: 79). This finding is worrying for those who promote the public actions of citizens' conscious collectives as a sufficient form of not only civic education, but also politics, to have an effect on the institutionalised inertia of pertinent practices of power and social interaction. This is not least because the public actions of citizens' conscious collectives have been framed as an answer to the privatisation of decision making, which, according to critics, has sustained the institutionalised inertia of the *status quo* (Sandler 2010: 167).

3.4 Concluding remarks

The promoters of transformative civic education have put a positive spin on the projected (ac)cumulative learning of educationally transformative practitioners, communal non-idiots, who have been subjectified as the Deweyan vanguard-citizens of social transformation and contrasted with those subjectified as 'idiots' of social reproduction. Conversely, idiots need civic environmental education in order to learn how to think as well as how to intentionally change their individualised Gestalts: volition and cognition or senses of subjectivity (Jickling and Wals 2007, Wals 2010a, 2010b). Accordingly, these authors have established that the consequent 'function' of civic/environmental education is to '*creat[e]* the ability to critique and transcend social norms, patterns of behaviour, and lifestyles without authoritatively prescribing alternative norms, behaviours, and lifestyles' (Jickling and Wals 2007: 7, emphasis my own, see also *Ibid.*: 12). Wals (2010b: 385) has elaborated this function by subjectifying all the educable citizens as im/moral agents of change who would obtain the essentially human competence to 'create[]' more and better 'opportunities for self-determined changes and actions' if only they would participate in that transformative (environmental) education which enables them to develop the deconstructive 'awareness', 'knowledge', and 'understanding'. Furthermore, the promoters of transformative civic education have established that the in-group transformative education/learning of the educationally preferred citizens subjectified as Deweyan "democratic" non-'idiots' is more likely than anything else to signify that these conspicuous citizens of social transformation are actually (ac)cumulating the vanguard action competence to bring about citizen-led deep change. This (ac)cumulation is yet to be recognised by academia, but, according to the transformative authors' projections, it is more likely than not that the conspicuous citizens of social transformation, who are publicly not 'obedient, deferential, and compliant', are not themselves profoundly hindering this (ac)cumulation; notwithstanding that, additionally, these non-'idiots' participate in the actual individualising of institutions of the States' and Capitalism's unintentionality on quotidian bases (Jickling and Wals 2007: 8).

As illustrated in Jickling and Wals (2008: 9, 10), the transformative educators' axis of subjectification stretches from the educationally preferred citizens of social transformation to the citizens of social reproduction who have been subjected to the necessity of their educational transformation and (see also *Ibid.*:

7-8, 12, 18, Mogensen and Schnack 2010: 64-5, 67, Rätzzel and Uzzell 2009, Wals 2010a, 2010b). To educationally transform the ‘idiot’-citizens’ volition and cognition serves as the utmost precondition for the deep actual change, because these intentionally im/moral citizens have been subjectified as those who are yet to learn to put aside their vested interests and move beyond self-interest to the socio-ecological common good (Jickling and Wals 2007: 8). On the other hand, citizens’ individualised ‘choices’ to publicly act as the Deweyan reformative characters have been taken as emblems most likely to signify that these non-‘idiot’-citizens of social transformation are the ones whose in-group education/learning is most likely to make them competent to obtain the actual full resources and enforce in person the deep Ostromian institutions, that is, their ‘democratically’ self-determined rules, norms, and sanctions. Given the self-sufficiency of Deweyan/Ostromian groups, these Ostromian institutions are, in turn, presumed to enforce the, so called, common good for every human of each group as well as these groups’ (socio-)ecological contexts, on the condition that every human obeys the self-determined rules, norms, and sanctions as established by the ‘democratic’ decisions of these groups (Jickling and Wals 2007: 8, see also Mogensen and Schnack 2010). It is noteworthy that the authors of transformative civic education have withdrawn from discussing the actual prospect that groups-empowered citizens ‘wishing to deal with [their existential] questions in a self-determined, relatively autonomous, and contextually grounded way’ might personally enforce some institutions, other than those which bring about the actual common good for all the obedient members of Deweyan/Ostromian groups alongside their (socio)ecological contexts (Jickling and Wals 2007: 18).

Because the (ac)cumulative educational steps taken by those citizens subjectified as Deweyan “democratic” non-‘idiots’ possessing the educationally preferred Gestalts are, by definition, more likely than not to bring about the deep *actual* institutions of the socio-ecological common good, these educationally preferred vanguards are to lead the reforms-based iterative way to that actual change which is by definition deep yet *not deterministic* (Jickling and Wals 2007: 8, see also Mogensen and Schnack 2010, Rätzzel and Uzzell 2009, Wals 2010a, 2010b). Consequently, the transformative axis of significance projects the (ac)cumulation of the yet-to-be-established action competence for the well-cited citizens-led change. The promoters of transformative civic education have hereto maintained that subjectifications of individualised educable practitioners as citizens of social transformation to be educationally transformed and as citizens of social reproduction heralding the educationally preferred struggle and failure, justify the analytical judgements whether the human in-group learning might signify the actual (ac)cumulation of the overdue action competence for the deep *non-deterministic* change.

Yet, to *not* collapse the profound critique to the material-discursive ubiquitous capitalism, which is regulated by the communally oriented nation states, with the actual indeterminacy of the relational sociomaterial changes means that there are neither ontoepistemological nor methodological grounds for a scholar promoting an actual radical/deep change to subsume the machinically enslaved citizens to the transformative educational prescriptions of how a deep non-deterministic change might and might not happen.

Deep actual change in the institutionalised *status quo* is needed, and therefore experiments and experiences as mechanisms of fashioning capacities [*puissance*] for non-deterministic actual changes should not be underestimated. Experiments as the *modi operandi* of transformative (socio-environmental, civic) education have been promising. However, the scholars of this transformative education have mainly forgotten that the collective agency of experimenting goes beyond ‘conscious’ ‘human’ capacities for a non-deterministic change. Conversely, the educationally transformed citizens have only struggled and failed in evidently (ac)cumulating the meaningful “democratic” competences for an actual deep change. To not disguise the participation of these communal citizens in daily social reproduction, illuminates the gap between the ideal learning outcomes of citizens’ group-based interactions and the need to study the actual non-deterministic changes in organic–cum–non-organic contexts that are explicitly socio-economic-ecological, because they are sociotechnical, such as urban. To heed and discuss this gap and its consequent effects on methodological choices as well as scholarly analyses is important, because most of the contemporary contexts for citizens’ quotidian interaction (including learning) have been explicitly, instead of indirectly, subsumed to the axiomatics of capitalism as instantiated by the regulation of nation states. While transformative agendas have framed the educational transformation of subjectified citizens’ individualised volition and cognition as the necessary precondition for their proneness to (ac)cumulate the actual action competence, it is yet to become academically evident as to how and why it is that the educationally preferred citizens’ educationally preferred actions do build up to their actual competence to obtain the Ostromian full resources in the context of ICTs (Benkler 2006, 2013).

The need for a deep actual change in the institutionalised inertia of pertinent practices of power and social interaction forms the basis for reviewing the literature presented in this chapter. In Section 3.2, the un- and mis-educative approaches to civic education are criticised for moving from the earliest perspectives of ‘awareness to action’ to the concurrent ‘educational’ practices of moralising the (usually globally) ‘networked’ citizens to make individualised choices to fight for our common future. Section 3.3 began with the transformative educators’ deconstructive perspectives on civic education, and continued with analysis of transformative education’s approaches to the development of citizens’ competences for social transformation.

Whereas (machinically enslaved) citizens lack full resources for change, the prevalent perspectives on the development of citizens’ competences for social transformation have emphasised the public actions of citizens’ conscious collectives both as a form of civic education and as a form of politics. To promote social transformation, the authors of transformative education have critiqued the globalising language and discourse of un- and mis-educative forms of civic education, and established that the function of education is to create citizens’ ability to both critique and transcend the institutionalised *status quo*. However, the capacity [*puissance*] of (machinically enslaved) citizens to actually transcend the institutionalised inertia of pertinent practices of power and social interaction is

not only conscious. Accordingly, although there is an institutionalised lack of resources with which citizens can substantially change their quotidian existence (even on those occasions when the citizens are willing to do so), this does not necessarily need to imply that non-deterministic actual change benefits only from conscious human capacity for change.

Scholars of transformative (socio-environmental, civic) education have promoted the educational strategy of tying human passions to those civic aspirations that build on people's wish to deal with their existential questions about life on Earth in a self-determined, relatively autonomous, and contextually grounded way. Thus, these authors have promoted experiences as a mechanism of an actual change, on the condition that connected human passions advance the development of conscious human' capacities (for non-deterministic change), functioning as a vanguard in transcending the institutionalised *status quo* that constrains the existence of machinically enslaved citizens. Therefore, unconscious collective actions have not been framed as essential for a deep actual change in society, even though critics have identified that it is necessary to move beyond the feelings and inaction that are caused by citizens' diminished sense of agency amongst the institutionalised inertia of pertinent practices.

The inherent expectation of transformative (socio-environmental, civic) education has been that experiential experiments, as the *modi operandi* of education, are beneficial for a non-deterministic actual change in the institutionalised inertia of pertinent practices of power and social interaction. However, whereas the capacity [*puissance*] of experimenting to actualise creative connections of the virtual is that of assembling, this capacity for change is always non-monolithic, explicitly collective, and not merely 'human' (and, goes beyond conscious human capacities to enact a non-deterministic change) (Deleuze and Guattari 1987). Therefore, there is a need to discern whether there are other kinds of collective agencies that might create masses with collective non-monolithic capacities [*puissance*] for non-deterministic actual change.

This section concludes the chapter by outlining the importance of collective experiments and experiences as mechanisms of fashioning collective non-monolithic capacities [*puissance*] for non-deterministic actual changes. The following discussion provides the necessary backdrop for understanding why ontoepistemological relational education provides an answer to the insurmountable challenges of civic education that promotes differences in comparison, including the presumption of the dichotomous citizenship. As discussed in this chapter, as well as in the previous ones, deep actual change in the institutionalised inertia of pertinent practices of power and social interaction is needed. Yet, citizens lack the full resources to enact change in their daily existence despite their willingness to do so. The main arguments of transformative education literature, discussed in this chapter, critique the globalising language and discourse of what they refer to as un- and mis-educative forms of civic education (reviewed in Section 3.2) (Payne 2010: 155). In addition,

the authors of transformative educational perspectives on non-deterministic actual change have identified that socio-environmental civic education may need to be indirect, because environmental problems are characterised by indeterminacy and non-intentionality (Wals 2010a,b,). The *modus operandi* of transformative education has been to conduct experiential experiments with individuals and communities wishing to deal with their existential questions about power and social interaction ‘in a self-determined, relatively autonomous, and contextually grounded way’ (Jickling and Wals 2008: 18, see also Fernandez-Gimenez *et al.* 2008, Sandell and Öhman 2010). The inherent expectation of transformative (socio-environmental, civic) education has therefore been that experiments provide opportunities to develop capacities [*puissance*] for actual change in the institutionalised inertia of those practices, which overwhelm the human existence during its lifespan.

As discussed in the previous section (3.3), the primary interest of civic education scholars on the social transformation side of the debate has been in the development of citizens’ joint capacity as ‘democratic practitioners’. In addition, the authors of transformative (socio-environmental, civic) education have focussed on those experiential experiments which might tie human passions to more and better joint civic actions (Jickling and Wals 2008: 7-8, Wals 2010a,b). These authors reflect the oft-indicated perspective (see Section 3.3) that, in the absence of intentional inter/national policies, citizens’ public participation is a sufficient form of both politics and education that aims at developing the citizenship of joint actions (Sandler 2010: 167). In addition, the educational strategy of tying collective actions and desires to civic aspirations acknowledges that human experiences might fuel the collective changes of society. For instance, Fernandez-Gimenez *et al.* (2008), who studied experiential experiments of ecological monitoring, were able to show how volunteering participants’ passions got bound up with actions that promoted informal and communal processes as a basis for successful socio-environmental regulation and enforcement. Under the transformative agendas, then, citizens’ educational transformation from ‘idiots’ to Deweyan “democratic” non-‘idiots’ can and should be advanced by subsuming all those citizens enthusiastic to experiment with(in) “their” socio-(economic)-ecological contexts to those educational practices of mediation, facilitation, and design which create transformative educational experiences and, by definition, ‘*shared* viewpoints or ways of thinking and feeling’ (Wals 2010b: 387, emphasis my own).

The studies that promote the tying of revolutionary desires to the aspirations of joint civic actions epitomise the inherent educational expectation that when humans experience an increase in their capacity to act, it is beneficial for fashioning a collective change in society. Anderson (2009: 77), who takes his inspiration from Marx, describes a collage of these experiences as an atmosphere which weighs like a force of 90 Kilonewtons, but which can hardly be felt before a spark ignites a spontaneous infection. Therefore, whereas human experiences of increase in the capacity to act are beneficial for fashioning a collective change of society, a non-deterministic actual change is based not merely on conscious collective actions.

Whereas a spontaneous infection propagates a change in institutionalised pertinent practices, the power of masses which fashions society is not fully conscious. Because non-deterministic actual changes in society cannot emerge without unconscious collective action, experiments and experiences, as mechanisms of fashioning collective non-monolithic capacities [*puissance*] for these changes, should not be underestimated. Thus, the authors of transformative education have not devoted much attention to the role of affect in going beyond conscious human capacities to enact a non-deterministic change.

A human capacity to experience is constituted in all the possible registers: physical, chemical, biological, neural, and social (Deleuze and Guattari 1987). However, the reference point for an *affect* is not a Cartesian fully conscious human being who is a singular object of analysis (Navaro-Yashin 2009: 12, Pile 2010). Instead, (according to the originally Deleuzian interpretation of affect), affects may move through human bodies, but do not necessarily emerge from them (Navaro-Yashin 2009: 12, Pile 2010). This radically altered and multiplied approach makes it possible to read many things, such as space and the environment, as consisting of non-human agencies that participate in human experiences (Deleuze and Guattari 1987, Navaro-Yashin 2009).

Affects (not feelings, or sentiment, which are introspective) might provoke the conscious ‘I am’ to leave its habitual(ised) home [chez sois] or abode – including its sedentary feelings of familiarity (Deleuze and Guattari 1987). Therefore, affects form an engine for those experiences which might sweep the sedentary ‘I am’ to participate in those surges of becoming collective actions which might elude determination (Deleuze and Guattari 1987). This aspect is noteworthy because, as discussed in Section 3.3, some academics have concluded that feelings which relate to citizens’ diminished sense of agency (amongst the institutionalised inertia of pertinent practices) plague conscious collective actions (Macnaghten 2003, Mueller 2009).

According to Deleuze (1995: 176), for actual non-deterministic change, we need both creativity and people. Deleuze and Guattari’s (1987: 252, 512, 513) pragmatic advice is to experiment in order to actualise ‘creative connections’ that might elude axiomatics. Because the non-actualised creative connections of the virtual are ‘real without being concrete, actual although not effectuated’ (Johnston 2008b: 120) it is not apparent which ways of pushing beyond thresholds would help the assembling agency of experiments to actualise creative connections of the virtual real. In short, whereas it cannot be reliably predicted how a bifurcating real future may unfold, ethical experimentation (St. Pierre et al. 2016) is needed for fashioning collective non-monolithic capacities for non-deterministic socio-environmental change. Since the deep actual change in the institutionalised inertia of pertinent practices of power and social interaction is needed, there is hence a need to explore whether there are other kinds of collective agencies with creative capacity [*puissance*], power [*puissance*] for short, for non-deterministic actual change. These are analysed these in the following chapters.

4 Collective agency and change in the control society

4.1 Why and how relational ethics, education and micropolitics matter

New Materialist and Deleuzoguattarian understandings answer to the 21st century need to understand and change control societies (Deleuze 1992: 6), most notably, the on-going investments in transitions to algorithmic control societies with algorithmic capitalisms and governmentality. They do so because they don't ignore how communities reproduce those socio-economic hierarchies that undergird the machinic economies of capitalist state. Not only do such communities produce goods for, and consume goods from, local and global 'traditional' markets (Wu 2012), but they also generate data for algorithmically enhanced markets, merging offline data like location information or electricity usage with online data like clicks and purchases. Such algorithmically enhanced markets are enhanced by the smart infrastructure that embeds algorithms in technologies and practices, for example, to enable communal management of pooled energy resources. In this way, 'democratic' communities generate marketable data for machinic economies as they enforce 'self-determined' rules, sanctions and rewards for their common good. They are, as it were, controlled and self-controlled. This mechanism of communal control functions as a distributed and voluntary system of micro-management, subsuming community members in a decentralised architecture of communal 'divide and (self-)rule'.

This communal control applies a logic of pre-emptive algorithmic agency – of protocols – to bring about this common good, this 'real'. It harnesses the capacity of algorithms to 'learn' as well as to create value. For example, communities who manage energy resource pools directly benefit from working to secure energy as a reliable resilient good and learning to this end. As a result, they are more likely to implement communal rules like 'do your laundry only when the windmill is turning'. In this example, the 'unmanageability' of the wind is conjoined with the 'manageable' bodies of community members through rules, sanctions and rewards about when, where and how to produce and/or consume energy. Thus, any pre-emptive algorithmic agency carries with it an explicit danger that it incorporates community members to harness their 'knowing in being' (Mazzei 2013).

Algorithmically enhanced contexts such as online or smart communities comprise social, economic and ecological relations: highly distributed, interdependent networks that are agentic and constantly changing, and at once material and discursive. Education for 'real world' change, change that 'makes a difference', needs to take account of the nature of these networks. New Materialist and Deleuzoguattarian understandings can do so because they can account for more-than-human collective actions. To take one example, voluntary civic self-regulation for others' ends presents a problem for online or smart communities – though such control might oppress the community members less than many other forms of control. It demonstrates how institutional affordances and constraints for change and those bodies affected by them are interdependent, or 'intra-active' (Barad, 2003). That is, though

the relational agencies at work in the community are changing that ‘real’ world of which they are part, the agencies themselves are always under change. This requires a certain ethical stance: because no difference (or ‘making a difference’) can be taken as pre-given, in that it entails an on-going process of differing (non-deterministic change), we are required to think ‘within difference, of a difference that makes a difference’ (Colebrook 2015: 139). We must think about power in ways that reject predetermined modes of significance and subjectification (Deleuze and Guattari 1987: 13) and predetermined methodologies and agencies (Barad, 2003). We must assume that the material-discursive ‘real’ consists of agentic phenomena that entail intra-actions: ‘differing in the making’ (Lenz Taguchi 2016, after Deleuze and Guattari 1987: 513). Matter is neither passive nor subject to human agency.

To turn now to the data from this study: a participant qualified how agencies of networks and algorithms are part of any material-discursive change. According to them, attempts to force matter, for example, executable programming code, into a pre-set form are unlikely to succeed. ‘I would say that not one single game is developed so that you have an exact floor plan and [...] then you proceed according to the plan’ (L.W.). Their description fits with how Deleuze & Guattari (1987: 454) conceive of the agency of an itinerant craftsperson, who, like an artisan or a metallurgist, discovers ways of pursuing their craft as an ambulant nomad might. This compares to the architect who follows a floor plan in order to make matter (say, a piece of wood) conform to a pre-set form (say, a wooden window frame or a blueprint). In other words, hylomorphic practices (practices that assume a separation of form and matter) at the nexus of agentic networks and algorithmic agencies are most likely to be ineffective. Thus, participants’ intra-actions with algorithmic agencies do not support material-discursive engineering; rather, they entail learning with a relational ‘real’ in the making, that is, education about collective agency and differing in the making. But this learning does not mean that the participants can assume a transformative educational leadership role in their communities.

According to the participants, although they can understand how the capitalist state’s investments have characterised their communal contexts both off- and online, this critical understanding has not translated into more and better opportunities for their communities to challenge the status quo. They cannot ignore that it takes communal agency to perform the socio-economic, racial and gendered hierarchies that undergird the political and ethical status quo, nor can they pretend that these hierarchies can be transformed independently of that which affords and constrains change. They cannot forget that communal enforcement of ‘democratic’ decision-making, self-determination and control (via rules, sanctions and rewards) explicitly carries with it the danger of micro-fascism: ‘self-evident truths, and clarities’ (Deleuze and Guattari 1987: 228). Furthermore, even if participants fully account for their compromised position, they cannot claim that their educational leadership creates the conditions for transformation. They cannot act on an epistemic entitlement to transform their peers into educated citizens who ‘are not idiots’ (Mogensen and Schnack 2010). In short, they cannot

declare that their communal ‘struggle and failure’ brings about that ‘long revolution’ and hoped-for common good. Consequently, they cannot conceptualise the ‘real world’ in terms of their moral right to characterise, categorise and criticise others as those who have or have not put aside their so called vested interests. Contra to the straightforward transformative agenda of environmental education, the participants cannot claim the moral high ground of transformative citizenship. This compromises their agency as ‘natural’ civic educators.

For instance, the participants stated that, as game developers, they cannot ignore that their personal desires and capacities for transformation are unlikely to transform the ‘real’ world; that their livelihoods are complicit in sustaining algorithmically enhanced markets with far-reaching political and micro-political effects; nor that these markets feed off communal action, not on supposedly individual actions. For instance, the discussion¹⁰ of D.P., D.T. and O.A., which continues in the excerpt quoted below, exemplifies how the participants have acknowledged that any infrastructure runs on ‘real’ socio-ecological effects that are not simply localisable notwithstanding whether a community, (such as the local independent game developers), pursues an agenda, (such as that all the ICTs run on energy drawn from the renewable resources), against a capitalist state, (such as the USA that governs against legally-binding global regulations pro climate). But they also acknowledged that they are complicit in sustaining a communally oriented state capitalism that feeds on communally created value – including the value that any joint civic action creates for the ends of surveillance capitalism and state surveillance.

D.P.: I would assume that during the next 20 years we resolve the energy supply issues because there is no other option. [...] But more than that, I would be worried about the society embedded with ubiquitous computing, because it is not at all clear whether there is cyber security or any actual safeguards to free speech, such as, who owns it, who manages it?

O.A.: I agree. Say, for instance, we [the medium-sized independent game development company based in Finland] did something that might be classified as corporate social responsibility, we would probably focus on something like that.

D.T.: I do as well. For instance, I had to read several times the piece of news stating that the NSA [the National Security Agency] is spying the gamers through Angry Birds client

¹⁰ D.T.: If there is no renewable energy available [...] as a marketing stunt the major service providers buy the power companies by the Hudson River just to claim that ‘we own green energy’.

O.A.: But isn’t it so that since the 1990s, corporate social responsibility has been a PR stunt.

D.T.: Sure is, but what are its limits ... the supply chain, and the power companies acquire the supply chain. Everything conclusively works the same way.

O.A.: Like, for example, [...] the packaging industry: all the products are imported in minimal packaging made of renewable materials etc.

D.P.: That said, as long as we keep thinking in product life cycles, I would prefer reparable Apple products. [...]

[software]. Say, we had a similar hugely popular game, the community of millions, even hundreds of millions, of gamers with our client in their user-end device – that [the NSA’s spying through one’s client software] would truly matter.

In short, as Cluley and Brown (2013: 118) put it, ‘the effort to not perform yourself as a data trace is no less easier than choosing not to perform a gender’. There is no outside of machinic economies: there are no transformed communities that offer access to ‘some great feminist [or post-capitalist] beyond’ (Colebrook 2015: 137). Nevertheless, we need to understand how citizens’ agencies are making a difference in the institutions that afford and constrain their agency.

New Materialist authors reject the concept of the sovereign individual agent who has the right to transform learners into agents of social transformation. Rather, they account for change, for making a difference, through the concept of learning as a continuous process of becoming-other (Lenz Taguchi 2016). They do not conceive of critical thinking ‘as the product of detached, “reasoned” bodies competing with each other for intellectual supremacy’ (Danvers 2016: 294). Nor do they claim an epistemic entitlement to teach learners ‘how to think, how to experiment, how to tip an assemblage toward the plane of immanence’ (St. Pierre et al. 2016: 106). Advocates of transformative education have hitherto thought differently. They have aimed to teach citizens how to think enable them to critique and transcend the real world (Jickling and Wals 2008: 7, 12). They have assumed that civic collective agencies replicate the dichotomy between educationally transformed citizens and ‘idiots’ (Wals and Dillon 2016): educationally transformed citizens are those who enforce communal control and resources management (while ignoring how their communal actions create value for the capitalist state); ‘idiots’ are those who are excluded from collective agency on the grounds that they are not educationally transformed citizens. This framing is supposed to contradict the dread and paralysis that non-‘idiots’ might feel in the face of wicked global problems, but, in fact, it robs them of their agency.

We might gainfully ask how collective agencies can make a difference – or, first off, why contemporary approaches to understanding agentic networks have not come up with a convincing answer to this question. The Actor Network Approach traces relational networks of actants, but does not account the power of institutions to resist change. Non-representational approaches take the related ‘leitmotif of movement and work with it as a means of going beyond constructivism’ (Thrift 2008a: 5). They emphasise how citizens’ agencies for change may be manipulated because the politics cuts across relational networks (Jones 2009) and the commodification of relations is located in the ‘half-second delay between action and cognition’ (Thrift 2008a: 243). This obscures the power of micropolitics to make a difference. In addition, any approach that focusses on things as agents ‘feels at odds with philosophies of education that are opposed to consumerist discourses of knowledge’ (Danvers 2016: 294). But practices matter because they entail micropolitics as they actualise a material-discursive ‘real’: politics is done in practices that are usually designated as ‘labour’, ‘work’

and ‘action’ – although these three ways of assembling the ‘real’ world are often difficult to disentangle (Law and Mol 2008: 141). In short, the power of practices makes a difference because any practice is a type of collective relational agency that is never only human, nor fully conscious, nor individual. In what follows, I unpack each of these aspects of collective relational agency.

4.2 Relational approaches to agentic networks that include humans and non-humans

4.2.1 The Actor Network Approach: Tracing relational networks

The literature on achieving positive socio-ecological change has foregrounded how citizens’ actions make change. But little advice has been given on how to make the connections between actions and change visible. The most popular approach over the past twenty years – the Actor Network Approach (ANA) (Callon 1986; Latour 1986; Latour 2005; Law 2007) – aims to understand the complex linkages between humans, institutions and technologies as networks that allow for the tracing of connections. ANA contests the ‘anthropocentric tendency’ of social sciences, according to which the ‘agentic power of human-nonhuman agencies (e.g., of artifacts, weather, conscious desires) appears as merely an effervescence of the originary agency of persons’ (Bennett 2005: 455). In addition, it also contests the ‘linguistic turn’ associated with post-structuralism and deconstruction (Navaro-Yashin 2009: 9). Instead, it focusses on relational thinking, which in part accounts for its impact in the social sciences and human geography (Bergmann et al. 2009: 266; Fuller 2006: 45, 58; Jones 2009: 492).

The Actor Network Approach’s ‘sociology of translation’ (Schillmeier 2009: 90) imagines relational networks as constantly maintained, but also disrupted, by human and non-human actants (Callon 1986; Latour 1986, 2005; Law 2007). It uses the term ‘actant’ instead of ‘actor’ to emphasise that both humans and nonhumans possess the capacity to act. It understands the social as not an explanatory variable, but as liable to change in the (re)production of these networks (Schillmeier 2009: 90). Actants’ acts connect to form Nature-Society hybrids (Latour 1993: 138-142). The systematic tracing of these connections allows us to examine the world without preconceptions as to the nature of the connections (Callon 1986; Latour 1986; Latour 2005; Law 2007). But the ANA does not account for the micropolitics that makes an ethical difference in institutions. The power of institutions to constrain and afford change remains implicit. Although ‘centres of calculation’ like power plants or programming labs exist that stabilise ‘truths’ and ‘realities’ by allowing references to circulate between a range of human and nonhuman actants (Wickstead 2009: 255), the power of the actants does not consist of something distinctive in the individual actants but originates from the networks of which they are part. The ANA can fail to account for actants that occupy positions in the network from which it is difficult to act in a traceable way (Fuller 2006). And although nonhuman actants like technologies or institutions keep some types of network relations intact and thereby act to

stabilise ‘truths’ and ‘realities’ (Wickstead 2009: 255), the ‘flattening’ of the networks (Latour 2005: 165-172) to generate symmetry between human and nonhuman actants can obscure the historical contingency and political specificity of Nature-Society hybrids and their power relations (Fuller 2006: 39; Navaro-Yashin 2009: 9). Further, citizens can, for instance, pursue several intertwined agendas for socio-ecological change, but the resultant complex phenomena cannot be understood simply through tracing the connections of the actants, because the same connections can give rise to different trajectories and to complexity that exceeds the sum of its parts. If tracing conformed to traditional qualitative inquiries, it ought to replicate their forensic logic that materialises the trans-corporeal match between traces as ‘evidence’, and their suspected sources, such as individualised and ‘institutional’ knowledges and ‘values’. But these assumptions must in part predetermine which actants are to be followed and what counts as knowledges, ‘values’, institutions, ‘evidence’, and so on. Such *a priori* assumptions can thus predetermine the outcomes by creating a model that replicates that which it sought to find.

The Actor Network methodology of tracing is best suited for researching trajectories of change. But trajectories do not capture changes that work through what Deleuze and Guattari (1987) would call cracking, rupturing or folding. Because its assumption is that processes of change are continuous, it makes no distinction between radical and incremental change (Geels 2010: 499-450). It is unsuited to researching changes that are not clear trajectories. We need an alternative approach better suited to understanding agentic networks with complex connections, one that better accounts for the potential power of citizens to advance institutional change.

4.2.2 Non-representational approaches: The agency of affective materiality

Non-representational or more-than-representational approaches have also added impetus to relational thinking. These approaches have commonly emphasised the role of affective materiality in co-constituting practices (e.g. Anderson 2004, Latham and McCormack 2004; Thrift 2004a, 2004b; Wylie 2005). They have built on wider criticism of the way in which post-structuralism was taken up especially, in cultural geography and cultural anthropology (Navaro-Yashin 2009: 11, 12; Pile 2010: 5; Woodward 2005: 460), that is, through a focus on the representation and interpretation of discourse through semiotics (Navaro-Yashin 2009: 11, Woodward 2005: 460). They have emphasised instead the presentation of “real-world” phenomena like practices (Thrift, 1996, 2004b, 2008a; Hobson 2006a; Laurier and Philo 2003; Spinney 2006). They focus not on materiality as the glue that binds other less material entities like social relations or cultural meanings together (Anderson and Wylie 2009: 332), but, drawing on Foucault and the Actor Network Approach, on materiality as the affective nature of the entities that constitute practices (Thrift 2008a; Jones 2009: 491, Anderson and Wylie 2009: 319). They posit affect, rather than discourse or intentionality, as central to individual and

collective political and ethical dispositions, and, therefore, agency and change. They draw on 'phenomenology, feminism, Massumi's reading of Deleuze's reading of Spinoza and/or Deleuze's reading of Spinoza, psychoanalysis, Tarde's sociology, psychotherapy, Marx and even Darwinian evolutionary thinking' (Pile 2010: 5). The reference point for an affect is not a Cartesian fully conscious human being who is a singular object of analysis (Navaro-Yashin 2009: 12; Pile 2010), but a force that move through human bodies, but does not necessarily emerge from them (Navaro-Yashin 2009: 12; Pile 2010). This approach makes it possible to read many entities, such as space and the environment, as affective (Navaro-Yashin 2009).

The problem of representing the behaviour of relational entities in space was discussed initially by Sayer (1989) and at length by Thrift (1996, 2005, 2008a). For non-representational approaches, space does not exist as an entity in itself, over and above affective entities and their spatiotemporal extensions and relations: things are spaces and spaces are things (Jones 2009: 491). The world is seen as a perpetual becoming of heterogeneous networks and events that connect internal spatiotemporal relations (Jones 2009: 491). As against the current interpretation of practice theory, which focusses on fluid sociotechnical configurations that are connected by practices (Shove and Walker 2010), non-representational approaches emphasise the flows of affect that are either maintained or disrupted by practices (Thrift 2008a). As against the Actor Network Approach, human actors as performers of practices don't interact with the affective entities that participate in the becoming of heterogeneous networks and events, but take part in a non-linguistic flows of affect. This dialogue becomes central in the making and unmaking of spaces through material orderings of things. Thus, the focus of political and ethical theorising of non-representational approaches turns towards the flows of affect (Navaro-Yashin 2009: 12).

Instead of focusing on representing this dialogue, non-representational approaches take the 'leitmotif of movement and work with it as a means of going beyond constructivism' (Thrift 2008a: 5). Earlier, the non-representational agenda was to cultivate political spaces (Pile 2010; Thrift 2008a). More recently, it has turned away from a spatial politics of affect towards a generalised argument about the commodification of everything and the (associated) affectual mobilization of the masses by the powerful (Barnett 2008). Thrift (2008b, 2009: 130) argues that the project of capitalism is ontological and what naturally follows is a "flock and flow" economy centred on consumers' affective desires. The powerful actors can push the flows of affect to form the affective backgrounds that attract practices. According to Barnett's interpretation of Thrift (2008a: 19, 235-254), affective backgrounding can 'take on the character of a political strategy in its own right, rather than a general condition of intentional action. It is made to seem suspect on the grounds that it depoliticises certain aspects of action by making sure they are not even noticed' (Barnett 2008: 196). It can be seen to aim at 'influencing the preferences of subordinate groups so that they do not feel the urge to place issues on the agenda' (Geels 2010: 506). The two major claims of non-representational theories' ontologised

accounts of affective politics are ambivalent (Barnett 2008: 198). The first argues that the manipulation of affective backgrounds ‘carries with it a normatively charged threat of harm or injustice, in the form of involuntary submission to the will of others’; the second, that ‘any and all subjective apprehension of the self relies on a background of affective dispositions’ (Barnett 2008: 198). Consequently, for Pile (2010: 13), non-representational approaches that build on these claims ‘can be accused of producing a depersonalised politics incapable of resonating with people’s actual experiences’. In short, the ontological theorisation of human and non-human agencies for ‘real’ change resorts to dealing with flock and flow economies that may have been manipulated.

4.2.3 Practices matter because they are collective

The material dimension of politics questions the current material ordering of the world and contrasts it with alternative and equally possible modes of ordering (Law and Mol 2008: 141). Yet how local interventions might be connected to global questions can be obscure – especially if these interventions simultaneously pursue several agendas. Therefore, in a performative, multiple and partially connected world, we must assume that what is actualised may be remade only with great difficulty (Law 2009). The challenge of interventions is to create and recreate ways of working with and on what is actualised (‘the real’), while simultaneously working for positive change (‘the good’). Practices deserve attention because they help to make and unmake the orderings of the material-discursive world in one way rather than another (Law and Mol 2008: 141). This is why we need to address how practices play out in the ‘real’ world. For instance, if we look at the ordering effects of a practice, then politics is done just as much in practices that are usually designated as ‘labour’, ‘work’ and ‘action’ (Law and Mol 2008: 141). And it is not at all easy to differentiate between these three ways of assembling the ‘real’ world. Furthermore, whereas some practices directly respond to the decisions of powerful actors (Lauridsen and Jørgensen 2010; Shove and Walker 2010), most practices continually create and recreate multiple material orderings through sociotechnical configurations that are embedded in countless everyday activities (Shove and Walker 2010). Thus, practices are a type of collective action that is not always intentional as they bring into being some instead of any other orderings of the world.

To address practices, Shove and Walker (2010) adapt practice theory to emphasise that the constant interplay of technologies, meanings and people in everyday practices forms fluid sociotechnical configurations. For example, some peoples’ practices involve greener forms of sociotechnical configuration than those common to the majority of practitioners (Shove and Walker 2010). What becomes essential to understand is whether some practices are so routine, stable or pervasive that they constitute patterns or repertoire. The possibilities for positive institutional and environmental change can then be inspected in the light of patterns or repertoire and through possible greener practices. But

this approach falls short in accounting for the non-human agencies that participate in practices. In short, such relational thinking helps in discussing environmental questions, which are ‘ontologically multifaceted and involv[e] the interpenetration of socio-cultural, economic and ecological systems; each of which are individually complex, but when taken together the emergent complexity far exceeds the sum of its parts’ (Carolan 2008b: 71). Therefore, we must reject the self-sufficiency of the structures that structuralism posits and the interrogations of the binary oppositions that constitute those structures, such as is/is not. Once binaries are rejected, there is a possibility to understand the interwoven complexity of environmental questions and collective agencies of change, and constraints for these changes.

4.3 Rhizomatic agencies are the best way to understand distributed institutional changes

A Deleuzogattarian understanding of micropolitics, power and relational non-resistance makes a relational difference that matters. The basis for understanding this difference is the concept of rhizomatic agency, which gives rise to one type of relational agentic network. Importantly, rhizomatic agentic networks are an institutional constraint for ‘self-determined’ civic change. But even as an institutional constraint, these agentic networks entail relational agencies that might actualise ‘real’ changes from within, that is, ‘differing in the making’ (Lenz Taguchi 2016, after Deleuze and Guattari 1987: 513). This differing is non-deterministic ‘real’ change, notwithstanding capitalists and states’ investments in these networks, as long as the complexity of an agentic relational network far exceeds the sums of their constituent parts. Consequently, it does not take a revolution to make a ‘real’ difference by simultaneously changing both institutional conditions and those agencies constrained by these conditions. But we cannot advance these institutional differences that matter unless we account for Deleuzoguattarian ethical agencies and ethical change in the making. Neither can we argue that these differences are making a difference if we adopt a position of technophobia or technophilia.

In what follows, I discuss why and how rhizomatic agencies entail both institutional affordances and constraints. This discussion will make it possible to argue that the relational power of non-intentional collective agencies to change institutions matters. But this does not mean that a rhizomatic agency’s creative power to actualise the virtual is without limitations. That is to say, the micropolitical power of ‘packs’ and ‘masses’ (Deleuze and Guattari 1987: 34) matters.

Why and how do rhizomatic agencies entail both institutional affordances and constraints?

One oft-utilised way of revealing non-traceable connections is Deleuze and Guattari’s (1987) concept of the rhizome, which ‘shoots out in all directions at once’ (Johnston 2008b: 111). A rhizome is decentred, dynamic and heterogeneous, and ceaselessly establishes material-discursive connections

from within institutionalised power structures and tree-like hierarchies (Deleuze and Guattari 1987). Instead of connections or relations in between the nodes of network, each connection is considered as a multiplicity of ‘ands’ rather than the static ‘is’/‘is not’ (Anderson and Harrison 2010: 15). Therefore, a rhizome is understood to be more an alliance between the agentic connections. As an ‘interbeing’, it is open and connectable, and therefore modifiable, in all of its dimensions (Deleuze and Guattari 1987: 12).

The distributed agency that exists in a decentred rhizome is considered by outlining the collective agency as an entity in itself (Deleuze and Guattari 1987), an entity often called an ‘assemblage’ (Deleuze and Guattari 1987: 4, 22-23, 284). The term ‘agency’ is a translation of the French term ‘agence’, which both describes a heterogeneous gathering and the process of ‘bringing or coming together’ (Deleuze and Guattari 1987: 284). An agency is therefore not only a noun for collective agency, but also a process of assemblage in which the elements that are connected are not fixed in shape and do not belong to a larger pre-given list, but are constructed at least in part as they are entangled (Deleuze and Guattari 1987: 284; Law 2004: 42). Agencies are not ‘intentional constructions of an individual or a collectivity’; every agency is ‘a functional arrangement of material and semiotic flows, with no other meaning than the fact that it “works”’ (Johnston 2008b: 117). The directions that material-discursive connections take in a rhizome due to the collective action of an agency can therefore be seen as non-intentional and connoting the ad hoc contingency of a collage or ‘mashup’.

Within rhizomatic agencies, entities such as actors and connections are difficult to define separately (Deleuze and Guattari 1987: 25, 415, 505-506, 512). However, rhizomatic agencies are close to the Actor Network Approach’s networks and events in their emphasis on provisionality, dynamism, instability and contingency. But the form and duration of the compositional unity remain undefined. Yet, one can refer to this unity or parts of it (Deleuze and Guattari 1987: 25, 415, 505-506, 512). The complex material-discursive connections between humans, institutions and technologies within a rhizomatic agency are always explicitly both partial and co-constituted.

A rhizomatic agency is an arrangement of material-discursive flows constantly under ad hoc construction without agreed-upon intentionality. It is a logical and metaphysical reaction against the Platonic and Aristotelian emphasis on causal, hierarchical and structured binaries such as one against many (Hammer 2007: 18, Sutton and Martin-Jones 2008: 3). Deleuze argues that the Socratic question of essence, ‘What is...?’, set philosophy on the wrong track from the start (Zepke 2008: 157). Instead, we must ask the very questions Plato rejected as inadequate responses to understanding (Zepke 2008: 157); these include relational questions such as to ‘How?’, ‘Where?’, ‘When?’ and ‘How much?’. Consequently, we must understand the world as a non-linear multiverse (Bonta 2010: 72, 73). And the possibilities for a rhizomatic agency to change this multiverse are always situated

and never ahistorical or independent of the institutions of power. This is because a rhizomatic agency's internal heterogeneity and impurity enables it to make creative connections: they are not actualised from nowhere.

Both the power of a rhizomatic agency as an entity and its capacity to transform practices are based on its ability to make creative connections (Deleuze and Guattari 1987: 512-513). Its ability to actualise, reinforce and proliferate creative connections stems from its heterogeneity, since heterogeneity within an agency makes possible mashups of once-distant, but now close, material-discursive flows. It allows practices, concepts and affects alike to move between multiple subjectivities and make change happen. Because of this heterogeneous co-presence, change happens in the middle, in-between and in the margins. However, it is not necessarily easy for citizens to perceive the processes of assemblage to understand the change that is happening: 'It's not easy to see things from the middle, rather than looking down on them from above or up at them from below, or from left to right or right to left: try it, you'll see that everything changes' (Deleuze and Guattari 1987: 23).

With regard to ethics in the making, we still need to understand how to address the collective responsibility for the material-discursive orderings of the world without facing the irreversible consequences of these orderings first. But it might be difficult to conceive changes that are not engineered by self-determined civic democracies. Further, ethics is an immanent responsibility in the processes of assemblage, but rhizomatic agencies are not ethical by definition (Bonta and Protevi: 10, 82; Deleuze and Guattari 1987: 513). Hence, we need to understand how to achieve conscious continuous re-conceptualisations of material-discursive orderings of the world without the luxury of not being part of them. This means that we must take seriously rhizomatic learning as a way to account for ethics and differing that matters.

The concept of the rhizome does make possible new ways of thinking (Albrecht-Crane 2005: 129; Bussey 2009: 32; May 1994: 34). This is because Deleuzoguattarian relational thinking is based on acknowledging the rhizomatic multiplicity of 'ands' that conglomerate to embody the material-discursive connections. The connections are not the causal binaries of 'is/is not'; they 'account for reality contextually, functioning at different times – or simultaneously – as discourse, as local subjective practice and as cultural process' (Bussey 2009: 35). They demonstrate a 'logic-of-becoming' (Bussey 2009: 34, 35), rather than the logic-of-becoming-known grounded on causal binaries. It follows that rhizomatic learning connotes the 'becomings in-between' (Waterhouse 2008). Thus, Deleuzoguattarian, and New Materialist, learning – relational ontoepistemological learning, for short – happens where change happens: when the creative connections are made among the assembled material-discursive flows. Such a concept of learning challenges the 'knower' to take part in

continuous processes of re-conceptualisation without having the luxury of a ‘objective’ perspective on the entangled and ever-changing connections.

The relational power of unconscious collective agencies to change institutions matters

To understand why differing in the making matters, we need to qualify the power that heterogeneous collective agencies such as practices possess as rhizomatic entities. According to Bonta and Protevi (2004: 3, 8-10), Deleuze and Guattari’s relational thinking enables the re-conceptualisation of the structure/agency dilemma since they explicitly link the political dimensions of Spinozist, Marxist, Nietzschean, Freudian and Bergsonian philosophy with the complexity of connections. The material-discursive agency of rhizomatic agencies is constituted in all the possible registers: the physical, chemical, biological, neural and social (Bonta and Protevi 2004: 10). But we need to analyse this collective and highly distributed agency immanent in matter, and its power to make a difference that matters, in political terms. Therefore, we must consider all the material-discursive connections in all the registers as under construction of all the kinds of institutional powers, especially the ones of ‘capitalism’ and ‘the state’. Consequently, the possibilities for human actors to choose their practices will always be constrained by the systemic, structural processes of subjectification. These processes of subjectification embed the constraints for human actors to choose their practices deeper in those institutional structures whose power they reinforce. The ordering of material-discursive connections – what Deleuze and Guattari (1987) call ‘stratification’ – does utilise the power of social signification (Bonta and Protevi 2004: 155-156), but the signifying regime that the processes of subjectification produce ‘is only one among many, and hence that its dominance in [academic] analyses ... has been too confining’ (Bonta and Protevi 2004: 8). Notwithstanding these institutional constraints, the re-conceptualisation of understandings might occasionally trigger material-discursive processes effecting an actual institutional change (Deleuze and Guattari 1987).

The interconnected possibilities for a rhizomatic agency to achieve change are tetravalent: to ‘code’ and ‘de-code’ meanings, and to ‘territorialise’ and ‘de-territorialise’ material-discursive orderings of the world (Deleuze and Guattari 1987: 505). The continuous processes that re-conceptualise understanding are important because they relentlessly challenge material-discursive orderings of the world. However, non-intentional questioning of orderings is also possible. This is because every agency performs orderings of the world that exclude all the other orderings (Deleuze and Guattari 1987: 503). The power of practices is the power of rhizomatic agencies to achieve change through making and unmaking the material-discursive orderings of the world, even though practices are not always intentional practices. We can contrast this with the Actor Network Approach, according to which the potential power of human and nonhuman actants originates from the networks that they control, and the emphasis is on agency that is an effect of networks, not prior to them (this emphasis is

made possible because the agency of nonhuman actants is explicitly symmetrical to that of human actants).

Even though the Deleuzoguattarian perspective includes nonhuman agency in the collective agency of rhizomatic agencies, it does not consider the materiality of matter through ‘an intelligible, formal essentiality or a sensible, formed and perceived, thinghood’ (Deleuze and Guattari, 1987: 450). It never considers matter to be in just one state or inert. But Deleuze and Guattari were not flow enthusiasts (Blackman and Venn 2010: 17). For them, connections with no other meaning than they work actualise material-discursive agencies that matter for a change that makes a difference. These connections entail heterogeneity of co-presence, not always identifiable as the performativity of ‘webs’ of connections which the Actor Network Approach postulates. And it considers humans and non-humans alike to be composites of multiple subjectivities that are always under construction and deconstruction (e.g. Bonta and Protevi 2004: 10, Bussey 2009: 32; Law 2004: 42). These multiple subjectivities participate in the collective action of a rhizomatic agency that ‘mashes up’ material-discursive flows, an agency that is always explicitly collective. For instance, it would think of the most common way to execute binary computing as a flow of charge like the flow of electrons or their lack through the medium of transistors.

Practices make and unmake some material-discursive orderings of the world as they mash together-apart agentic phenomena with once-distant, but now close, rhizomatic connections. Yet from the Deleuzoguattarian perspective, we must acknowledge that neither ‘human’ nor civic actors connote ‘the image of a godlike creator’ (Johnston 2008b: 21). But practices actualise creative connections that ramify into unknown because they intra-act with dynamic collective agencies, rhizomatic *agencement*, or assemblages, while being part of them, from within the middle, or margins, of them. Such assemblage involves intra-actions between practices and the settings in which practices exist, or ‘milieux’ (Deleuze and Guattari 1987: 503) that may be embedded with algorithmic agencies. But we cannot conceive of the material-discursive orderings of the world that constitute rhizomatic assemblages in terms of the binary of form (as fixed and produced by ideas and imagination) and matter (as homogeneous and actualising the form) (Blackman and Venn 2010; Trummer 2009: 65). Instead, we must think of non-human multiple subjectivities, like those that execute algorithmic computing, as taking part in the processes of assemblage. The actualisation of a wooden piece of furniture (Trummer 2009: 65) or an algorithmic game is not solely a creation of a craftsman’s ideation and imagination, but a collaboration of craftsman and the material in the production of new material-discursive orderings. Assemblage seamlessly mashes up matter with ideas and imagination. Thus, we can conceive of the existing material-discursive orderings of the world as powerful, even though practices arrange material-discursive flows on an ad hoc basis.

How, then, can the practices of a rhizomatic agency make change? Collective but never fully intentional processes of assembling enmesh matter with understandings, ideas and imagination about the material-discursive orderings of the world. As the processes of stratification are powerful, human practices that take part in assemblage possess only partial relational power to make and unmake material-discursive orderings. Nonetheless, the orderings of the world come into being and all the other possible orderings are excluded when some connections are actualised and some others are not (Anderson and Wylie 2009: 329-330). Deleuze and Guattari (1987) describe the process this way.

The practices of a rhizomatic agency non-intentionally actualise some of the virtual connections that arrange material-discursive flows. Therefore, the collective agency of individualised practices non-intentionally utilises the power of a rhizomatic agency within the processes of assemblage that make and unmake the material-discursive orderings of the world. When the actualised connections ‘question’ the existing orderings of the world, a rhizomatic agency utilises its power to achieve change, even though this is not necessarily intentional.

In the specific context of algorithmic games and their communities of production and consumption, the practices of programming provide meaningful experiences of gaming to the users of a program, the gamers. The practices of programming are performed with the help of a series of layered programming languages, which ‘allow the user to manipulate data, expressions, processes, and – thanks to object-oriented programming languages – virtual objects and structures in complex new configurations’ (Johnston 2008a: 753-754). These practices actualise some of the virtual connections within the processes of assemblage. Likewise, some of the virtual connections are actualised by the practices of consuming these games, by the business practices based on the production and consumption of these games and by the technologies these practices rely on. These and all the other material-discursive connections that make up the assemblage define how the material computing systems perform and bring about the ‘world’ of algorithmic gaming. We could see the widely distributed power of those who take part in the assemblage as originating from their practices, but we must take into account that the choices that they make that are ‘environmentally responsible’ are not always intentional or what might be expected, and the connections from their actions to their environmental consequences, not always visible.

The limitations to a rhizomatic agency’s creative power to actualise the virtual

Hereto, the further away a rhizomatic agency’s connections are from the ‘connections causing blockages (axiomatics), organizations forming and strata (stratometers), reterritorializations forming black holes (segmentometers), and conversions into lines of death (deleometers)’ (Deleuze and Guattari 1987: 51), the more power it possesses as a chaotic attractor, an unpredictable generative force (Johnston 2008b: 153) that Deleuze and Guattari (1987) call an ‘abstract machine’. A chaotic attractor defines an infinite set of divergent series (it is virtual), and is differentiated (it is actualised)

in a ‘becoming other’ (Johnston 2008b: 120): a common example is a weather system, which is not predictable with precision even though we might know its initial conditions and the ‘laws’ by which weather operates. In other words, though the factors and variables of a chaotic attractor can be known, its actualisations cannot always be predicted (Zepke 2008: 159). The capability of rhizomatic agencies as chaotic attractors to destabilise the material-discursive orderings of the world is emergent.

We must note that rhizomatic agencies do not constitute all the kinds of ‘becomings’ and thereby serve ‘as a kind of Platonic form that exists independently of its instantiation in a particular nonlinear dynamical system – which is how [chaotic] attractors are sometimes viewed’ (Johnston 2008b: 153). Instead, creative connections that question material-discursive orderings of the world can come into being when practices intra-act with milieus on the verge of a creative but not destructive ‘chaos’, or entropy (Bonta 2010: 72; Deleuze and Guattari 1987: 313; Johnston 2008b: 11).

Deleuze and Guattari demystify the creative power of rhizomatic agencies to achieve change, even though rhizomatic agencies are open systems on the verge of chaos. This is because relational collective agencies are never ahistorical, even though a rhizomatic agency enmeshes the material-discursive flows without intentionality and on an ad hoc basis. Nevertheless, the actualisation of virtual connections instantiates some material-discursive orderings of the world – and eliminates all the others. They utilise the power of rhizomatic agency to make and unmake – both intentionally and non-intentionally – some instead of other material-discursive orderings, orderings that are both material-discursive and virtual-actual.

The power of packs and masses matters

The quality of power that a rhizomatic agency wields as an entity resembles the power of ‘packs’ or ‘masses’ (Deleuze and Guattari 1987: 220-221). Such a concept of power makes it conceivable that even though human agents, such as consumer-citizens, may form a group with a minimal sense of communality, their individualised practices utilise the power of a collective – even when it is non-intentional. More or less environmentally conscious practices alike are part of a rhizomatic agency of consumer-citizens, whose collective processes of assemblage partially result in positive (or negative) environmental change, even though some agents possess institutional power to define which practices are responsible or not for environmental change and address them or not. The power of a rhizomatic agency derives from its internal heterogeneity: the individualised practices and subjective positions of human actors do not need to be compatible with each other (Deleuze and Guattari 1987: 358). For instance, the users of an Internet service might disagree or even compete with each other, but their practices as a collective agency utilise the power of packs or masses. This power makes and unmakes the material-discursive orderings of connections that partially actualise both the digital ‘real’ in question and its material-discursive effects, like electricity consumption.

Neither humans nor nonhumans as collective agencies of multiple subjectivities emerge independently from the conditions that constrain and afford their agency. The partial and situated knowledges, power relations and all the other connections that originate from the past play a part in the processes of assemblage, even though the practices arrange the material-discursive flows on an ad hoc basis. And said power relations continue to play a part into the future too (Bussey 2009: 33; Steinberg 2009: 474; Deleuze and Guattari 1987: 9) – which is important in the case of environmental questions that can impact future generations. Changes in material-discursive orderings of the world make differing and ethics in the making visible. Such creative connections challenge the power of dichotomous ‘is’/‘is not’ to subordinate human bodies to the predetermined and self-referential ‘real’. But the creative differing that takes place when practices actualise and proliferate creative connections need not happen fully intentionally.

A rhizomatic agency possesses the power to perform creative connections that matter because of its heterogeneity. But it can entail both more and less sustainable practices and the subjective positions, for example, on sustainability. Nonetheless, a rhizomatic agency utilises its power as a collective in the processes that create and sustain institutional structures. This power is especially tangible when practices accidentally actualise changes that challenge the material-discursive thresholds such as those set by environmental regulation or technological structures. The relational learning that is needed is the willingness to acknowledge that heterogeneous rhizomatic agencies utilise collective power in the processes that make and unmake the material-discursive orderings of the world, even though the utilisation of this power is not always intentional. It is to such analysis that I now turn.

4.4 New Materialist and Deleuzoguattarian understandings make differences that matter

To conclude this chapter, I plug the mismatch of transformative civic education and algorithmically enhanced control society into a New Materialist and Deleuzoguattarian understanding of the ‘real’. In doing so, I take my cue from the New Materialist analytical method of ‘diffraction’, whereby multiple perspectives are read through each other for the consequential differences that matter (Barad 2014). New Materialist analysis centres on agentic phenomena and their ‘intra-actions,’ or co-causality (Barad 2003: 815), that make the ‘real’ in an on-going process of relational change. It enables us to understand, analyse and respond ethically to complex changes in the making, including, for example, the on-going transition to an algorithmically enhanced control society. In doing so, New Materialist analysis does not dissociate the agency of knowing-in-being from its intra-actions with agentic phenomena. This ontoepistemological understanding of agencies overcomes the tension between the work of sciences and social deconstruction as a way of ‘discovering’ the ‘underlying reality’, notwithstanding ‘[w]hether there is any’ (Donaldson et al. 2010: 1526). Therefore, New Materialist analysis can account for the fact that agencies that change the ontoepistemological ‘real’ are always

collective, highly distributed through a range of material-discursive registers (including the physical, chemical, biological, neural and social registers) and part of the 'real' to be changed (Deleuze & Guattari 1987). Consequently, New Materialist analysis acknowledges that material-discursive 'spacetime-matter' constitutes both relational phenomena and collective agencies in the making. It also enables us to take into account that the socio-economic-ecological effects of algorithmic systems are never localisable – and that there is a profound collective inaction on this front (Rouvroy 2016: 218) – and that on-going transitions towards data and control networks for embedded ubiquitous computing reinforce communal civic control in the service of the communally oriented capitalist state. Most profoundly, New Materialist analysis can enable us to account for the profound relational problem that it is communities, not atomised individuals, that reproduce the socio-economic hierarchies of inequality that undergird the communally oriented capitalist state. Therefore, it can account for the way in which material-discursive changes are always actualised from within machinic economies: neither civic actions nor their socio-ecological contexts exist beyond time, space and matter.

For New Materialist analysts, an ethics is thus immanent in every agency and all phenomena. They must explicitly account for their own responsibility in making the material-discursive 'real' existent – and changing it – by studying it (Barad 1996). But for us to acknowledge our agency in shaping the 'real', our knowing-in-being, means that we become 'responsible not only for the knowledge we seek but for what exists' (Willey 2010: 1008). That is, for us to engage with intra-acting collective agencies and phenomena is to perform a micropolitics that advances the 'real' that does not yet exist. Thus, we must re-problematise the entitlement of understandings and actions to bring about that 'real' to which they point. For instance, a communal entitlement to perform its 'democratic' transformation performs that world of differences to which it points. Further, any simplified understanding of, and civic education for, agency and change only serves to disguise how this entitlement performs a 'real' that includes and excludes certain citizens. By definition, atomised others are 'idiots' who hinder communal 'democratic' citizens, the agents of 'transformative' change, from enforcing their self-determined 'real' of a 'common good'. That is to say, 'transformative' communities cannot be immune to the dangers of micro-fascism. And to mobilise a 'real' of equality and democracy that does not yet exist necessitates a rejection of agentic 'reflection' (Bozalek and Zembylas 2017), which only serves to emphasise individual differences – and hence perpetuate these differences by giving rise to that world of differences to which they point. For instance, decades of academic studies on sexism and racism in the making show how 'reflection' has failed to shift the status quo towards that 'real' of equality that does not yet exist. Furthermore, to adopt our full ethical responsibility for performing the 'real', knowing-in-being, that does not yet exist means to engage with the on-going intra-actions of 'differencing: differences-in-the-(re)making' (Barad 2014: 175). This call is not trivial because scholarly theories succeed insofar as they mobilise that 'real' to which they point in such a way that it cannot be ignored (Pollock and Williams 2010: 530-531, 537-538). But it is timely because any

entitlement to perform a material-discursive 'real' in order to make it a self-fulfilling prophecy carries with it an explicit danger of micro-fascism.

To perform relational non-resistance means to ascribe 'meaning and values' to recalcitrant collective agencies. It means to problematise the civic 'economy of reputation, risk and opportunity' (Rouvroy 2016: 34). In contrast, those who have performed the 'real' where collective entitlement to characterise, categorise and criticise is bringing about that world of difference to which it points have replicated the logic of surveillance capitalism and state surveillance. They are 'rendering the world predictable but insignificant' (Rouvroy 2016: 222) by bringing about a self-fulfilling 'real'. This is true of algorithmic agencies that both perform that world of difference to which they point and 'give existence in advance to acts that are not yet committed' (Rouvroy 2016: 31: 33). But in practice, algorithmic pre-emption, does not reveal which norms underlie its stratification of the relational 'real'. Hence, citizens who act to change the norms that underlie algorithmic pre-emption cannot simply disobey or contest these norms unless they somehow find out which acts become im/possible because of this algorithmic pre-emption. Their civic agency intra-acts with the phenomenon of algorithmic pre-emption in a complex, not a straightforward causal manner. But New Materialist analysis of agency and phenomena as an intra-active 'real' in the making helps us to understand and change this complexity because it reveals how and why it matters that algorithmically enhanced contexts change our knowing and being simultaneously. In doing so, it emphasises how implementation of a self-fulfilling 'real' carries with it the implicit danger of micro-fascism, even if this world was 'self-determined' 'democratically'. Consequently, it makes possible a Deleuzogattarian understanding of micropolitics, power and relational non-resistance that can make a relational difference that matters.

5 On collectively occupying a cramped niche of communally oriented capitalism

Everyday lives of citizens occupy a ‘cramped’ (Deleuze and Guattari 1986: 17) niche of globalised capitalism that is increasingly algorithmically enhanced. Citizens are complicit in sustaining their own machinic enslavement: they can neither step outside of capitalism nor adopt a ‘resistant counter-identity’ (Colebrook 2015: 137). The understanding that ‘money is just a social convention’ does not enable them to act as if money were not ‘the physical embodiment of value’ (Žižek 1989: 31), neither can their civic community opt out from their capitalist nation state. Just as importantly, for them to act in the service of a societal collective and/or socio-ecological change sustains the norm that every day, everyone needs to make an effort for something important (Swyngedouw 2014: 184-5). This norm facilitates their civic self-regulation to others’ ends, or control (Deleuze 1995: 174), by justifying civic desire and capacity to act for collective change. Instead, citizens need to foster relational non-resistance through their practices, tactics, and non-tactics. This can only be done from within their cramped everyday lives, not from ‘outside’ or from nowhere. Such relational non-resistance escapes control by resisting the dichotomies and classifications that mark oppositional resistance, including the assumption of civic divide that underpins this resistance. It matters because control works by ‘co-opting critique as fuel for the new spirit of capitalism’ (Galloway 2011: 484). It also matters because communal civic control has opened up ‘aspects of life previously beyond the reach of the market’ for commercialisation (Martin 2016: 149). For the most part, however, control rules.

But the time to change the on-going transitions to algorithmic control societies with algorithmic capitalisms and governmentality, while being part of them, is now. We need to fully account for the real world problem that value has been converted to material-discursive money at the collective expense of nation states. Real world tax free money has been measured in intergalactic quantities, that is, quantities that well exceed the budgets of small nation states (Colebrook 2015). Therefore, we need to qualify agentic quantities and qualities of relational money in the making, to clarify how two scales internal to money intra-act. During the interviews of this study, the participants volunteered their insights on this front. Accordingly, I will plug their insights into a New Materialist and Deleuzoguattarian analysis of relational money and its agentic intra-connections in the making. This discussion makes visible how algorithmic governmentality guarantees the smooth conversion from value to intergalactic money. But first we need to understand the real world where civic divide does not conform to civic agencies and changes constrained by money – which itself has been one resource of communal ‘fight for’ their self-determined future. But communities have ensured the integration of citizens into control societies (Deleuze and Guattari 2004a: 256).

5.1 There is no dichotomous citizenship if one does not ignore how ‘value’ is converted to real world money that is material-discursive

Nation states world-wide aim at financing themselves via money and taxation. At the moment, this presents a collective world-wide dilemma for them, regardless of whether or not they are investing in communal orientation. At the heart of this dilemma lies the dichotomous nature of money. Typically, the agency of money as salaries and wages is tightly bound to the earning-citizen as a material-discursive body that creates value (Read 2008). For instance, Google CEO’s 2006 salary, one dollar, was as bound to this earning-citizen and his personal tax liabilities, as would have been a salary of one billion dollars. But added value measured in intergalactic quantities, quantities that well exceed the budgets of small nation states, has been typically converted to agentic real world money that may elude taxation. That is, it is a financial fantasy that there is a common measure between citizens’ salaries, wages, and savings and their over-valued mortgages that have been re-packaged as tradeable assets (Colebrook 2015: 151). Secondly, and interrelatedly, nation states worldwide have bolstered this fantasy against their collective financial interest. They have done this by rewarding excessive financial risk-taking with public safeguards, most notably bail-outs, subsidies, and regulation that advance international tax planning (Colebrook 2015). Therefore, ‘genuine calculation – who has taken what’ is needed for discussing the excessive accumulation of money (Colebrook 2015: 150) at the collective expense of every nation state worldwide through practices such as globalised tax planning. But this calculation should not be ‘impeded by morality, by wars on welfare and various other supposed threats to life and family’ (Colebrook 2015: 150). The participants in this study qualified how these types of ‘genuine calculation’ might be performed as they volunteered their insights as participants in global algorithmic markets. They identified how these markets operate beyond national regulations, and also noted that this is not a national but a collective and global dilemma. They did not, however, resolve this dilemma with oppositional to their machinic enslavement.

As a collective agency, citizens occupy a cramped niche of global capitalism because this collective agency, unlike banks, is never ‘too big to fail’ (Colebrook 2015). But this shared commonality has not meant that citizens have participated in sustaining socio-economic-ecological connections as equals. Neither the established capitalisms nor the algorithmically enhanced ones have been level playing fields for atomised individuals; instead they have facilitated different types of choices for groups of citizens. These choices include those of civic communities to act collectively for that which they consider to be important. Money is a material-discursive resource that has sustained communally oriented control with the help of – rather than in spite of – citizens’ self-determined changes and actions.

However, the oppositional resistance relies on an imagined dichotomy between those who are and those who are not exempted from fully accounting for the foundational agencies of money. This

dichotomy separates those citizens who are, ‘idiots’ from those who are Deweyan communally-oriented citizens; who participate in the citizenship of predestined social transformation (Mogensen and Schnack 2010: 64-5). By definition, the Deweyan non-‘idiots’ have rejected their vested interests and are accumulating action competence for a society-wide common good of communal divide and self-rule (Jickling and Wals 2008: 7-8, Mogensen and Schnack 2010: 64-5). Hence, only those who have been subjectified as ‘idiots’, yet to be educationally transformed, have been held publicly accountable for the everyday civic participation in hierarchies of social reproduction (ibid.). But no educationally transformed citizen can opt out from machinic enslavement.

It is a shared problem of nation states that they collectively regulate for global capitalism that does not work for their financial ends. But in ‘Western’ representative democracies, this problem cannot be addressed by subjectifying voters as either atomised individuals (‘idiots’) or educationally transformed citizens ‘fighting for’ the communally-oriented common good as defined and enforced by their ‘self-determined’ ‘democratic’ decision-making, such as Ostromian rules, norms and sanctions. Rather, for instance the 2016 elections both in the UK and in the USA show how communally-oriented citizens, both online and in person, have been mobilised to unite for the benefit of their common good on others’ account. To this end, the elected US president’s campaign promised to ‘make America great again’ (Roland 2017, Weems 2017) and the UK campaign mobilised citizens to ‘take back control’ by voting that the UK leaves the EU (Barnard and Ludlow 2016), which serves as a regulatory, legally binding and economic body beyond nation states’ regulation. Notably, both these mobilisations (see Barnard and Ludlow 2016, Roland 2017, Weems 2017) emphasised the communal entitlement to the socio-economic power structures of the past (to obtain all the resources needed for American ‘greatness’ or British ‘control’) in the name of democratic decision-making (anti-establishment). Neither of these mobilisations addressed that legally binding global co-operation is needed, because globalised capitalism primarily feeds on the socio-ecological account of each and every nation state notwithstanding their communally-orientated civic control. But both these mobilisations exemplify macropolitics of declaring that the prevised ‘path’ has to be followed (Colebrook 2015: 146), notably, that the preventive and pre-emptive measures must enforce control that rigidifies power hierarchies. For short, the voters of both these communally-oriented nation states were mobilised to take back biopolitical control over embodied ‘others’, (such as migrant workers), by enforcing preventive and pre-emptive measures (such as those taken at national borders) to this end (Barnard and Ludlow 2016, Roland 2017). In turn, the mobilisation to make communal America great again (see Roland 2017, Weems 2017) openly subsumed all the embodied ‘others’ to everyday power hierarchies at their biopolitical work¹¹. That is, the communally-oriented citizens of the UK and the

¹¹ These include, for instance, the communal entitlement to enforce control measures that bring about their self-determined common good (see Weems’s (2017) example of a ‘great’ American neighbourhood that

US were mobilised to obtain the full civic resources to bring about the projected future of their collective entitlement to self-determine their common good on account of embodied 'others'. This means to enforce collective 'anti-establishment' measures that bring about the power institutions at play, (notably including the America of voters entitled to make it great again and the UK of voters entitled to take back control).

But the open rejection of believable political framings for macropolitical measures that perform the predetermined real to which they point replicates the logic of surveillance capitalism and state surveillance. This is notable, because during the past decades the scholars have been most concerned that practitioners as democratic participants of collective decision-making are not capable of understanding how causality and verifications serve predetermined political ends (Colebrook 2015: 146-7). But macropolitics of bringing about the predetermined future entails micropolitics of 'self-evident truths, and clarities', micro-fascisms for short (Deleuze and Guattari 1987: 228), (such as Britain is 'full up'), which overshadow macropolitical debates about causality and verifications, (such as whether the Britain, or London, is 'full' of people¹²). Take, for instance, New Zealand Labour party, which declared in the wake of the UK and the US elections, in April 2017 heading towards September general election, that Auckland should offer the 'best shot' to 'kiwi life' with affordable housing, unclogged traffic infrastructure and healthy environment, but in order for this to happen profound measures to decrease net immigration must be implemented¹³. These measures exemplify macropolitics for ensuring that local communities never find out whether the immigrant others might have some causal and verifiable effect on those common 'resources' they have self-determined serve their common good, (including empty motorway lanes; seats in commuter trains; affordable houses with backyards; jobs, investment properties and other sources of money; healthy blue, green, urban and other environments; planning measures that serve public 'kiwi' lifestyles; and so on). This mobilisation of voters exemplifies how macropolitics of implementing preventive and pre-emptive anti-immigration measures becomes justified because one can predetermine that the mere existence of immigrant others presents a threat to the communal entitlement to self-determine and enforce their predetermined common good, (such as 'kiwi life'). But such measures exemplify how a communal entitlement to self-determine and implement democracy, self-regulation and control can serve micro-fascism. Interrelatedly, and just as importantly, these three mobilisations of voters' control for the

excludes any racialized body) and transgressing any embodied 'other' (see Roland's (2017) examples of groping and grabbing any 'female' body)).

¹² See, for instance, The Guardian 2016 at: <https://www.theguardian.com/world/2016/feb/09/is-britain-full-home-truths-about-population-panic>

¹³ See, for instance, New Zealand Herald 2017 and The Guardian 2017 at: https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11834706 ; <https://www.theguardian.com/world/2017/apr/19/new-zealand-restricts-skilled-worker-visas-in-kiwis-first-approach-to-immigration>

socio-economic entitlement of their communities exemplify how macropolitics of appropriating the predetermined future has not conformed to the presumed civic divide between 'left' and 'right'. For instance, both the 'left-wing' candidate Sanders and the 'right-wing' candidate Trump juxtaposed their leadership for the 'anti-establishment' future with that of Hillary Clinton (Democratic Party), whom they branded as the candidate of establishment notwithstanding her profound 'left-wing' past as an anti-establishment revolutionary activist (Bordo 2017). Yet, there is a drastic difference between the regulatory actions that have followed the two 2016 elections. Unlike the new president of the USA, the parliament of the United Kingdom is obliged to regulate for different types of axioms that are part of global capitalism if the country leaves the EU following the majority of 'leave' votes.

We cannot ignore that communally oriented control perpetuates socio-economic hierarchies of social reproduction, if we are committed to positive change. Neither can we ignore that nation states have regulated for civic investments and control in the service of communally oriented states and capitalisms. Most importantly, algorithmic markets, including those of gaming, relentlessly facilitate the leakage of taxable money measured on the scale of civic livelihoods to tax-free money as profits measured on the intergalactic scales beyond small nation states' budgets. The functional basis of this leakage is that regulatory limitations allow banks to lend out money in quantities that exceed the monetary value of their assets. In Finland and other EU countries, this lending conforms to regulation on prudential requirements for credit institutions and investment firms and amending (EU 575/2013). An important collective step of nation states on this front was led by the USA's 1971 decision to end international convertibility of the U.S. dollar to gold¹⁴. But this global circulation of money has hardly been sustainable. For instance, in the EU, the multi-year debt crisis since the end of 2009 has converted excessive financial risk-taking into national debts at the expense of every EU citizen. Most indicative has been the EU members' collective aid to the Greek government in the on-going debt crisis since 2009. Yet, despite knowing all this, citizens cannot simply opt out from acting as if material-discursive money as their everyday livelihoods and expenses was not an actual embodiment of value. They discern with their 'sober senses' that money 'is just a social convention' (Žižek 1989: 31), but this does not translate into a collective agency to bring about the demise of capitalisms and states. They cannot opt out from their collective debt as EU citizens.

It matters, therefore, that citizens who invest material-discursive resources into their communities are simultaneously investing in the communal orientation of states and capitalisms. Citizens lack the full material-discursive resources, including money, to impose their self-determined control within their democratic communities and/or over their resource pools, including those of electricity. But it is hypocritical to ignore that the communal turn inwards for accumulating these resources is

¹⁴ And as an aftermath of the WW II, gold is now transferred back to Germany, and the Bundesbank will be storing half of Germany's gold reserves in its own vaults from 2020 onwards (Bundesbank 2016).

perpetuating the root problem of capitalism as well as intra- and inter-communal power structures. There is no dichotomous citizenship, and no communal citizen should be exempted from ‘checking one’s privileges’ akin to the contemporary feminists – be these privileges communal or individualised. But how can their collective agency to act change be understood without claiming the moral high ground of underdogs who heroically fight for the projected common good? In what follows, I qualify three agentic phenomena that matter on this front. The first phenomenon qualifies conversions of value to material-discursive money. Secondly, the collective agency of communal turn inwards only serves the ethical and political status quo. And lastly, any collective agency engenders value and data for the profitable ends of states and capitalisms. When seen as intra-connected with each other they qualify how communities have implemented the 21st century apparatus of anti-production that conditions the global production by ensuring the integration of citizens into communally oriented control societies (Deleuze and Guattari 2004a: 256). This work has served to disguise that there is no common measure between the value the cramped civic existence engenders and how this value is converted to real world money in intergalactic quantities.

Civic agency of choosing to choose from within conversions of value to material-discursive money

Algorithmic markets challenge the tenet that in-person communal control advances the projected profound change of global capitalism despite creating profitable ‘value’. They make it visible that communally oriented control, both online and in person, works for free for the benefit of both the state and capitalism. They inform how cramped civic existence also forms a material-discursive basis for algorithmically enhanced capitalisms. But most importantly, they reveal the relational agencies of material-discursive money at work.

The insights of the participants in this investigation explored how algorithmic markets operate, as well as how they benefit what could be called online enterprises. The term online enterprises has been chosen for the sake of readability. These are the important international enterprises that have invested globally in merging infrastructures, technologies, and practices underlying the Internet with civic existence in person. They include Amazon, AOL, Apple, AT&T, Cisco, Facebook, Google, IBM, Intel, Microsoft, Oracle, SAP, Sun, and Yahoo. These insights are needed now because scholars have regarded communities ‘online’ as real in a different sense from communities ‘in-person’. Deweyan in person communities have been hailed as the vanguard acting for the projected demise of capitalism (Jickling and Wals 2008: 8); online communities have not. Further, entrepreneurial livelihoods feeding on a communal turn inwards, such as peer-to-peer economies, have been framed as a civic critique to the dominant relations of production and consumption (Martin 2016). But now, investments in the transitions to algorithmically enhanced infrastructures, technologies, and practices are increasingly merging these two types of communal cramped existences, in person and online. Not only have the participants been part of an on-going transition that has directly connected their

livelihoods with how online enterprises convert ‘value’ to money, but their lives and livelihoods have been part of a more drastic transition that is on-going. This ‘monetary’ transition is happening because contemporary investments in smart communal lifestyles are embedding market practices that have succeeded online into in-person infrastructures, technologies, and practices that have not been previously algorithmically enhanced. These are investments in creating added value that feeds on the cramped civic existence that was previously beyond markets’ reach. What matters most, however, is how this value is converted to money that is not taxed by any nation state. The participants’ insights into money and their everyday livelihoods are needed to tease out what is going on in this transition to online business practices feeding on communally created value. Their insights illuminate the on-going financial exemptions that are a drain on the finances of every nation state worldwide (for feudal capitalism, see Colebrook 2015, Deleuze and Guattari 1983). They also exemplify how everyday civic investments (be they time, money, effort, and/or other material-discursive resources) sustain cramped civic existence – communally-oriented or not.

On this front, the participants volunteered their sober analyses of how they are bringing machinic enslavement upon themselves.

If you decide you start creating games for living, what follows is like utter selling yourself. [...] It takes a lot of work and there's definitely no money coming in during the first year. It's [financially] really tight before you start to even cover the development costs, let alone earn any holiday pay. [...] I spent my January with this [project] and get the money in June. (L.R.).

For this participant, the choice to participate in algorithmic markets has meant a choice of working without money as income¹⁵. Neither did the participants imply that major investors in online markets are anyhow affected in any way by this state of affairs. But they brought attention to choices to choose to transform the field of gaming from within, without disguising our complicity in sustaining control societies (Colebrook 2015). For instance, independent game development may promote positive changes in the context of gaming, on the grounds that games have primarily been developed for the purposes of gaming, not of making money. According to one participant, their team of developers does not do anything in a way that should be ‘self-evident’ if one’s aim is to participate in the

¹⁵ L.R.: [...] In practice, you work on your own time. You have a full-time job and another full time-job free of charge. Your family, or similar, may suffer from that.

L.A.: Consequently, independent game development is up to young men...

L.R.: Well...

L.A.: Ok then, the unpaid job of young men and women, which is unfortunate; there is no manual to how the independent gaming culture works and what kinds of games one may develop.

L.R.: Which easily leads to the situation where one resorts to developing clones and copies.

algorithmic gaming markets by marketing and selling games in these markets terms. Instead, they focus on developing the games:

We [the team of developers] hardly do a thing that should be ‘self-evident’ for the sake of marketing and selling their games. We focus on developing games. (V.K.).

This participant clarified that position as choosing to choose what to change from within the algorithmic markets. But none of the participants declared themselves to be an ideal educated citizen whose action competences benefit a projected institutional transformation. For instance, when asked to elaborate on their choice not to do ‘self-evident’ things for marketing and sales, the same participant offered the metaphor of a pirate ship. To explain how the passions of everyone involved had contributed to a working lifestyle that served as a foundation for not developing games on the markets’ terms. ‘No matter how fertile a patch of land these pirates find, they do not settle down to cultivate it only because it produces plenty of pumpkins’ (V.K.). But the same participant also emphasised that the success of their games in the market had enabled them to exercise this choice. That is, the agency of money from the market has facilitated a choice not to primarily develop games for financial or market-driven ends.

The fact is very much that nobody here who would get excited to do that. I mean, if someone has a pirate ship that is sailing around and robbing commercial vessels and one earns their living by doing that. No matter how fertile patch of land might these pirates find, they do not settle down to cultivate it only because it would produce plenty of pumpkins. Thus, it is a matter of living and going their own way. And in a certain way those people define the culture and that culture defines how to deal with the market. We understand that there is, or we have, still room for improvement and we certainly will do things on that field. Meanwhile, it is quite interesting that until now we did not have to conform to [the markets’ rules]. All our games made it to top 20. (V.K.).

For them the axiom of money underlies a choice about what to ‘fight for’ (Read 2008: 154), but it also emphasises how one might choose to not participate in algorithmically enhanced markets on their terms. This non-radical opportunity is important because it accounts for the multiple thresholds between presumed value that has been created, and its conversion to real world material-discursive money. On this front, the participants, have, for instance, created and published games that do not earn them a single cent (though possibly some new fans)¹⁶. They choose to probe algorithmic markets

¹⁶ E.W.: We gain publicity even if the pirates play our game for free.

I.R.: Further, if one of the pirates records their gaming and uploads the video to YouTube, and we get more gamers as a result, that’s good.

and act as if value could be converted differently to material-discursive money. This choice exemplifies a minotarian civic position of choosing to choose. It is a sustainable position because one cannot opt out from everyday participation in the axiom of money. But choosing to choose is a move against the on-going ‘rigidification of the field’ (Colebrook 2015: 155), where presumed value is converted to real world material-discursive money.

The collective agency of the communal turn inwards only serves the ethical and political status quo

As long as the axiom of money exists, any civic choice about what to fight for, resist, or not resist belongs to the majotarian cramped niche of sustainability. But sustainability has been a chosen enemy for transformative civic educators who have defined that only those considered non-‘idiots’ are accumulating action competence for a projected radical transformation (Jickling and Wals 2008). Unlike ‘idiots’, educationally transformed citizens have not been publicly named and shamed for being ‘obedient, deferential, and compliant as they take their place within hierarchical and authoritative social structures and power relationships’ (Jickling and Wals 2008: 8). For instance, Wals, ‘one of the few leaders in [civic] education’, has openly built on his father’s success amongst socio-economic hierarchies in order to take his place amongst uneven academic hierarchies (Peters and Wals 2016: 180; for uneven academic hierarchies, see, for instance, Morley 2016). In addition, he allows his own children to directly benefit from his successful standing amongst the hierarchical social reproduction in the name of communally-oriented social transformation (Peters and Wals 2016: 188).¹⁷ This non-meritocratic stance emblematises how, by definition, educationally transformed citizens accumulate civic competences for a projected radical change – and that this happens in spite of their socio-economic privileges, including communal ones. That is, unlike idiots, educationally transformed citizens are entitled to ignore how they work for the ends of the state and of capitalism as they reinvigorate socio-economic patchworks of communally oriented capitalisms and states.¹⁸ But this volunteered control micro-manages on behalf of the state and capitalism under the guise of communally-oriented self-determination (see Jickling and Wals 2008: 18).

‘The game didn’t sell, and thus it was given away for free; there were no earning mechanisms embedded in the game so it could only gain publicity. Then the game made it to Apple’s list of featured games, and suddenly it had been downloaded 150 000 times, and then more than a million times.’ (N.T.). [K.K. is nodding affirmatively.]

¹⁷ For instance, in Finland, the revival of Marxist dichotomies as the foundation for academic understanding and research took place in the 1970s and 80s. This trend was simultaneous with the efficient inclusion of prominent student demonstrators in mainstream party politics after 25/11/1968 demonstration (von Bonsdorff 1986).

¹⁸ In contrast, practitioners of 21st century mainstream feminism keep checking their civic privileges.

Socio-economic hierarchies feed on the communal turn inwards. Consequently, ‘strategic economic interests and everyday social practices [...] facilitate the placement of specific ways of control and regulation of increasingly fragmented cities and unequal societies’ (Luque-Ayala and Marvin 2015: 2112). Thus the inequalities between and amongst heterogeneous communal contexts are not accidental: intra-communal control for the ends of the state and capitalism primarily sustains socio-economic hierarchies between communities. This volunteered civic control primarily self-regulates for the ends of the state and capitalism via communal-orientation of everyday living and contexts. In short, it only replicates the illusion of civic divide to frame that everyday social reproduction prevails because atomised individuals who are socio-economically distant from each other are not resisting or working for a common cause. For instance, there are ‘plenty of examples around the world where multi-cultural neighbourhoods are some of the most desirable and vibrant places to live’ (Peters and Wals 2016: 184). But both the state and capitalism feed on voluntary civic actions for the communal patchwork of socio-economic desirability. It is in their financial interests to benefit from unpaid civic control for communal divide and self-rule; also transformative investments in communal turn inwards cultivates socio-economic desirability for their benefit.

Closely connected communities have most often sustained the wider economic interests of ‘green’ and/or ‘smart’ growth, whereas ‘smart’ refers to anything enhanced with value drawn from the work executable algorithmic agencies do, and most typically infrastructures, technologies, practices are made ‘smart’ by embedding algorithmic agencies into them to this end. This growth has taken place primarily because the shortened connections of communally oriented control societies have made it easier for small-scale, micro-, and sole entrepreneurs to establish new services (Datta 2015). Further, socio-ecological education has reinforced the communal orientation of capitalist nation states with its goal of educationally transformed citizenship, which invests its material-discursive resources, actions and desires in communal turn inwards. But the shortened communally-oriented connections of capitalist societies of control have also facilitated various types of sharing and peer-to-peer economies. As part of these, shortened intra-communal connections have existed in-person, as algorithmically mediated, or as combinations of both (akin to Airbnb, Freecycle, and Uber). In addition, states and capitalisms have invested in embedding algorithmic agencies in infrastructures, technologies, and practices that facilitate communally networked activity. Emerging examples on this front include urban, green communities that are ‘smart’, that is to say, algorithmically enhanced. Most notably, communally-oriented resources management, such as electricity production-consumption, has become increasingly algorithmically enhanced. But all these investments enable incumbent businesses to tap into communally created value, whether this value is created via control, data, or socio-economic desirability. And this presumed value is yet to be converted into the money that trickles down to improve the finances of state and/or its communally-oriented citizens.

Any collective agency engenders value and data for the profitable ends of states and capitalisms

Most importantly, algorithmic surveillance economies have fed on the creation of value by networked civic activity and the data it engenders (see Benkler 2016, Benkler and Clark 2016). Some participants remarked that it should not come as a surprise that algorithmic surveillance agencies are embedded in technologies, infrastructures, and practices online, because the Internet was originally developed for military intelligence purposes (T.P.)¹⁹. The value of surveillance data lies not in an individual but in communal intra-actions.

Surveillance economies based on algorithmically gathered data exemplify the more established forms of regulation that favours major investors, notably Amazon, Apple, Facebook, Google and Microsoft, at the expense of civic societies'.²⁰ Importantly, algorithmic surveillance data resulting from the networked activity of socio-economically deprived communities is valuable in a different way from data resulting from the networked activity of, say, affluent transformative communities. In principle, various communities could convert the presumed value of 'actionable data' (Benkler and Clark 2016: 7-8) that they create into taxable money. For their own speculative amusement, the participants brought up two unanswered questions on this front. Firstly, can one call oneself an independent game developer if one sells game data to the National Security Agency (NSA)? And secondly, could it be possible, even in principle, to encrypt that data so that it would make more sense to the NSA to pay for it instead of just taking it?

M.M.: Can we be an indie [group] if we sell user information to the NSA?

K.A.: We don't have to sell.

A.P.: Yes we can. [No we don't because] they take it [the user information data] automatically.

K.A.: If we manage to sell it [the user information data] to them [the NSA] that is only a good state of affairs.

A.P.: Well then we're not indie, but then it wouldn't even matter

K.A.: First, we will develop the most powerful encryption mechanism so that the NSA cannot obtain it [the user information data]

A.P.: Then they will come to ask 'hey come on open it [the encrypted user information data] up'

K.A.: Yes

¹⁹ 'Internet was developed in the '60s for military intelligence purposes. It would be naïve to think it does not serve them. The solution is not to whine about the Internet, but to do something completely different; the Internet has been a surveillance system by function'. (T.P. [B.D, T.R. are nodding]).

²⁰ For instance, these investors may choose to contribute no taxes to the economy of a nation state because as economic bodies they are legally eligible to plan their taxation on a global basis.

A.P.: 'Open the door.' Well, we know that we don't know [whether] they [the NSA] open some doors.

K.A.: Then we'll say that 'surely you can de-encrypt it by yourselves but it's probably cheaper to buy it from us'

A.P.: And then they [the NSA] reply that 'I just got the decryption key from your [...] home computer'

M.U.: These all are most plausible scenarios, because we do have way too much time and people to try and develop something along these lines

These questions exemplify how difficult it is for citizens to know where to start in changing algorithmic surveillance economies. In addition, recent investments in the development of the Internet (Benkler 2016, Benkler and Clark 2016) have furthered the on-going consolidation of algorithmic markets for the ends of surveillance. These investments also do not imply that communities might own any 'big' or 'actionable' data that would make them major economic benefactors. It is hence more likely that communally-created value continues to be converted to money that may contribute to nation states' finances via globalised tax planning.

If intra-communal self-regulation succeeds, it increasingly appears as outsourced micro-management on behalf of service providers, including AirBnB, Freecycle, and Uber. In this way citizens contribute to the value of the service, which translates to the financial value of the service provider. This value is material-discursive, never fixed and commonly measured in money, and the differing agencies of money are always bound to the axiomatics of capitalism as instantiated by states' regulations. And in the case of major investors, this presumed value is closely linked with the fluctuations and bubbles of a stock market, which has become the primary reference point for contemporary differences in value. But the transition to communally-oriented capitalism has enabled incumbent business strategies to better transform everyday communal ways of living, including livelihoods, into value on algorithmic markets.

Typically, in the past, shortened intra-communal connections have been thought of as collective civic efforts to critique the dominant connectedness of production with consumption (Martin 2016). But they have actually sustained nation states' regulation endorsing civic investments as a basis for material-discursive civic contexts, lives, and livelihoods. Prime examples are material-discursive civic investments in communally-oriented electricity production. These civic investments include money, time and effort, and they have channelled citizens' desire and capacity for change to deliver civic energy resilience as a means of control. But this civic groundwork has sustained nation states' and commercial investments in the on-going transition to both fractured energy networks worldwide and civic energy autarchies. It exemplifies how 'commercialisation' (Martin 2016: 149), including algorithmic surveillance, plugs into civic investments in communal turn inwards. But none of this on-

going development has presented a profound dilemma for those who have framed transformative struggle and failure as a pathway to the projected demise of capitalisms and states (Surin 2010). For instance, transformative civic education has defined Deweyan/Ostromian communities as those which accumulate action competences for the common good of society (Jickling and Wals 2008: 8).

Is, then, transformative education towards the communal turn inwards the radical transformation for the socio-ecological common good that it claims to be? Why is it the best ethical practice to bond citizen-learners into communities where ‘actors do not get along or even distrust and dislike each other [...] and even become violent towards each other’ (Peters and Wals 2016: 184)? Is there a way for the practitioners ever to show evidence that they have learned ‘how to think’ (Jickling and Wals 2008: 12)? And what if those competent in ‘teaching [learners] how to think’ wish not to follow the transformative leadership model that supposedly sustains transformative change (ibid.)? In short, are any citizens allowed to reject the intra-communal decision-making because it glorifies civic control for the benefit of communally compartmentalised states and capitalism, or because intra-communal micro-fascism and hierarchies of entitlement run on civic ‘divide and self-rule’ in the name of democratic self-determination (Deleuze and Guattari 1983, 1987)?

The material-discursive investments in communal turn inwards ensure ‘the integration of groups and individuals into the system’ (Deleuze and Guattari 2004a: 256). This integration of cramped communal lives with the state and capitalism serves as the first key function of the apparatus of anti-production. But the apparatus of anti-production exists ‘at the heart of the production itself and conditioning this production’ (Deleuze and Guattari 2004a: 256). That is, communally-oriented self-regulation of citizens has sustained states and capitalisms at the expense of civic time, money, and/or other resources. This has happened firstly because no-one can step outside of the axiom of money although one may critique it (Žižek 1989: 31). Secondly, intra-communal control has functioned as the foundational networked activity, or material-discursive work, that has self-regulated for communally-oriented nation states and capitalisms. Thirdly, by investing in the communal turn inwards, citizens have opened up their everyday contexts, lives, and livelihoods to markets that previously were not able to feed on them. But intra-communal control has presented a civic goal for promoters of ‘transformative education’. The ontology of civic divide ensures these communities are exempted from fully accounting for how they sustain socio-economic hierarchies of ‘social reproduction’ (Jickling and Wals 2008). In short, the educationally transformed citizenship, by virtue of being on the left of civic divide, is to establish the ‘democratic’ communal contexts where full communally-managed resources are beyond co-optation by the state and capitalism (ibid.)

Transformative education for intra-communal control has thus, perhaps unwittingly, served to disguise the fact that the cramped everyday lives and livelihoods of civic societies are never a collective financial agency that is ‘too big to fail’ (Colebrook 2015).

The axiom of money is unlikely to be demolished soon, but micropolitics from within a cramped niche of communally oriented capitalisms is relevant here. They matter because conversion of value to real world money in intergalactic quantities feeds on states' collective finances. They matter because communally networked activity and civic control facilitate value for this end. They matter if one accounts for communally-oriented micro-fascism and entitlement in the making, online and in person alike. And they matter because the valuable communal activity is extensively carved out from within the intra-connected space, time and matter that are algorithmically enhanced – (partially algorithmised?). In short, 'it is not technical capitalism per se' that needs to be primarily problematised (Sturm and Turner 2014: 23, see 36). Rather, the inescapable conversion of presumed value to money at the expense of cramped civic lives needs to be accounted for. Intra-communal democratic decisions are not only complicit and contaminated (Colebrook 2015) in bringing about their nation states' economies as part of global capitalism, but also finance the value measured in the money that escapes the common interest of states to finance themselves via money and taxation.

5.2 Relational money and cramped civic livelihoods

5.2.1 Agentic quantities and qualities of relational money in the making

Recent regulation for public safeguard of neo-feudal profits 'reinstalls a power that exists by fiat rather than right' (Colebrook 2015: 141). It rewards accumulation of money in excessive quantities with the help of excessive risk-taking under the protection of regulations, including emergency bail outs, subsidies and globalised tax planning. This fiat contradicts the original role of money, which was to fund states, primarily via taxation (Buchanan 2008: 28). Rather, presumed value has been converted to neo-feudal accumulation of money at the collective expense of states. This makes nation states' collective regulation for neo-feudal accumulation of money an 'enemy' within. Further, it sustains neo-feudal benefactors who 'have abandoned any pretension of the good polity' and 'now flagrantly name and mark themselves as exceptional by means of bonuses and stately architecture (such as Manhattan's Trump Tower)' (Colebrook 2015: 141). However, the civic understanding of all this does not bring about a competent citizenship who can step outside of their participation in neo-feudal accumulation of money in excessive quantities. Therefore, 'genuine calculation – who has taken what – [should not be] 'impeded by morality, by wars on welfare and various other supposed threats to life and family' (Colebrook 2015: 150).

For instance, a participant concluded that is it not at all easy to make a living as a game developer based in Finland by participating in these markets – let alone fund a family life or meet one's legal obligations, such as payments towards a pension. If it is easy to attend to the algorithmic global markets, it is not at all easy to make a living from these markets.

It is easy to enter the game market but it is not easy to stay there. Especially in Finland it's hard to make a living in the games industry, to earn enough to support your family and to cover the [obligatory] pension costs. (L.R.).

The quantity of money that can be earned on global algorithmic markets ceases to accumulate the quantity of money one needs in Finland to make a living. This is because the algorithmic markets function to the ends of whomever owns the algorithmic platform for these markets, not the ends of those who develop the 'products' - here, gaming content - to be sold on these markets. No participants had any illusion that this would be otherwise. But nor did they promote lower salaries or the reduced legal protection of employees. This insight might or might not be unique to the socio-economic contexts of Finland and/or other Nordic countries with similar employment regulations. But in either case, it certainly does not echo the friction, between an employer's successes and their cost to employee's socio-economic wellbeing. For instance, another participant volunteered how much it costs to pay a fair salary to an employee with four children, a mortgage, and a partner who is not working:

It is great even to think that someone has four kids at home and his wife at home and a mortgage. Then, he must get three thousand a month, net, into his hand to get this arrangement even to work. And three grands net is quite a lot in Finland, when you think about the equivalent gross. (K.O.).

These insights exemplify how the status of a salary-earner as an independent game developer is not always easy to attain. For most of the participants, the choice to make a living as an independent game developer has meant that they have become a sole or a small-scale entrepreneur. In Finland, this is not only a choice to give up one's comparably secure income but also a choice to give up one's legal position as a wage or salary-earner. This choice is decisive because Finnish social security schemes have been designed in favour of those who belonged to the waged/salaried workforce before unemployment, underemployment, illness, or similar. Accordingly, in Finland, an employer's social security payments significantly contribute to the total cost of employment (Finlex Data Bank: 771/2016). In short, in the regulatory context of Finland, the participants' choice to become a small-scale business for the purposes of developing independent games has not been an act to oppose the current welfare state; neither has it been a risk that is likely to result in wealth or affluence. Rather, the participants expressed that it is the price they pay for realising their dream of developing independent games as more than a recreational activity. 'The enemy, in short, is no longer bourgeois ideology and the putative benevolence of the market (Colebrook 2015: 136). But 'the enemy' within comes in the form of regulations that facilitate neo-despotic (Deleuze and Guattari 1983), or neo-feudal, hoarding of money (Colebrook 2015) at the expense of every nation state worldwide.

Amidst machinic economies, unions are institutions that sustain their established axiom amidst all the other axioms of contemporary capitalism²¹ (Deleuze and Guattari 1983: 238, see also Colebrook 2015: 155, Read 2008: 153). Historically, trade union density (based on the paid membership fees) has been the norm in Finland, though it has been declining since the 90s' recession, with the latest OECD figure of 69% (OECD: 2013). Further, there is a yearly national income policy agreement as well as the law stating the universal validity of collective labour agreements (Finlex Data Bank: 55/2001). All these social democratic frameworks in power [pouvoir] imply that the national mass leverage the trade unions are supposed to have should have had a meaningful effect on some recent measures have been aimed at advancing entrepreneurial livelihoods (ibid.)²². These measures have been a reaction to the on-going downturn/recession since 2008 and the consequent debt accumulation,²³ both of which began with the global contagion after the US financial market crash. But rather than 'wars on welfare', these measures imply how representative democracies have regulated for collective and global agency of money in order to escape from contributing to their finances. In particular, the 'emergency' bail outs after the 2007-8 market crash show how nation states have failed in regulating for their common interest to finance themselves via money and taxation.

The participants' insights qualified in how conversion from value to intergalactic money has failed in the context of algorithmic markets, but did not resound oppositional resistance. The following discussion plugs the real world problem of cramped civic existence into some collective agentic in the making. Firstly, the differences of agentic economic bodies in the making need to be made accountable. Secondly, the agency of regulations is to be made accountable for serving quantifiable common good. But simultaneous change the traditional civic agencies might be making seems unlikely to debilitate capitalisms soon. This approach addresses how the conversion from the presumed value of civic good to intergalactic money has failed. This has happened because civic lives and livelihoods undergirding this conversion are never too big to fail but measured in intra-atomic quantities of money. By this I mean that the value that is created at the scale of everyday civic existence (intra-atomic) never matches that of enterprises (intergalactic). But how then can we address global capitalism that may not benefit the collective and shared interest of all the nation states to finance themselves through money and taxation?

²¹ Their 'struggle and failure' has not accounted for the neo-feudal accumulation of money that may eschew the common interest of nation states' to finance themselves via money and taxation. Workers of all lands are yet to unite for this 'common good' of every citizen globally.

²² Further, despite these social democratic frameworks in power, during the past decades none of the Nordic countries where the trade union membership is still a norm has been immune to privatisation, outsourcing, and similar quotidian decisions with drastic institutional effects (OECD: 2013).

²³ In Finland, the on-going downturn/recession since 2008 resulted from the 2007-8 market crash due to the globalised intra-connections of money. See <http://www.velkakello.fi/> for visualisation.

The differences of agentic economic bodies in the making need to be made accountable

Two very different kinds of economic bodies underlie the failed conversions from the presumed value of civic commodity to intergalactic money. Civic economic bodies and their material-discursive agencies to act vary as they conform to different regulatory contexts. But they tend to entail an important similarity between the material-discursive agency of ‘intra-atomic’ money as filiation and that of ‘intra-atomic’ money as alliance. Typically, the agency of material-discursive money is tightly bound to a specific material-discursive body, and this body forms an identifiable foundation for the assumed value. Intra-atomic wage/salary-earning is bound to the suspected value of one’s embodied existence as a material-discursive entity: an employee (Read 2008: 150-1). Conversely, major investors, including online enterprises, may optimise their global taxation because they, as material-discursive bodies, surpass differing regulations of various nation states globally. As highly distributed economic bodies they conform to regulations of nation states worldwide, but these regulations vary.

But communities and other civic agencies might be able to change the embodiment of their intra-atomic money and its regulatory ties to their nation state. This can be done, typically, by forming a trust. As a material-discursive legal body, a trust might comply with different regulations of a nation state than that of a wage/salary-earner. But communal and/or civic choice to plan their taxes globally and/or locally only means to participate in the collective agency of ‘excess and theft’ (Colebrook 2015: 149), to steal from other citizens, be they neo-liberal or socialist. This choice does not account for civic tactics of becoming unaccountable because embodiment of material-discursive money is not ‘just an agreement’ but an intra-connected socio-economic-ecological phenomenon.

Commonly, the circulation of intra-atomic money via citizens’ investments is bound to identifiable assets, most typically homes as property. These serve as material-discursive bodies associable with the suspected value of citizens’ investments in technologies and infrastructures, most typically property. Colebrook (2015: 148, 151) notes that mortgages are originally debts attached to property as an identifiable commodity. In addition, properties have served as an identifiable material-discursive body in order for a bank to lend. For instance, a participant concluded that independent game development company in Finland was funded in the beginning in this way (L.R.)²⁴.

Thus, two very different kinds of economic bodies have led to the failed conversions from the presumed value of civic commodity to intergalactic money. For instance, ‘commodities, homes attached to mortgages, [and] speculation about buyers and sellers’ (Colebrook 2015: 148) are never valuable enough to sustain the ‘pyramid’ (Colebrook 2015: 151) of money built on top of them. These pyramids have primarily been built as banks, and have re-packaged the material-discursive value of civic debt to tradeable assets. Hereto, non-dichotomous change of machinic economies that matters

²⁴ ‘The house of the founder’s father served as the collateral’ (L.R.).

begins with accounting for the differences of agentic economic bodies in the making. This entails the need to make the agency of regulations accountable for serving quantifiable common good.

The agency of regulations is to be made accountable for serving quantifiable common good

Nation states with representative democracies have been regulating for money as finance for more than three decades (Buchanan 2008: 33). Before the 2007-8 global crash, public politics for this end purported, on occasion, to show a nation state's power over, or power through, economy (Buchanan 2008: 32, see Ranciere 1999). But the global spread of financial downturn has shown how the collective agency of nation states via regulations has not succeeded. For instance, after the 2007-8 crash, banks across the world were declared to be 'too big to fail' and bailed out at the expense of tax payers (Colebrook 2015). These bail outs typify how states' regulations as a collective agency have not succeeded in modulating a collective agency of finance money that flows globally across their borders. But the bail outs at the expense of taxable money were needed in the first place because regulations by the nation states has guaranteed the collective agency of finance money to flee on a global basis. Therefore, it is important that the participants brought up how the EU is a collective body that can and should use its leverage for the benefit of a better civic world.

The nation states of the world are yet to conclusively succeed in addressing the elusive value-creation for taxation purposes. In particular, they would need to account for the value-creation in terms of how, where, when and how much. This means to understand value-creation as a type of work the highly distributed collective agency of humans and nonhumans do – work that should be liable to contributing to the economies of nation states. For instance, during a discussion regarding globalised tax planning in the field of gaming, a participant mentioned that an EU-wide rejection of globalised tax planning via 'Flag of convenience' (FOC) could serve as a first step on the global tax re-regulation front (D.P.)²⁵. Further, most of them emphasised that the major online investors have been notable and notorious 'tax evaders' as they have planned their taxation based on their globalised operations (L.W., S.T.)²⁶, see also excerpt quoted below: O.A., D.P). These operations make globalised tax planning legally sound, as they are internal to a major investor as a legal economic body – an enterprise. At the

²⁵ 'Regarding [the globalised tax planning of] other industries, including logistics, [...] if the EU boycotts, say Nassauan, FOC ships, surely the ships are re-registered in another country. It is not hard to re-regulate the global practice of FOC.' (D.P.).

²⁶ 'Some injustice has been commonly accepted, such as unethical global tax planning, and so on' (L.W.). 'If one's operations are jumping across [national borders], one is a notorious tax evader' (S.T.)

time of the interviews, this type of critique had not surfaced in everyday public discussion because the interviews took place prior to the more recent case of the ‘Panama papers’.²⁷

The participants critiqued the USA in particular, but also the EU for their non-efforts to tackle tax planning on a global basis. The background for their critique was that as a regulatory, legally binding and economic body, the EU has overarched the national regulations.

O.A.: Concerning the tax exemption to this kind of big companies or to anyone, in my opinion it is not OK. The United States pretends to do something for this matter. At E.U. they have tried to do something but it is quite ostensible.

D.P.: I think economic sanctions against tax havens would be a kind of first thing that e.g. E.U. could do. On the Isle of Man, they would quite soon be starving and then they could... I mean, it may be quite cynical to think that the global community is not able to do anything to these tax havens; it cannot be so difficult.

O.A.: It is so wrong if this is a thing to which their eyes may be in a way too much closed.

D.P.: Quite much so.

O.A.: If they start, this could be one of the first things to do.

The discussion reproduced above established how the EU, as both a regulator and a collective socio-economic-ecological body, could use its leverage for the benefit of a better civic world. But the publication of selected ‘Panama papers’ is yet to result in globally binding changes in tax regulations. That is, nation states are yet to publicly seek a common ground that would support their collective interest to finance themselves via money and taxation. Additionally, there has been no shortage of believable justifications for nation states to take collective actions now in favour of money as global finance at their collective expense (Colebrook 2015: 146). But these actions have been taken out of concern that the collective agency of money to flee globally is too powerful: that this flight results in a contagious recession that is globally long-term. Well-founded critique and ‘genuine calculation’ are continuously needed on this front to account for excessive risk-taking at the expense of public safeguard (Colebrook 2015: 150). This critique is needed now because communally-oriented voters, both online and in person, have recently been mobilised to unify against ‘excess and theft’ (Colebrook 2015: 149). But this mobilisation for anti-establishment has thus far failed in accounting for the material-discursive money that has been exempted from contributing to the finances of any state globally. As confrontational approaches they have reinforced the dichotomous thinking as the basis of civic agencies, yet failed in seriously debilitated machinic capitalisms with this approach. This is

²⁷ ‘Panama papers’ refers to information released in 2015 about global tax planning via Panama. This information was selectively published based on 11.5 million files obtained from the database of the world’s fourth biggest offshore law firm, Mossack Fonseca.

partially because they have failed in accounting for both the global regulation for the axioms of capitalisms and the complex economic bodies in the making. All these are material-discursive agencies that intra-act with space, time and matter. It is the ‘How?’, ‘Where?’, ‘When?’ and ‘How much?’ of these intra-actions that needs changing.

The traditional civic agencies in the making might not debilitate machinic capitalisms easily

Every axiom, including every axiom of machinic capitalisms, is always material-discursive. Traditionally, confrontational approaches have urged joint civic actions against a ‘global capitalist system’ as if capitalism was not material-discursive (DeLanda 2008: 176). Those participants who mentioned this type of oppositional resistance emphasised their full support to the concept of resistance in the service of equality and justice for all. But they also remarked how problematic it is that citizens have been made responsible for creating the missing feedback loops between civic actions and nation states’ regulation for democracies and globalised axioms beyond their borders. For instance, a participant mentioned how sad it is that encrypted anonymity networks are needed because open discussion is not possible. They continued that it is both great, and an intriguing thought, that people are using the Internet, a network originally designed for the needs of military intelligence (Arpanet), for revolutionary actions and demonstrations. But the true problem of the contemporary political and ethical status quo is that citizens need to take actions towards, and voice their support for, oppositional resistance.

D.T.: I think it is a little bit sad that... well, sure it is idealistic to say but it is a little sad that those [encrypted] anonymity networks must exist because it is not possible for all to freely discuss in the open network, but it is good that [encrypted] anonymity networks exist and it is good that all folks - without any scruples - utilizes the military network originating from Arpanet, just for doing revolutions and demonstrations. Even as a thought it is just great.

O.A.: And the problem is that we have to speak in favour of this

This quotation echoes DeLanda’s (2008: 176-7) conclusion that any meaningful change has to be material-discursive. He argues that traditional civic actions against globalised capitalism have mainly utilised the same approach as the social justice movements (ibid.). But these actions have evidently failed in creating the missing feedback loops between their critique and the meaningful transformation of globally intra-connected capitalism. This is because they have largely assumed that ‘there is no distinction between what actually exists and what we discourse about’ (DeLanda 2008: 177). That is, there are no ‘real world’ targets whatsoever: it only counts that one claims the moral high ground on the transformative side of the predetermined us/them dichotomy. Because these citizens have ignored that the axioms of capitalism are always material-discursive, it becomes unproblematic for them to claim that they are transforming the global capitalism.

None of the participants echoed the idea that the material-discursive agency of global capitalism is traceable to the subjectivities of dichotomous citizenship. For instance, throughout the interviews, the participants emphasised that not everything can or should be valued in monetary terms. One of them concluded that the value of independent games as follows. ‘Notwithstanding the money that may be made, there is value in any independent game itself, as there is in passing on a [different type of gaming] culture’ (L.A.). But none of them even hinted that this culture of independent games and gaming would exist as autarkic rather than as part of the material-discursive capitalism undergirding any production and consumption of algorithmic content. For instance, they emphasised that the choice for anyone to establish their everyday life and livelihood as an independent game developer is bound to the resources at their disposal (L.A., A.P., K.A., M.M.²⁸, see also S.T. quoted in full below). Another participant, for instance, echoed how ‘money is just a social convention’ (Žižek 1989: 31), but to understand this does not make one competent to act as if value was not converted to money, to a material-discursive resource.

In the Apple store there is a list of 25 games, and the consumer is thinking why the value of one game is five-fold in comparison to some other game. It's no use explaining that the cost of developing it was 50 times more, that the gaming experience is of higher quality. (S.T.).

This calculation exemplifies how one cannot opt out from acting as if the conversion of value to material-discursive money was not real. It qualifies how the everyday civic lives do not exist in some other space, time and matter where money does not serve as a source of their income, paid by the gamers. In other words, to question the material-discursive agencies of money is very easy to do discursively, but this does not entail a material-discursive way of life independent from differing agencies of money. How then, may we, without resorting back to dichotomous understanding, understand ethics embedded in conversion from value to material-discursive money in real world quantities?

²⁸ ‘[...] but of course some money is needed in order for us to do that’ (L.A.).

M.M.: [...] And then I just changed one number in order to double the length of one level [of the game].

A.P.: Apt development and programming practices are brilliant, but they are time-consuming, and time is what we don't have. If we had money, we could buy time, the resources of work.

K.A.: Or ready-made solutions, or something.

5.2.2 Ethics within two scales internal to money and intra-actions of money in the making

Again it is sanctimonious truth – the truth of capitalism in its current form as the only way – that needs to be destroyed by a sense of simulation, inscription and a mode of theory that refuses such smug certainty (Colebrook 2015: 150).

Two scales internal to money underlie the conversion from value to material-discursive money in real world quantities. These scales are simultaneously disconnected from, and connected with, each other: dis/connected. These scales have been called ‘intra-atomic’ and ‘intergalactic’ scales of money (Deleuze and Guattari 1983: 230). But there is no common measure between added value at the financial scale of enterprises (intergalactic) and value that is created at the scale of everyday civic existence (intra-atomic).

The two scales internal to money are disconnected because there is in fact no common measure, even though value is supposedly measured in the same analytical unit: money.

‘Measuring the two orders of magnitude in terms of the same analytical unit is a pure fiction, a cosmic swindle, as if one were to measure intergalactic or intra-atomic distance in meters and centimetres (Deleuze and Guattari 1983: 230).

Also a participant echoed this conclusion.

Our ‘cooperation partners’ belong to that [global] 1‰ of a 1‰ [one per mille of one per mille] which actually owns everything. [By ‘cooperation partners’ the participant referred to the notable online enterprises such as Amazon, Apple, Facebook, Google, and Microsoft. (D.T., see also the lengthy excerpt²⁹).

²⁹ D.P.: I would say that all the problems, including workers’ rights, raw materials, and so on, are part of the same issue: these problems do not matter to the big players, which are too big. That is, they are exempt from being accountable to the society, for instance, in practice there are two types of mobile phones [they come with either Apple OS (operating system) or Google OS]. [...] It is very difficult for both the European voters and the comparable companies to successfully resist them.

O.A.: I guess legal monopoly akin to tobacco companies that lobbied legislation around late 1990s, early 2000s.

D.P.: I agree, but the difference is that the community of users matters. [...] Even if you split Facebook, and the two halves are equally good, the people begin to gravitate towards one or the other. I think it’s great we have two competing corporations in the mobile phone market [Apple and Google].

D.T.: Just like D.P. said earlier, the issue of unaccountability is beyond the means of our [medium-sized] independent gaming company [based in Finland]. Us three, on this side of the table, belong to this famous one percent [because one belongs to the richest 1% globally with yearly salary of 34 000USD, even if one belongs to the local ‘99%’ (see Kenny 2012, <https://foreignpolicy.com/2012/02/27/were-all-the-1-percent/>)]. I don’t know about those doing academic research...? Maybe if they work for Apple.

The author of this study: Depends. We can say yes.

D.T.: Let’s say yes. Our ‘cooperation partners’ belong to that [global] 1‰ of a 1‰ which actually owns

But simultaneous to their disconnection, these two scales are also complexly connected. They are connected via direct agentic actions that are internal to money. These are the intra-actions of money, and their agency is always material-discursive. This is because it is an illusion that one can step outside of capitalism (Colebrook 2015: 149, Žižek 1989: 31).

Figure 1 visualises the two dis/connected scales of money, as well as five of the different ways for material-discursive money to intra-act. Traditionally, the analyses on intergalactic and intra-atomic scales of money have emphasised the disconnection between money as capital and money as wage/salary-earning. For instance, Buchanan (2008: 30) borrows Deleuze and Guattari's (2004a: 249) terminology of alliance (money as payment and wage/salary-earning) and filiation (money as finance) to this end. But there is no authentic action citizen akin to 'the worker (whose labor will always grant them a genuine sense of the struggle of existence and resistance of the real)'. Neither are there communal civic competences outside of money, time, effort and/or other resources. Rather, both the trophy of the worker and the trophy of the action citizen have served 'a fantasy that resistance comes from outside' (Colebrook 2015: 155). By doing this they have perpetuated the illusion that the capacities of an insightful transformative community to act change are somehow not participating in reproducing the socio-economic hierarchies of communally oriented states and capitalisms. Even though it presents 'an attractive and stimulating idea' (Holloway 2002: 167), a partial freedom from machinic enslavement is nevertheless a fantasy, or a fiction. And it is 'a fiction that easily leads on to other fictions, to the construction of a whole fictional world' (Holloway 2002: 167). But it is akin to 'a fiction of a prisoner who imagines that they are already free (Holloway 2002: 167), even though they cannot opt out from the space, time, and matter of their imprisonment.

The terms 'alliance' and 'filiation' are used in Figure 1 to draw out how money is simultaneously internally disconnected and connected via intra-actions. That is, money as agentic quantities, including everyday wages, salaries, and mortgages, takes part in the intra-actions that do not pre-exist the agentic phenomenon of money. Therefore, it is highly important that the participants qualified how their agencies of choosing to choose as independent game developers have taken part in the intra-actions of money. These insights exemplified how any citizenship participates in bringing about the ethics embedded in material-discursive money in the making.

Figure 1 visualises five of the different ways for material-discursive money to intra-act. This is because the participants explicitly identified these five. Firstly and secondly, there are cross-scale

everything. They can, or do, rule, and our means are very limited.

D.P.: Further, compared to Supercell [a medium-sized independent gaming company based in Finland] our one is miniscule. It's weird that at the moment we have a chance of, say, 1‰ [one per mille] to become the one that is catapulted to the level above Supercell.

intra-actions of intergalactic money as filiation with intra-atomic money as both alliance and filiation. Two examples from the interviews are outsourcing and venture capital, respectively.

cross-scale intra-action: intergalactic filiation <-> intra-atomic alliance

One invisible group of game makers are those who sub-contract for Rovio and others, e.g. Android versions and Windows Phone versions; doing first sub-contracting for bigger companies for a shorter time and then creating their own product. (L.R.)

cross-scale intra-action: intergalactic filiation <-> intra-atomic filiation

‘The founders [of a small game development company were] ‘A bit mischievous, [because they were themselves] the angel investors. [...] A few months ago, they got the first real financial investment of about one and a half million. (N.T.)

Thirdly and fourthly, there are intra-actions within intra-atomic money as both alliance and filiation – for instance, crowdfunding and buyout, respectively.

intra-scale intra-action: intra-atomic alliance <-> intra-atomic alliance

Nowadays [...] people seem to spend months on making the [crowdfunding] pitch [the Kickstarter pages and the demo] [...], but it may happen that you do not get any money with the help of it (N.T.).

intra-scale intra-action: intra-atomic filiation <-> intra-atomic filiation

In case our product is not ready, they’d rather have a share of the company (A.P.).

Fifthly, there are intra-actions of intra-atomic money as alliance and as filiation, such as friends and family funding.

intra-scale intra-action: intra-atomic alliance <-> intra-atomic filiation

They collected money from their own savings and by begging, then got some from TEKES³⁰, from the friends-and-family financing circle, just to get their company for operating (N.T.).

³⁰ TEKES (the Finnish Funding Agency for Technology and Innovation) funds academic, public and private research and development projects; its funding comes from Finnish Ministry of Employment and the Economy.

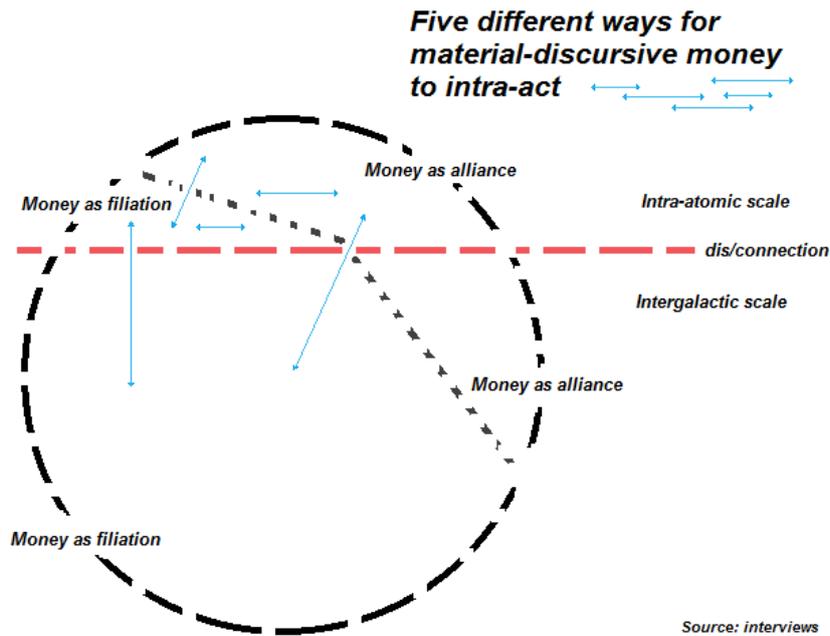


Figure 1: Five different ways for material-discursive money to intra-act.

Figure 1, above, qualifies and makes visible material-discursive agencies of money at work, and visualises five different ways for material-discursive money to intra-act. The on-going intra-actions of money, the on-going agentic work of money, qualify and make visible cramped economic existence in the making, as an integral part of machinic economies. In short, money as a material-discursive resource facilitates civic actions that do not bring about a more equal socio-economic-ecological world. To further qualify Figure 1, outside the circle (dotted black line) we can locate the taxation of nation states, their central banks and externalities, including negative ecological effects. Below the red line of dis/connection, inside the circle, are the markets between (B2B) and internal to business entities, which conform to rules such as OECD transfer pricing.

It makes a difference that matters to qualify and visualise intra-actions of money, the agentic phenomenon of money in the making. First and foremost, this conceptualisation contributes to destroying ‘the truth of capitalism in its current form as the only way’ as it shows ‘a sense of simulation, inscription and a mode of theory that refuses such smug certainty’ (Colebrook 2015: 150). Neither does it rely on morality to do so. Rather, it explicitly rejects dichotomous critique to capitalism – and the consequent moral and ethical high grounds. Therefore, it reveals ethics embedded in money in the making. This does not mean to suggest that this ethics in the making may ever engender ethical choices. But this conceptualisation of ethics embedded in intra-actions of money may serve as an opening for future studies and discussion.

To analyse ethics embedded in intra-actions of money helps in critiquing material-discursive phenomena such as globalised tax planning. The hoarding of money in intergalactic quantities at the

expense of nation states, and intra-connected qualities of economic bodies in the making, need to be accounted if we are to account for money as an institutional constraint for a civic-led collective change (Colebrook 2015). But to respond to ethics embedded in the phenomenon of globalised tax planning we need to account for intra-actions of money that entail differing agentic qualities in the making. Importantly, though material-discursive agency of money may enter into the collective agency of globalised tax planning this certainly does not mean it legally has to. Tax planning is an option, unlike liability to pay taxes, which is a duty that ties some economic bodies tightly with the agentic tax regulations of a state. But what enters into the collective agency of globalised tax planning is the material-discursive agency of money.

Two differing agencies of a horse exemplify how two differing agencies internal to material-discursive money differ as they join into two differing collective agencies. A working horse typically enters into a collective agency of ploughing in a similar way a tractor might (Deleuze's and Guattari's 1987). And a racing horse typically enters into a collective agency of racing in a similar way a motorcycle might (ibid.). This does not mean that one cannot plough with a racing horse or race with a working horse (ibid.). It means that the material-discursive agency of a horse, or money, differs if it takes part in a different collective agency. Hereto, if the agentic quantity of money changes, this does not automatically change the agentic quality of the money. But what matters is the collective agency of global flight. This collective and revolutionary agency of money to flee intra-acts with space, time and matter. This agency does not pre-exist the how, where, when, and how much of its occurrence. The phenomenon of non-taxation necessitates the global regulations that frame this flight as an option but intra-actions of money entail it. But most importantly, the collective and global agency of money to flee exemplifies how material-discursive money in the making entails ethics.

Therefore, ethics is embedded in that material-discursive agency of intergalactic money which is not entering into the collective agency of globalised tax planning, even though it could do so. But does the agency of choosing to choose matter if it is not associable with civic economic bodies? For instance, does it matter that a medium-sized gaming company based in Finland chooses to pay taxes in full rather than make more money by joining to the collective agency of international tax planning? This question is of real world because this is exactly what Supercell, a medium-sized mobile games company, and its key personnel have paid all the taxes in Finland instead of planning them on a global basis. This official open data from Finnish tax administration³¹ has served as a topic of yearly media discussion, starting 2013 after the publication of tax year 2012 statistics³²

³¹ See 2012-2015 open data of Verohallinto at: https://www.vero.fi/tietoa-verohallinnosta/tilastot/avoin_dat/

³² See, for instance, YLE 2015 and 2016 at: <https://yle.fi/uutiset/3-8419524> ; <https://yle.fi/uutiset/3-9262761>

Supercell's choice exemplifies a material-discursive agency of intergalactic money at work. Not entering the collective agency of globalised tax planning means not eluding material-discursive bodies complying with a nation state's tax regulation. Furthermore, the fact that this choice is uncommon implies that 'it is now widely accepted that the few at the top will do all they can to maintain wider and wider difference' (Colebrook 2015: 141). However, the regulation undergirding the disconnection of intergalactic and intra-atomic money does not need to be widely accepted.

But every time there is a news coverage about Supercell's money and profit, I would like to write to the journalist, 'P.S. Include in your story that Apple just profited [because data underlies profitable conversion of value to money]. And then of course Apple takes 30 percent of the total sales without paying taxes worth a single penny of it. I'm sure there's nothing to worry about. (D.P.).

This quotation provides a genuine calculation that addresses regulation for material-discursive money as a global, not national problem. On this front, another participant noted that, contra to Google, Apple has been paying national taxes on behalf of every game developer from the beginning. '[...] Apple is taking care of paying the taxes, and you get your net payment as a royalty' (S.T.). In the case of a one dollar game purchased with intra-atomic money, this is hence the 'where' and 'when' and 'how' of the disconnection of 30c of this intra-atomic dollar from its intra-atomic scale of money. The agency of this 30c of money is free to enter the collective agency of globalised tax planning, as its material-discursive value is now measured on the intergalactic scale.

Firstly, this process implies two unanswered questions. What does it actually mean, and what happens when a nation state with an elective democracy cannot avoid bankruptcy measured on the intergalactic scale of money? It also shows how the two dis/connected scales of money qualify the ethical and political status quo in the making. But it does not imply how to act – without any illusion of stepping outside of machinic enslavement – as if 'value could be converted differently to material-discursive money. Therefore, the pertaining question remains whether the traditional politics, 'formed [...] from excess and theft' (Colebrook 2015: 149), should primarily actualise different axioms of intra-acting money. This is left for future studies to analyse.

5.2.3 It matters how we understand and change material-discursive money in the making

Money facilitates an everyday access to choices citizens may make. It is an illusion that citizens can opt out from enlivening their own machinic enslavement via money (Colebrook 2015: 149, Žižek 1989: 31). Most importantly, money is 'the invention of the State, primarily for the purposes of taxation' (Buchanan 2008: 28). Neither money, nor any of the agencies internal to money, would exist

had the regulations of nation states worldwide not made them possible. That is, regulation encompasses that which might have been left unregulated. The material discursive axioms of capitalism, as well as money and taxation, depend on regulations or the lack thereof. But differences in the making destabilise the on-going transitions to algorithmic capitalism from within them though the axiom of money facilitates civic choices. In short, collective power [*puiissance*] of highly distributed collective agencies neither resists nor adopts that which investments in on-going transitions to algorithmic capitalisms, societies of control and governmentality, which works for ensuring the profitability of algorithmic capitalisms at communities' expense, have decided on our behalf. But it destabilises from within them the intra-actions of essentialist 'data' and 'evidence' with predetermined everyday differences and control hierarchies, which facilitate volunteered civic control for the ends of communally oriented capitalisms and control societies. Neither does this non-deterministic change replicate the divisive logic of algorithmic, civic, political and other comparisons that enact micro- and macropolitics of co-opting projected futures by predetermining where the difference between agency and change lies, and which differences, agencies and changes matter.

It hereto matters globally that nation states worldwide have regulated against their common interest to finance themselves via money and taxation, because they have regulated to allow the global agency of money to freely traverse their legal borders. They have regulated for diminishing their collective and global power [*pouvoir*] to modulate, the collective and global power [*puiissance*] of financial capital that flows through them. This is a shared dilemma of all nation states. The regulation to allow money to move globally matters because the relative quantity of globally free money well exceeds the quantity of that money that is confined to states' legal borders (Colebrook 2015: 127, 147, 149). In 2016, the voter communities of the UK and the USA, both in person and online, were mobilised with the idea that they can and should obtain the socio-economic power [*pouvoir*] over 'their' national economy. These campaigns mobilised their communally-oriented nation state to turn inwards by ignoring that what needs to be addressed is the collective regulatory agency of states globally. But what needs to be accounted for is the collective and global, not the national, agency of money. This revolutionary and collective agency has been successfully united and freely crosses nation states' borders.

The regulations for global capitalism do not stop at the legal borders of nation states, because they presuppose that as a collective agency, material-discursive money is both globally connected and internally heterogeneous. But for instance the transformative citizens of all countries have not united their collective agencies for the global common good and justice of all. Their joint efforts are yet to evidently accumulate their projected competence to profoundly demolish both nation states and capitalisms.

The communally oriented struggle and failure does not, by definition, sustain the hierarchies of ‘social reproduction’ (Jickling and Wals 2008). By definition, some communal citizens are accumulating material-discursive resources without vested interests (Hobson and Niemeyer 2011). Further, all citizens worldwide have been made responsible for accumulating socio-economic-ecological resources as members of the democratic communities imagined by Deweyan transformative scholars. But what makes this accumulation just and deeply socio-ecological is that the communal citizens declare that they ‘are not idiots’ (Mogensen and Schnack 2010: 64-5).

These definitions have reinforced a ‘fantasy that resistance comes from outside’ (Colebrook 2015: 155); that there is a socio-ecological existence beyond cramped space-time-matter. These definitions have hence overlooked that, at the moment, no communal context, algorithmically enhanced or not, can opt out from a nation state that regulates for capitalism. Neither have they taken into account that it is likely impossible for any citizen to discern whether their everyday civic contexts – communal and/or other – might have been infiltrated with some intentional strategies of the state and/or capitalism. Thus, these definitions do not reflect the real world difficulties for citizens to profoundly change institutions that constrain them but without them knowing about these institutions. Neither do they inform civic competences to transform control societies that are communally oriented, relational, and increasingly algorithmically enhanced. In short, they imply a scope for relational non-resistance and education for the ends of material-discursive micropolitics with capacity [puissance] to make a difference that matters.

The precondition for relational non-resistance is that the agentic quantity of intra-atomic money does not have an agentic quality all its own. But intergalactic, unlike intra-atomic, money ‘of’ all countries is already successfully united. Consequently, the agendas of relational education would also benefit from advancing a material-discursive change that is not ‘impeded by morality, by wars on welfare and various other supposed threats to life and family’ (Colebrook 2015: 150). This change is needed to eschew any control feeding on self-determination and decision-making internal to communities, which cannot opt out from their communally-oriented State and capitalism. It is possible to ‘act on evidence for’ socio-ecological phenomena, including climate change (Colebrook 2015: 146-7), yet not reinvigorate control.

6 Ethics of relational education and micropolitical non-resistance

Ethics is embedded in intra-actions of personal recalcitrance with collective agencies that are never individual, nor only human, but always collective, co-constituted and highly distributed through a range of material-discursive registers, including the physical, chemical, biological, neural and social. In what follows, I show a civic micropolitics of relational non-resistance at work to change from within the on-going transitions to algorithmic societies of control with algorithmic capitalisms and governmentality that feed on communal implementation of their predetermined real world, including their work for civic climate resilience. This analysis makes visible how collective agencies of practices destabilise the rigidification of communities as power centres for biopolitical control for the ends of surveillance capitalisms and state surveillance, and I reveal the limits of control as I discuss smart grid as energy commons. In short, to actualise a virtual real entails an ethics that both re-conceptualises how differing matters and experiments ethically to understand and experience, the best one can, without implementing categorisation and comprehension of other (Bogue 2007: 9-10, 13). But ontology as ethics makes a relational difference that matters. This discussion allows me to establish how ethics is embedded in relational ontoepistemological education that can foster a civic micropolitics of relational non-resistance. Further, it allows me to analyse why the agency and change embedded in the on-going transitions to algorithmic governmentality matter. But why does ethics for destabilising relational phenomena from within them matter?

6.1 Why ethics for destabilising relational phenomena from within them matters

To act on civic ethical responsibility (Bogue 2007: 7-15) means to destabilise conceptualisations and actions that implement a relational real world where comparisons rule. But to put in practice this ethical responsibility means to reject the dichotomous ontologies that entail these comparisons. Thus, relational non-resistance does not conform to the material-discursive axiom that there 'is' essence, but entails a multiplicity of 'ands': the rhizomatic 'mashup' of relational agentic phenomena and intra-actions. This understanding challenges the micro- and macropolitics of deciding in advance whether there is a difference, and if so, whether that matters. In doing so, it changes from within the on-going transitions to algorithmic governmentality 'as the only way' (Colebrook 2015: 150). Neither does essence ground regulation for predetermined differences that, most notably, bring about the global axiomatics of material-discursive money and taxation. Further, to reject the essentialist understanding of agencies and changes necessitates that we do not subsume our research inquiries to causal, hierarchical and structured binaries, such as one against many, that reproduce what they seek to find. For instance, no practice is ever individual or only human but always a collective highly distributed agency that acts. Therefore, to conceptualise and act ethics means to contradict civic education that

continues to subsume learners to the essentialist myth 'I am'. This myth has facilitated collective entitlement to characterise, categorise and judge in order to bring about the world of comparable differences that the characterisations, categorisations and judgements have premediated and predestined. Of recent civic educators, New Materialists, alongside delezoguattarians, have adopted a non-binary metaphysical stance. Yet, the assumption of essence continues to dominate civic education that divides practitioners to those who, in their essence, are/are not atomised idiots, citizens of social reproduction (Jickling and Wals 2008: 8). In short, the predestined demise of capitalisms and states has been traced back to the civic competences and mindsets, Gestalts, of educationally transformed non-idiots. Consequently, education for turning idiots to non-idiots has subsumed citizenships globally to transformative mediation, facilitation, and design to this end (Wals 2010a, 2010b). Conversely, educationally transformed citizens have been entitled to publicly adopt a moral high ground of having put aside their vested interests and acting for the global common good and justice for all (Hobson and Niemeyer 2011: 966). But why does it matter that the axiom of essence allows non-idiots to frame the individualised others, idiots and their households/families, as those to be held accountable for everyday social reproduction?

The axiom of essence is written into algorithms largely because our everyday micro- and macropolitics, including civic education, take essentialist power hierarchies as given, only to be co-opted and framed as 'natural', im/moral and/or democratic. But what can we do for rejecting the axiom of essence that performs a real world where a difference in comparison, rather than a difference in itself, is meaningful? We can begin with civic education that does not implement lazy conceptualisations but rejects the essentialist difference and consequent shortcuts such as 'human nature', 'character' and 'a shared sense of subjectivity'. This choice matters because rejection of essence would resolve the prime ontoepistemological problem of algorithmic governmentality: that we cannot know which comparisons undergird the everyday algorithmic work. Conversely, civic education has praised transformative communities for bringing about their predetermined 'common good' by implementing their preferred power institutions, self-determined decision-making, rules, norms and sanctions (Jickling and Wals 2008: 8, 18). In short, all citizens have been required to invest their resources, actions and desires in a communal turn inwards, for example, in the 'sustainable' management of resource pools, and these investments have been projected to contribute to the 'long revolution' (Surin 2010) and the predicted demise of states and capitalisms. But material-discursive investments in communal turn inwards that implements self-determined management measures, including biopolitical control over embodied persons, work to insure that money at intergalactic quantities is made from these measures – even if communities frame them as global implementation of common good and justice for all. Most notably, they replicate the logic of algorithmic governmentality by implementing 'an ongoing practice of disaster ethics: in an age of volatility and precarious life – we are told – we cannot afford to be too relativist, and need to turn back to

management and expertise' (Colebrook 2015: 148-9). Therefore, if we did not accept the lazy conceptualisation that it is just for moral communities to enforce their preferred 'real,' we would be in a much better position to challenge how future-oriented intra-actions of every person with real world have been, literally, written into programming code. But how then, can we act ethically on evidence for climate change (Colebrook 2015: 146-7), yet not reinvigorate control for the ends of communally oriented control societies that are 'smart', algorithmically enhanced? I return to this question in section 6.2, and reveal the limits of 21st century control by unpacking smart grid as energy commons. But before I do that, I continue addressing the need for ethics embedded in relational ontoepistemological education that can foster a civic micropolitics of relational non-resistance. To this end, I next outline the need for education that addresses profound ontoepistemological problem of pre-emption, which algorithmic governmentality has made visible.

The need for education that addresses the ontoepistemological problem of pre-emption at work

Algorithmic governmentality has largely embraced algorithmic pre-emptions. Pre-emption 'consists in acting not on the causes but on the informational and physical environment so that certain things can or cannot be actualised, so that they can or cannot be possible' (Rouvroy and Stiegler 2016: 34). This presents an ontoepistemological problem because by simply observing algorithmic pre-emption at work, neither citizen nor scholar is able to identify the norms, if any, that underlie it. The 21st century algorithms may learn, act, and learn about learning and acting, which means that the norms, if any, underlying these processes may be subject to change. Further, it is never certain whether one actually identified the norms one set to find by enquiring about them from the algorithm itself. Also, algorithmic pre-emption serves to make everyday communal pre-emption visible because it makes visible the need to address what we can do in order to make ethical and responsible difference without pretending that we are acting on the essentialist causes of complex phenomena, such as societal energy-reliance. But political mobilisations that urge communal entitlement to enforce pre-emptive measures for their common good need continuous scholarly attention. For instance, if communities 'are interested in knowing in advance what risk the [foreign] newcomer represents for their safety and tranquillity' (Rouvroy 2016: 126), they replicate the logic of acting on the informational and physical environment. If that newcomer does not succeed in signing a rental agreement in some community, s/he might never find out whether the potential landlords are acting on the causes of phenomena, and if they are not, what, if any, norms and/or other power institutions, is this community enforcing? In short, whereas divisive ontologies have urged civic predetermination, taking actions to cause, algorithmic pre-emptions, taking actions to prevent, have been condemned. But both future-oriented actions preclude. Both co-opt the future because they act the micro- and macropolitics of deciding in advance whether there is a difference, and if so, whether that matters. Next, I provide a conceptual backdrop for the profound need for ethics in the making by discussing the on-going rigidification of moral power centres for the ends of 21st century biopolitical civic control. This discussion explains

further why there is a need for relational ontoepistemological education that unpacks and builds on collective agencies with collective capacity, power, for short, to destabilise communally oriented control societies from within. After this discussion, I continue with unpacking the intra-actions of civic education and 21st century apparatus of biopolitical control at its quotidian work.

Civic education and rigidification of moral power centres for the ends of biopolitical civic control

As Colebrook (2015: 150) argues, ‘Power has always been achieved by impeding exchange and establishing a moral center’, and, hence, ‘war of differentials [...] on the rigidification of the field’ is needed (Colebrook 2015: 155). Such recalcitrance destabilises from within those intra-actions that pre-empt phenomena with predetermined differences in comparison. Consequently, collective politics means ethical experimentation rather than co-opting the predestined future. As opposed to this ethics of experimentation, micro- and macropolitics that rigidify moral power centres ‘declare quite shrilly that a certain path must be followed’ (Colebrook 2015: 146). Such politics must be problematised because collective politics of co-opting the pre-destined future entail micropolitics of ‘self-evident truths, and clarities’, micro-fascisms for short (Deleuze and Guattari 1987: 228).

For example, transformative civic education has required that citizens invest their resources, actions and passions in their communities and declare the moral high ground of social transformation notwithstanding that these directly benefit capitalist control societies of communal ‘divide and self-rule’. That is, this education has served to obliterate that material-discursive investments in communal turn inwards reproduce socio-economic and other hierarchies of inter- and intra-communal inequality (Datta 2015, Luque-Ayala and Marvin 2015, Wu 2012). Further, this education has reinforced communities as moral centres whereby everyday power hierarchies, including rules, norms and sanctions, have been reproduced despite that ‘many of these structures and routines have been oppressive for various groups of people’ (Brinkmann 2017: 126). That is, transformative communities have institutionalised meaning and values, or ‘modern archaisms’ (Deleuze and Guattari 1983: 258) that subsume civic willingness and capacity for change to intra-personal rigidities. Simultaneously, any personal experiences of harm and injustice have remained as a primarily privatised concern to be kept from destabilising from within those communities that sustain these experiences. Consequently, for instance, critical scholarly communities have not refrained from reproducing hierarchical institutions of biopolitical control that directly benefit machinic capitalisms at the personal expense of some community members, nor taken up vanguard leadership and undertaken joint civic actions to this end (Morley 2016, Jackson and Mazzei 2011). Rather, these communities have typically framed themselves as moral power centres against capitalism, yet not questioned the ontology that frames meaningful changes as oppositional. Further, the assumption of a divided citizenship has guaranteed rigidification of moral power for those salary-earners wishing to declare that their ‘shared’ subjectivity functions as evidence that their communities are fighting for a common good and justice

for all. But money and other resources resulting from hierarchical social reproduction facilitate any civic and/or communal choices to relieve their cynicism and bad conscience by fighting for something morally sound (Buchanan 2008, Read 2008). Scholarly debates have problematised this political and ethical status quo; orthodox civic education for turning communities of citizens into communities with ‘shared’ senses of civic subjectivity has left it mostly unaddressed (Ferreira 2009).

Moral education for transforming communities has been framed as the only sound agenda (Ferreira 2009), notwithstanding that communities have institutionalised oppressive power hierarchies (Brinkmann 2017: 126), including epistemic inequalities, in the moral guise of anti-capitalist common good and justice for all³³. Consequently, this civic education has left it undertheorised that communal turn inwards means some practitioners put aside their so-called vested interests as de facto unequal, or oppressed, members of communal democracies (Bordo 1996, Stanley and Wise 2000: 263, 273-5). Hereto, this education has served to conceal how the rigidification of communally orientated states and capitalisms outsources the crises of democracy to patchworks of civic divide and self-rule. Therefore, civic education that primarily addresses the rigidification of moral power centres is needed if biopolitical control is not to implement communal micro-fascisms such as classism, sexism, racism and xenophobia. For instance, the 2016 UK and US elections show how reinvigoration of these power hierarchies may unite communities across the left-right divide of traditional party politics. But this would require that we reject lazy conceptualisations and eradicate the differences in comparison that undergird divisive ontologies and hierarchical power institutions in the service of communally oriented control societies. How then, does civic education intra-act with 21st century apparatus of biopolitical control at its quotidian work entail?

Civic education and 21st century apparatus of biopolitical control at its quotidian work

As part of communally oriented control societies, also communities function as capitalist net consumers and objects of consumption that rigidify the communal patchwork of social reproduction and biopolitical control for control societies’ ends. Traditionally, both atomised idiots and individualised households/families have been condemned for functioning as objects of capitalist consumption suited to expressing civic choices that rigidify both capitalisms and states. (Buchanan 2008: 33, Colebrook 2015: 138). Commonly, intra-household and/or familial rigidities have been critiqued for bolstering nation states and capitalisms by privatising the personal experiences of harm

³³ For decades, feminist theorising has questioned all the hierarchies of scholarly communities that have devised what counts as understanding and knowledge (Bordo 1996, Morley 2016). Notably, English-language speakers and publications, such as ‘US academic feminism reaping the products of US imperialism’, rule globally (Stanley and Wise 2000: 282). But there is a need to profoundly address the epistemic hierarchies that rule ‘anti-establishment’ communal politics. These have devised ‘leftist’ ‘Western’ agendas and revolutions by trivialising and individualising the overdue institutional change of gendered power and control (Bordo 2017).

and injustice: for relieving and treating them (Buchanan 2008: 33, Read 2008: 155-7). This critique has left rigidification of communal power institutions intact. Consequently, education for civic investments in communal divide and self-rule has denounced the everyday changes and actions of idiot others, atomised practitioners and individualised households/families, but urged those of non-idiot others (Wals 2010b: 385). But civic education for communal turn inwards has disguised how 21st century communities replicate the traditional role of a family, a ‘microcosm, suited to expressing what it no longer dominates’ (Deleuze and Guattari 2004a: 286). For instance, material-discursive investments in communal climate resilience exemplify that during extreme weather events the survival and suffering of embodied persons is profoundly at the mercy of whatever their communal self-rule implements (Lemieux 2014, Neimanis and Walker 2014, Ramos et al. 2013). That is, choose your community wisely, capitalisms and nation states will not prioritise your survival neither protect you from your fellow citizens. In short, civic education for tying volunteered investments in communal development only serves to disguise how ‘the Desire of the most disadvantaged creature will invest with all its strength, irrespective of any economic understanding or lack of it, the capitalist social field as a whole’ (Deleuze and Guattari 2004a: 249-250).

Hereto, civic education for material-discursive investments in communal turn inwards has served to disguise that there is no common measure between these investments in intra-atomic money and the intergalactic quantities of money that continue to evade nation states’ taxation. In the past, macropolitics for communal development has helped in concealing how the wealth of the so called third world countries have been turned into debilitating national debts (Buchanan 2008: 30-31, Parenti 1995: 6-14). Contemporarily, the ‘first world’ civic education serves, perhaps unwittingly, this same end by disguising that intra-atomic quantities of money – that is the everyday cramped niche of civic economic lives and livelihoods of ‘first world’ communities – do not form a collective agency to be saved because it is ‘too big to fail’ (Colebrook 2015: 136). (And how could it be; the money that funds bailing out economic rigidities that are ‘too big to fail’ comes from nation states’ budgets, commonly from their accumulation of national debt at the expense of every citizen.) Rather, contemporary nation states of the ‘first world’ experiment with universal income, and investors toy with arguments akin to taxation of ‘robot’ workforce, precisely because ‘first world’ intra-atomic economies have become small enough that their further shrinkage towards failure might, perhaps, have some meaningful economic and political consequences. Conversely, ‘genuine calculation – who has taken what’ (Colebrook 2015: 150), would show how the ‘first world’ communities mostly consume at the expense of ‘third world’ communities (Rouvroy 2016: 218) despite that they themselves remain as both net consumers and objects of consumption for the ends of communally oriented control societies. Thus, civic education that makes only the atomised idiots and individualised households/families publicly responsible for sustaining machinic economies misses the root concern of globally intra-connected capitalism it purports to change.

But simultaneous to education for communal turn inwards, though, ‘first world’ citizens of communally oriented control societies continue to enjoy a somewhat less cramped existence amidst ‘protocological’ biopolitical control. ‘Protocological’ biopolitical control means civic voluntary regulation for others’ ends within contingent, less rigid, environments (Galloway 2001: 88). Protocols are akin to conventional road traffic rules (Galloway 2001: 82-3, 86), in order for non-human collective agencies and/or embodied persons to intra-act with heterogeneous decentralised networks that are never only human but highly distributed through a range of material-discursive registers, including the physical, chemical, biological, neural and social. On a surface level, protocols facilitate frictionless intra-actions, but they do this for the ends of whomever benefits from this smooth functioning; most commonly at least nation states and capitalisms are the main benefactors. Like rigidified centres of biopolitical control, protocological biopolitical control has subsumed embodied persons to others’ representations that tie back sampled and coded fragments of information to civic bodies and also to non-human ones (Deleuze 1990). But breaches of a prevailing protocol serve to make it visible that protocols themselves have been and can be subject to a continuous change. Unlike institutionalised power hierarchies, neither protocols nor the breaches of them have been mystified as profoundly ‘natural’, or even ‘democratic’. Accordingly, protocological biopolitical control makes evident the necessity to ‘imagine and create a different, more ethical existence. We made the existence we have – it is not “natural.” We can think and make another’ (St. Pierre et al. 2016: 102). Take, for instance, personal experiences of harm and injustice due to intra-personal use of power over one’s body. If these experiences follow breaches of protocols, one may address these experiences by proposing an alternative protocol altogether and/or acting, implementing, the prevailing protocol differently: changing it from within it. In short, ethics can be acted through protocol for changing the prevailing institutions (Deleuze 1986, 1990). Conversely, to address rigidification of communal power hierarchies that facilitate these experiences means to challenge communal biopolitical control as de facto revolution against capitalisms and states. That is, to refrain from destabilising this de facto revolution from within it means to normalise abuses of communal power hierarchies as exceptions. But rigidified power hierarchies also intra-act with protocological biopolitical control.

Hereto, we end up with a 21st century apparatus of biopolitical control whereas rigidified power centres, including communities, may and may not resonate with protocological biopolitical control. With education for rigidifying civic investments in communal turn inwards, this apparatus of biopolitical control resembles that of the back-to-the-land movement of the late 1960s North America. This movement was close to 21st century civic education in that also it subsumed civic and personal desire to feel, perceive and think to intra-personal power hierarchies. First of all, these communities are yet to exemplify valuable practices in how a community may attain an actual everyday autarchy, or self-sufficiency. Rather, from the very beginning these communities relied on the affordability of items and equipment from the businesses that were listed at the classified section of the Whole Earth

Catalogue (see Kirk 2007, 2013). This catalogue coincided the early development of the Internet, and it also functioned as a medium that allowed these communities to communicate with other communities through a classified section, akin to a notice board. Thus, much like the contemporary communication over the Internet, the decentralised communication between these communities necessitated some centrally-led structures, including state and privately funded infrastructures, technologies and practices, such as road networks and functioning mail system. Secondly, these anti-establishment democracies are yet to be widely copied or emulated throughout the world. This implies that their publicly known experiments with, and experiences about, communal power institutions have not empowered citizens worldwide to follow their vanguard leadership in communal turn inwards. In other words, 21st century citizens accustomed to decentralised protocological control are yet to embrace in its stead the communal biopolitical control based on the best practices of these communities. In short, the learning experiences and experiments of these communities with biopolitical control exemplify how life-long struggle and failure of practitioners is yet to evidently add up to their actions competences for the projected profound change.

To assume an ontology of a divided citizenship with de facto revolutionary patchwork of communal divide and self-rule entails a kind of civic impasse. That is, struggling and failing communities cannot show evidence that their investments in communal turn inwards have accumulated action competences prior to that revolutionary change which has been projected to happen due to these competences. Conversely, this ontology allows civic educators to declare that they are evidently doing the good and important work for the common good and justice for all (Jickling and Wals 2008: 3). But this educational hierarchy needs problematising because it might, perhaps unwittingly, perpetuate the idea that a moral high ground exists (Colebrook 2015: 138, 146) and the corresponding educational practices that transform scholarly colleagues as well as idiot-practitioners (Jickling and Wals 2008: 18-19). Further, as long as citizens cannot prove that their competences development is contributing to the projected demise of capitalisms and states, why should their education for transforming capitalisms and states rigidify moralism and lazy conceptualisations such as authenticity, identity and propriety (Colebrook 2016: 126, 137, 140, 147)? Why not primarily address how real world democratic decision-making implements civic, communal and employment economies of reputation, risk and opportunity? Why not adopt a pragmatic ontology of ethics that allows for a micropolitics of relational non-resistance based on personal recalcitrance to succeed in changing material-discursive systems from within them? To illustrate the scope for this ethics that matters because it makes a difference, I now read the interview material with transformative literature to illustrate the opposite, namely, how the essentialist assumption of divided citizenship has not allowed the participants to show evidence they are contributing to the profound projected change.

Transformative environmental education for civic divide and the participants' agency

Transformative environmental education has assumed essentialist civic divide, but precludes the participants from showing evidence that their agencies are contributing to the profound projected change. For instance, some participants discussed how game developers have struggled and failed to profoundly change the role and status of female game characters in computer games. According to two participants, if one develops female characters, one receives only civic critique for not succeeding in that task; if one does not develop female characters, one receives only civic critique for not doing it at all (E.M., P.P., T.U.)³⁴. This example attests to the lack of any 'evidence' that the practitioners are accumulating meaningful civic competences for change. Before the everyday power hierarchies of civic social reproduction are profoundly demolished, the practitioners may only do things wrong (such as struggle and fail in developing female game characters) and wrong things (such as not develop them). But if the projected revolution did happen they could, perhaps, credit their 'action competences' for successfully implementing their predetermined real world.

Neither did the participants purport to show any evidence that their insights and actions regarding the collective practices of energy-reliance are adding up to the projected demise of capitalisms and states. For instance, some participants commented that not every company may claim they draw energy from renewable sources if most energy is actually still drawn from non-renewable sources (D.T., T.P.)³⁵. In another example, a participant pointed out whether an electric car is environmentally friendly if that car consumes electricity drawn from coal³⁶ (T.P.). Along similar lines, another participant pointed out

³⁴ [A discussion about how everyone is tired of online practices that entail public naming and shaming.]

P.P.: In short, [the main complaints always are that] there are not enough many female lead characters, and if there are, everything is just wrong.

T.U.: Yes. If there are, they are just thoroughly bad.

P.P.: Yes.

E.M.: It doesn't matter how you, as a developer, make a female part of the game; it's still wrong.

P.P.: That's so true.

E.M.: You need to have more female characters, and when you do, you get all the slam.

P.P.: But really, this discussion has meant that we don't pay attention to other things, such as, how awful are the plots, or gaming characters in general. Mostly, anyway. I mean, how substandard are the narratives, or personalities of gaming characters, or anything else. It's all forgotten because the loudest anonymous voices are heard, and for them nothing is apt and everything is unsatisfactory.

³⁵ 'Actually, the real world industry is drawing electricity from nuclear power, not from hydroelectric sources' (D.T.). 'If there is one windmill somewhere, the whole global industry cannot claim they are drawing energy from it' (T.P.).

³⁶ The author of this study: How about Apple's claims regarding their clouds and electricity production, comments?

T.P.: So... [Neither do B.D. and T.R. say anything.]

The author of this study: I mean, have you come across their claims that their clouds do not draw energy from coal, say, branding, reputation management, etc? Anything you may wish to comment is most welcome.

that it is hypocritical to think that one's agency makes the difference, but this does not mean one should not make choices that may benefit the environment (K.V)³⁷. This participant concluded that one may make oneself believe that it is desirable to act for a collective environmental good but at the same time the mass media continue to have an effect on how millions of people think about something. But oppositional resistance for citizens to use mass media for spreading their alternative agendas has largely not worked.

For instance, 'corporate censorship' delimits which types of gaming content can be published (D.P.)³⁸. This is because alternative markets outside the saturated marketplaces, such as mobile app stores, largely do not exist. A participant gave an example about a mobile application, the purpose of which was to make visible the invisible USA drone war (D.P., see quotation below). This example emphasised how app market facilitators filter content based on non-transparent decisions. For instance, the drone war application never made it to the Apple store because it was breaking the rules of the store on some unknown grounds.

D.P.: A thing that disturbs me quite a lot are those Apple's non-transparent censorship criteria of which nobody can make any sense. Interestingly, somebody made an application [that worked like a notification]: always when U.S. makes a drone attack, an alarm pops-up on the screen, such as, 'pling, eight people just died in Pakistan'. Its main idea was to make the invisible war visible, but then it didn't go to distribution at Apple store because it was against the Terms of Service for some unknown reason.

D.T.: Someone somewhere decided.

T.P.: This is yet another sleight of hand, as are cryptographic systems or components that are considered highly resistant to cryptanalysis. I think it may not even comply with physics I've learned, how potential works; you cannot really single out a source part of a power grid. But even as a sleight of a hand, it might help in drawing attention to the long term transition to more environmentally friendly energy systems. But we always have these macro level challenges and problems. Take the concept of an electric car, how environmentally friendly is an electric car if that car consumes electricity drawn from coal?

³⁷ 'You can make yourself believe it is cool to act ecologically, but that counts as living in your bubble. If we think of mass media, or even games, which are not mass media though they may reach a large audience, it continues to have an effect on how millions of people think about something, and relatively speaking your act of switching to environmentally friendly light bulbs is small. So you might make a difference with regard to how people think about something with a game that reaches one million gamers because of its cumulative effect. But I wouldn't advertise my individual actions.' (K.V.).

³⁸ 'We deal with corporate censorship's of Apple and Sony as part of our routine work. If we discuss whether our game can visualise blood, we turn to Apple's terms and conditions, and ponder whether, and whether Apple's representatives might say we can. A thing that disturbs me quite a lot are those Apple's non-transparent censorship criteria of which nobody can make any sense.' (D.P.).

D.P.: At the bottom of this is legislation, I don't understand why Google is legal if Pirate Bay isn't.

This excerpt exemplifies how traditional resistance might promote 'awareness', 'knowledge', 'and 'understanding of real world issues' via proactive citizens' 'self-determined changes and actions' (such as the drone app the participant brought up) (Wals 2010: 385). But it also exemplifies how civic critique did not create material-discursive feedback loops that would have changed the drone war, or the app store. Neither did this app, (nor the civic discussions and thoughts it might have provoked), evidently accumulate 'action competences' (Wals 2010) for game developer communities to change the drone war, or the app store. Rather, the story of this app exemplifies how and why it is difficult for communal non-idiots to change the mass communication markets from within them.

The participants' insights make it clear how practitioners do not believe in top-down change in energy-reliant capitalism and the need to assess how to transform the collective practice of energy-reliance from within it. But neither these participants, nor the rest of them ascribed meaning and values to the collective agency of consumers. In doing so, they made it evident how some practitioners have already learned 'how to think' (Jickling and Wals 2008: 11), and how citizens have not served as 'impressionable minds' for governments, special-interest groups, and industry to 'implant[] [...] [an e]ngineered [...] message, agenda, ideology, or consumer preference' (Jickling and Wals 2008: 7). But if one does not assume a moral high ground of civic divide and self-rule, civic practitioners are neither the atomised 'idiots' nor the transformative non-'idiots' the civic educators have framed 'them' to be.

To depict energy practices as relational and more than human matters because it does not preclude recalcitrant personal agencies embedded in collective agencies of practices that can destabilise and change the 'real'. Conclusively, every participant confirmed this perspective on the collective practice of energy reliance. Most also asked whether independent game development can ever be ethical or independent (I.N., J.T.)³⁹. They thus confirmed that traditional civic resistance and activism is most

³⁹ I.N.: [...] I came to think... In general, ethics is always incredible complex, and it's easy to concentrate on just how markets function, such as whether it's ethical that Apple takes 30%, or what rules does it follow to do that, and what kind of dynamics it creates with its own app store mentality. But if you start to think daily practices, there is a designer working as an independent game developer based in Finland, [...], the game is sold through Apple's app store, it electricity is consumed every time it's downloaded, the production of user-end devices themselves is likely unethical in multiple ways, and so on, adding everything up from the beginning to the end of production processes, such as, one needs to include the designer's tools. So we can easily create such a multifaceted question whether independent game development can ever be ethical. Such as, if we develop a game, is that actually akin to signing some sort of an agreement that justifies child labour somewhere on the globe. The question is escalating very easily, I guess, if we think ethics of any relations beyond the scale of markets [of algorithmic capitalism].

J.T.: Yes, and of course even drawing money out of independently developed games is an ethical grey area. For

unlikely to change the phenomenon of independent game development from within. This political and ethical status quo confirms the New Materialist and Deleuzoguattarian understanding of how institutional constraints and their constraining effects emerge simultaneously (Colebrook 2015, Jackson and Mazzei 2011). But neither did the participants co-opt the collective agency of practices as evidence that they are non-‘idiots’ able to develop ‘action competence’ for social transformation. Their insights left a cramped niche for their personal recalcitrance and a micropolitics of relational non-resistance to exist as part of a collective agency of practices. This matters for an actual positive change because recalcitrance implies human agency at work. Next, I show a civic micropolitics of relational non-resistance at work in changing from within the on-going transition to algorithmic capitalisms and control societies that feed on communal pre-emptions, including civic climate resilience.

6.2 The limits of control: The smart-grid as energy commons

6.2.1 The transition to civic energy autarkies

*When there is no opposition, control becomes a meaningless proposition
(Burroughs 1978: 38).*

The transition to smart grids, which are emergent algorithmically enhanced networks of networks, for electricity distribution holds out the promise of civic energy autarkies, namely, self-sufficient local electricity networks ‘based on renewable sources, low demand and citizen participation’ (Moss and Huidobro 2016: 235). But it does not deliver its brave new world of participatory energy democracy. Though a number of studies have argued that distributed ‘renewable’ energy networks can facilitate energy autarchy, or self-sufficiency (see Müller et al. 2011, Scheer 2007), how exactly autarchy, ‘renewables’ and decentralisation interact is unclear (Hodson and Marvin 2010). In this section, I outline a set of critical propositions that attend to the ways in which investment in a transition to the infrastructures, technologies and practices that make up the apparatus of smart grids has served to deliver so-called ‘civic energy resilience’ as a means of what Deleuze (1995: 174) calls ‘control’, or self-regulation to others’ ends through ‘continuous control and constant communication’. It has done so through the mechanism of ‘smart’ algorithms, which facilitate minimal investment and maximal

instance, ‘free to play’ runs on some type of psychology of gambling, and that’s definitely not good at all for every kinds of people, neither is it justified that a child spends a lot of money on gaming. [...]

I.N.: [...] It is important to discuss the ethics of gaming now that independent game development is emerging as something more than boys’ hobby, predominately boys’; later on we have seen some business, more gamers from various age groups, and games as part of some other industries than entertainment. And now we are already discussing many aspects related to games. Suddenly the society regards games as culture, and we can have a lot richer discussion than the speculation whether games cause violent behaviour of children.

profit from the grid infrastructure not only by monitoring the behaviours of individual users and networks, but also by mobilising users' collective desire to act for the good of the social collective and ecology (Swyngedouw 2014: 184–185). Smart grids seem to produce not autarchy, but hierarchy. But how is their control to be resisted? The conventional forms of political resistance that exercise citizens' so-called 'freedom of choice' (Colebrook 2015) – here, to oppose the power of electricity companies and their smart grids – are unlikely to be effective. Instead, alternative forms of micro-political resistance that '[have] a sense or feeling for the inflections of power' in the apparatus of smart grids may generate 'multiple lines of resistance', if they can be exploited creatively (Colebrook 2015: 126–127). Such resistance would imply that smart grids are potentially not hierarchies, but heterarchies (see Crumley 1995), namely, dynamic, relational 'power networks' (Castells 2011). It is this potential that opens up the possibility of participatory energy democracy.

To understand the functioning of smart grids, which are emergent networks of networks, we can rely on Karen Barad's (2007, 2014) concept of 'intra-action', which draws on the fact that in quantum physics, quantum probability defies clear-cut distinctions and distinct boundaries between entities in spacetime (Barad 2014: 168). She conceptualises worlds as constructed of 'phenomena', which represent the 'ontological inseparability [...] of intra-acting agencies' (Kleinmann 2012: 77). The term intra-action emphasises that any emergent material-discursive phenomenon cannot be understood as the mere interaction of collective agencies. For example, when the collective agency of civic energy resilience and smart grids 'intra-act', a certain phenomenon emerges that entangles matter and spacetime, observer and observed, human and non-human, matter and discourse (Barad 2014: 168). For example, instead of observer and observed, there is a mutual relationship of 'becoming-observation' (Deleuze and Guattari 2002): collective, co-constituted and highly distributed through a range of material-discursive registers, including the physical, chemical, biological, neural, and social registers. Consequently, we cannot assume that we can fully understand how our positionality has been co-constituted throughout all these material-discursive registers: we cannot claim to be objective or sufficiently undetermined to be able to promote a fixed scholarly position. Thus, the set of propositions – and accounts of civic experiments that follow – do not prescribe how a civic society should enact profound change in its economic and ecological, or 'econological', institutions. But these insights emerged through the 'diffractive' scholarly intervention of reading multiple scholarly 'insights through one another' (Barad 2007: 25) in a way that can do justice to the intra-active phenomenon at hand.

Institutional investment in pooled energy resources as the basis for civic energy autarkies has only just begun. For example, in Berlin, the individual and collective entrepreneurship of 'ecopreneurs' have joined with civic initiatives to regain ownership of the grid as a public utility (Monstadt 2007: 333–335, Moss and Huidobro 2016: 231–234, Moss et al. 2015: 1555–1557). This change was driven by

Germany's transition to non-nuclear 'renewable' energy and built on the assumption that 'local and regional initiatives and organisations [will] deliver' this transition (Moss et al. 2015: 1547–1548). Berlin's historical fear of reliance on imported fuel had led the local government to maximise local energy autarky (Moss and Huidobro 2016); this has translated into a focus on local self-sufficiency based entirely on 'renewables' and bottom-up civic control (Moss and Huidobro 2016, Moss et al. 2015). Such institutional investment in pooled energy resources is interesting for three reasons: firstly, because it contributes to the development of fractured energy networks; secondly, because it exhibits a greater reliance on 'renewable' electrical energy than previously; and thirdly, because it relies on a transition to 'smarter' infrastructures, technologies and practices in urban contexts and populations. In general, urban environments and populations have been targeted as the primary testing ground for 'renewable' and/or 'smart' energy 'solutions' because the majority of people inhabit such environments (Viitanen and Kingston 2014: 808, see Bulkeley and Broto 2013).

A number of recent studies have promoted the transition to civic energy autarkies. They tend to frame the transition to microgrids that enable the sharing of energy resources as an opportunity for profound citizen-led change. For instance, Cubitt (2013: 319–320) urges the 'privileged West' to follow the moral leadership of the 'slums' and adopt microgrid initiatives for pooling energy. For him, the small-scale economies of communal microgrids represent a meaningful civic action against the globalised energy market because they can combine low voltage generators and storage devices to provide a local area with electrical energy and heat (see Planas et al. 2015). Further, the studies also identify microgrids as key to the transition to 'smart' energy grids, which enable bi-directional energy flows and algorithmic energy monitoring to integrate intermittent energy production and consumption (Elsayed et al. 2015, Haidar et al. 2015, Stadler et al. 2016, Unamuno and Barrena 2015). They allow energy companies to measure, predict and manage citizens' energy practices through the use of machine learning algorithms relying on neural networks to map their energy practices, thereby centralising the management of the grid. They have also reduced the need for investment in infrastructure because energy consumers, rather than producers, have invested in the infrastructure, technologies, and practices necessary to ensure that there is sufficient supply capacity, so that energy producers have been able to maximise profit from their existing assets. Consequently, the infrastructures, technologies, and practices that drive the pooling of civic energy resources cannot be considered separately. Rather, they are part of an econological drive to civic energy accountability as a precondition for civic energy resilience through fractured energy networks. The paradox that the transition to smart grids promises civic energy autarkies but does not deliver them turns out to not be so paradoxical: such autarkies and fractured energy networks exist 'together-apart' (independently but interrelatedly) in the service of networked energy management (Barad 2014: 168). The algorithmic tracking of individual consumers and networks feeds on the uniqueness of each, and entangles human with non-human agencies. Consequently, acts of differentiating self-sufficient energy networks from

other networks are simultaneously acts of entangling them through their monitoring: ‘entanglings entail differentiatings, differentiatings entail entanglings. One move – cutting together-apart’ (Barad 2014: 168).

Thus, material-discursive investments in the transition to civic energy autarkies and fractured energy networks have channelled citizens’ desire and capacity for change to deliver civic energy resilience as a means of control (Moss and Huidobro 2016, Moss et al. 2015). The harnessing of this networked commons, or ‘shared interest or value’ (Gudeman 2001: 27), in the service of energy resilience as a major business ‘platform’ represents ‘tomorrow’s threat’ (Swyngedouw 2014: 186). No doubt, civic energy resilience as a commons is desirable, but the question remains: how can citizens resist it becoming a means of control?

6.2.2 Propositions on civic energy autarkies

Institutional investment in civic energy autarkies is unlikely to effect change in the state or capitalism.

Institutional investment in civic energy autarkies is unlikely to effect change in the state or capitalism through the communal management of resources because it tends to promote entrepreneurialism and algorithmic agency through the smart grid as a non-public good. It simply serves to reinforce the neoliberal drive to ‘free’ flows of capital and information from public services. Algorithms, for example, exercise a considerable influence on this ‘market’ (Ziewitz 2016: 5–6), not so much by measuring existing flows of information (here, ‘energy’), as by regulating and thereby generating the objects they purport to measure (here, ‘a resilient smartgrid’) (Barad 2007, Introna 2016: 20–24). The smart grid thus brings about the algorithmic operation it executes (Colak 2016, Mahmoud et al. 2014, Ou et al. 2014, Patrao et al. 2015). The agency that predicts, steers, and responds to the demand for energy resources – an intra-action of energy company and algorithm – manages the network in its own ‘interests’ and to its own ‘ends’, rather than those of citizens.

Past institutional investment in microgrids has not advanced them as a sustainable civic good.

Up until now, it has not been possible for microgrids to run sustainably, or self-sufficiently. This would require that the materials and energy to manufacture, maintain and dispose of next-generation equipment for electrical energy production and consumption, such as computers, wind energy plants or dye-sensitised solar cells, come from local communal resources (Bonou et al. 2016, Khalilpour and Vassallo 2015, Parisi et al. 2014, Teehan and Kandlikar 2013). But the materials to manufacture the equipment can seldom be obtained locally, and are often rare and toxic (Suckling and Lee 2015). And, over time, such equipment’s demands for energy, not to mention the waste that results from its manufacture and maintenance, have only increased (Viitanen and Kingston 2014). These factors have

led to a reluctance on the part of institutions to invest in microgrids, except as commercial enterprises, for example, to satisfy ‘ethical’ consumers’ demands for ‘sustainable’ energy.

Institutional investment in microgrids is unlikely to promote citizen-led institutional change to civic energy autarkies.

Institutional investment in the infrastructures, technologies, and practices of pooled energy resources, such as microgrids, rather than promoting civic energy autarkies, has served only to turn ‘self-sufficient’ communal energy networks into sub-networks of a smart grid network. Consequently, such investments are actually investments in energy resilience as a major business platform. As yet, there have been few studies on political coalitions in or of ‘Western’ communities to nationalise or communally distribute (energy) resources as a new foundation for the State and/or Capitalism – nor of the pros and cons of turning to the concept of the commons to do so in the age of communally-oriented neo-liberalisation. Yet, for many citizens, access to energy is not only a non-negotiable basic need, but also beyond their means.

The shift towards pooled energy resources as the basis for civic energy autarkies has promoted a greater degree of civic accountability.

Civic society has been urged that, in order to be responsible and responsive, it must become ‘smarter’ and adapt its daily practices to consume and store ‘renewable’ energy when it is abundantly available (Sintov and Schultz 2015). And ‘smart’ ‘green’ energy producers and consumers have been taken to be closely connected to each other, not only via their immediate communities on the microgrid, but also via algorithmically mediated communities online (Naus et al. 2014). So far, however, there are few financial or other incentives for ‘smart’ consumers to plan their daily energy practices individually or collectively; nor is there much debate about the justice or otherwise of such planning (Kitchin 2015). Walker (2014: 53), for example, criticises online energy communities for advancing ‘predictably information-driven and individualised behavioural initiatives’ that encourage households and other individualised consumers to lower their carbon footprints by drawing energy from ‘sustainably’ produced pools whenever ‘the grid is green’. Instead, he demands a radical change in collective energy practices to allow ‘smarter’ and ‘greener’ energy production to match ‘smarter’ and ‘greener’ energy consumption (Walker 2014). Yet, by decentralising civic accountability, this solution ignores the issue of the interdependence of communal energy networks and energy resilience as a business platform.

Institutional investment in pooled energy resources is unlikely to change the state and capitalism because it relies on entrepreneurialism.

The precondition for entrepreneurialism based on so-called ‘green growth’ is the closer connections between consumption and production commonly known as ‘prosumerism’ (Ritzer and Jurgenson 2010) or ‘produsage’ (Bruns 2008), and peer-to-peer or sharing processes (Martin 2016), whether established in-person, through algorithmic mediation or both (as with Airbnb and Uber).

Traditionally, networks working this way are conceived of as collective civic efforts to criticise the dominant modes of production and consumption (Martin 2016), but, in this case, they once again tend to serve energy resilience as a business platform.

Institutional investment in smart energy networks is unlikely to benefit those citizens who cannot afford to invest in them.

Institutional investments in smart energy grids are unlikely to change the state and capitalism, in part, because pooled energy resources are unevenly distributed. According to Chester (2014: 401–402), debates about energy pricing cannot be separated from those about energy impoverishment. Further, the algorithmic pricing of energy and its derivatives reflect observed and predicted supply and demand of energy just like the algorithmic stock market does of stocks (Benedetto et al. 2016, Chen et al. 2014, Day et al. 2014, Niesten and Alkemaded 2016, Shen et al. 2014, Zhang et al. 2015). Consequently, if energy consumers lack access to these algorithms, the commercial contracts that flow from them or production capacity of their own, they are unlikely (at least without external regulation) to secure the best energy prices for themselves. Thus, investments in smart energy grids might well occur at the expense of those vulnerable groups of citizens who cannot afford to invest in them and thereby advance ‘a nightmarish form of neoliberal capitalism’ (Martin 2016: 149).

Institutional investment in the algorithmic operation of smart energy grids channels control via critical energy infrastructure.

The algorithmic operation of smart grids has been designed to reduce the overall fragility of the critical energy infrastructure because in the past energy grids have been vulnerable to cascading failures that cause blackouts (Ancillotti et al. 2013). When a sub-network of a smart grid malfunctions, an algorithm ‘triggers’ to isolate it in order to protect the larger network. It is the play of agency that is important here: while the critical infrastructure itself is an intra-action of humans and non-human agencies, the choice to protect an element of a critical infrastructure or not is a matter of human agency (Aradau 2010: 492, 509) – and thus vulnerable to control by vested interests. In short, an algorithm implies a designer who acts to their own ends and in their own interests.

Institutional investment in smart energy grids does not promote electrical energy as a reliable public good.

Institutional investment in fractured energy networks has been framed as necessary because the grid needs to be updated in response to climate change, but also because elements of the grid have become unreliable or obsolete. By 2030 in the USA, for example, USD\$1.5 trillion will need to be invested in the grid because the energy companies that own the grids have chosen to take profit rather than re-invest in the grid (Byrd and Matthewman 2014: 96). Investment would also help reduce the unreliability that is a result of inefficiencies due to transmission distances and failures due to the complexity of the grid (Byrd and Matthewman 2014). However, if the investment is in ‘renewable’ energy sources, it must reckon with the unreliable nature of these sources, the capacity to generate from which varies on a daily and seasonal basis (Suomalainen et al. 2015), in contrast with non-‘renewable’ energy sources like coal or gas (Byrd and Matthewman 2014). Thus, investments in fractured energy networks are yet to provide energy as a reliable public good.

Institutional investment in fractured energy networks implies a different mode of social control.

Institutional investment in smart energy grids is accompanied by newly intrusive means of social control of citizens’ everyday lives, for example, the implementation of ‘smart’ energy meters and Internet of Things (IoT) devices and applications that supposedly enable individual citizens and networks to monitor and control their energy consumption, but really provide rich real-time information to energy companies, so that they can better tailor energy ‘plans’ to minimise the need for investment in infrastructure and maximise income (Faruqui et al. 2010, Xenias et al. 2015). (It is not necessary and minimal but sufficient and sustainable investment in infrastructure that is required.) This information feeds a ‘market’ running on ‘samples, data, markets, or “banks” ’ (Deleuze 1992: 5, emphasis given) and allows algorithms to measure, predict and manage citizens’ energy practices. In what follows, I explore this new mode of social control.

6.2.3 Civic energy hierarchy

Communally pooled energy resources have seemingly been put in a position to regulate power as they modulate the emergence of civic energy resilience. When the citizens of an ‘autarkic’ energy pool regulate their energy production and consumption, they modulate energy availability for other purposes in the same energy network. As soon as that energy pool is connected to a smart grid via a microgrid, an algorithmic intra-action of the microgrid with the smart grid as a resilient connected whole is generated. But although the energy ‘autarchy’ to a degree modulates the power of the smart grid, even perhaps generating energy to help power the smart grid, it remains a ‘net’ consumer, rather

than a true prosumer, because the transition to fractured energy networks advances a control society – and remains in the interests of energy companies. From a Deleuzoguattarian perspective, this power imbalance can be explained in a number of ways.

Firstly, it embodies the debtor-creditor relation of citizens and state under capitalism. Under capitalism, citizens never quit repaying their ‘debt of existence’ to the nation state, the laws of which instantiate the axioms of capitalism (Deleuze and Guattari 2004: 197). While, under feudalism, debts are local and finite (to such and such a person), under capitalism, they are national and infinite (to the state). And while citizens have a duty to repay their debt (through money and taxation), the state has only an option to lend to them (through ‘welfare’): ‘the creditor has not yet lent while the debtor never quits repaying’ (Deleuze and Guattari 2004: 197–198). Accordingly, it is the circulation of an ‘infinite debt’ rather than the rule of law keeps nation states together (Deleuze and Guattari 2004: 197, see Harney and Moten 2013: 61–68). This infinite debt is confirmed by what Deleuze (1992: 6) calls the ‘control society’, an increasingly global state or ‘market’, under which ‘man is no longer man enclosed [or ‘confined’, i.e., by a disciplinary society] but man in debt’. Energy-resilience exemplifies this debt. Energy-reliant citizens are indebted to the state as guarantor of the grid and the other econological institutions that undergird it, no matter how much energy they consume – or generate.

Secondly, the power imbalance reinforces the market capitalism of the society of control, a ‘capitalism of higher-order production’ (Deleuze 1992: 6) that privileges a marketable, i.e., transformable, product (energy resilience through smart networks) over production (energy generation). The market thus becomes an ‘instrument of social control’ (Deleuze 1992: 6). In the case of smart grids, the market exists to promote the uneven distribution of pooled energy resources in the name of civic energy autarchy. The technologies, and often the infrastructures, of the smart grid remain owned by – and return rent to – energy companies (Franklin 2012), so any investment in such technologies and infrastructures just serves to increase the returns to such companies. The market has been fostered by prosumerism and peer-to-peer or sharing processes, with their orientation to the ‘sell[ing of] services’, creating market operations that are ‘short-term and of [sic] rapid rates of turnover, but also continuous and without limit’ (Deleuze 1992: 6). And the market, as far as the companies are concerned, is increasingly not for energy itself, but for algorithms for, and algorithmic data about, energy-resilience and the financial derivatives that relate to it. In addition, this market is replicated within civic energy communities, where the peer-to-peer or sharing processes also serve as an instrument for social control, whether or not the resource pool is connected to a wider energy network, through the enforcement of ‘self-determined’ rules, norms, and sanctions (see Dietz et al. 2003, Gibson et al. 2005).

Thirdly, the power imbalance exemplifies how any totalitarianism, or ‘empire’ (like that of the society of control – or neoliberal capitalism), produces a distributed network of control, or ‘autarchy’

(Deleuze and Guattari 2002: 223). An empire is ‘an *abstract machine of overcoding*’ (Deleuze and Guattari 2002: 223), or ‘reterritorialization’, that is, economic and political restructuring (overcoding is completely ‘writing over’ what was there before). The reterritorialization represents space as divisible and individuals as ‘dividuals’, or bundles of capacities (Deleuze 1992: 5):

[I]t defines a rigid segmentarity [i.e. categorisation], a macrosegmentarity, because it produces, or rather reproduces, segments, opposing them two by two, making all the centers resonate, and laying out a divisible, homogeneous space striated in all directions [...] [thereby] creating the conditions for ‘autarky’, producing a reterritorialization by ‘closed vessel’, in the artifice of the void (this is never an ideological operation, but rather an economic and political one). (Deleuze and Guattari 2002: 223)⁴⁰.

But a reterritorializing macropolitics (‘molar’, or general, politics) typically exists by virtue of a certain deterritorializing micropolitics (‘molecular’, or particular, politics), which in the case of smart networks is citizens’ desire and capacity for change through a networked commons.

What we end up with is a civic energy apparatus based on what Galloway (2001: 82) calls ‘protocological’ control, a new kind of ‘distributed management’ in which citizens control, or manage, themselves via voluntary self-regulation (a protocol is a set of rules that enable computers to ‘talk’ with each other in distributed networks). Although the shift to a new means and medium of control is to a degree a citizen-led change (Dietz et al. 2003, Gibson et al. 2005), it is one that serves the interests and the ends of energy companies rather than those of citizens. This civic energy hierarchy embodies a contradiction native to protocol between a hierarchic machine (the energy companies and their smart grid) and an autarkic machine (the citizens and their ‘autarkies’, that is, their self-regulatory management of self-sufficient local electricity networks):

One machine radically distributes control into autonomous locales, the other machine focuses control into rigidly defined hierarchies. The tension between these two machines – a dialectical tension – creates a hospitable climate for protocological control. (Galloway 2001: 8)

Further, this civic energy apparatus generates a certain ‘infrastructure space’ (Easterling 2014: 2), which, like an ‘operating system’ for the network of networks that is the smart grid, ‘makes certain things possible and other things impossible’, serving as a ‘content manager dictating the rules of the game in [its] milieu’. It dictates the terms of any discussion about civic goods like water and wind, which cannot but be talked about as ‘energy resources’ that are local and intermittent, and to be managed in ways that are ‘smart’ (algorithmic) and ‘green’ (‘renewable’). And the apparatus retains

⁴⁰ This quotation draws attention to material-discursive agencies at play. To paraphrase DeLanda (2008: 176-7), to change global capitalism means to change it as a real world ‘target’ with connections that exists here and now.

the ultimate sanction: the power to connect and disconnect consumers, both manually and algorithmically from energy production and management resources, which remain owned by energy companies.

6.2.4 Civic energy heterarchy

What are citizens to do to address this civic energy hierarchy? How can they do justice to the desire and capacity for change through the networked commons that smart grids promise? Conventional forms of macropolitical resistance by which they might oppose the power of electricity companies and their smart grids are unlikely to be effective. Instead, they need to look to alternative forms of micropolitical resistance that '[have] a sense or feeling for the inflections of power' in the civic energy apparatus to generate 'multiple lines of resistance' (Colebrook 2015: 126 127).

Citizen-consumers are expected to do their protocological (self-regulatory) bit for the distributed management of the smart grid. Their collective agency, intentional or not, is shaped by the functions of the smart grid and the data it produces that is available to them. To act not against, but *athwart*, these functions and data might pre-empt the actions of the institutions of the state and capitalism and could serve as a type of resistance. Whereas acting against the grid (withdrawing from or blocking it) would look a lot like traditional macropolitical political demonstration, acting *athwart* the grid (using it for other than its intended purposes or in other ways than were intended) would look quite different. As such, it could express the communal power of individualised energy practices, such that a civic energy heterarchy emerges. For example, citizens could interact normally with the grid, but for a shorter or longer period of time, which would constitute a kind of distributed denial of service (DDoS) that would prevent the grid from functioning normally. Or they could interact differently with the grid, which would constitute an 'exploit' (hack) of its operating system, or what Galloway and Thacker (2007: 97) call a 'counterprotocol' (see Galloway and Thacker 2004).

Counterprotocols – as expressions of what Castells (2011) calls 'counterpower' in networks – have a number of characteristics by means of which citizens might exploit smart grids. Firstly, they 'attend to the tensions and contradictions within ... systems, such as the contradiction between rigid control implicit in network protocols and the liberal ideologies that underpin them' (Galloway and Thacker 2007: 98) – or, in the case of smart grids, the power imbalance between energy companies and citizen-consumers. Secondly and thirdly, they aim to 'push technology into a hypertrophic state, further than it is meant to go' (Galloway and Thacker 2007: 98), and 'function by new codings' (Galloway and Thacker 2007: 100). The latter form of counterpower is what Castells (2011: 778) calls 'programming', which allows for 'collective action from social movements ... to introduce new instructions and new codes into the networks' programs'. So if citizens were to exploit the grid in

their own interests and for their own ends, not necessarily capitalistic, they might be able to push the infrastructures and technologies to enable civic energy resilience as a true commons. And, fourthly, given the nature of the smart grid as a homogeneous network, were they to do so, they could easily disseminate their exploit because counterprotocols ‘can capitalize on the homogeneity found in networks to resonate far and wide with little effort’ (Galloway and Thacker 2007: 99). An analogous form of counterpower is what Castells (2011: 777, 778) calls ‘switching’, namely, ‘the control of the connecting points between various strategic networks’. Citizens make use of switching now in ‘un-smart’ networks when they use the network to switch energy companies, so they can ‘resist’ price and service differentials between companies; they could do the same and more to resist control.

Finally, and most importantly, counterprotocols make possible various ‘tactics of nonexistence’ (Galloway and Thacker 2007: 135), practices that can enable citizens, if not to quit, then at least to admit their ‘debt of existence’ (Deleuze and Guattari 2004: 197) to the society of control⁴¹ by exploiting the algorithms that drive the smart grid. As Galloway and Thacker (2004: 136) put it, ‘When existence becomes a measurable science of control, then nonexistence must become a tactic for any thing wishing to avoid control’. They define nonexistence as follows: ‘The nonexistent is that which cannot be parsed by any available algorithms’ (Galloway and Thacker 2004: 136–137). Thus, the question citizens must ask to understand how resistance – or, rather, nonexistence (or *non-resistance*) – to control might be possible is the following: ‘how does one develop techniques and technologies to make oneself unaccounted for?’ (Galloway and Thacker 2007: 135). The answer lies in becoming unmeasurable, or *unaccountable*. Galloway and Thacker’s (2007: 136–137) tactics of nonexistence all entail ‘existence without representation’. They could involve ‘nonexistent action (nondoing); unmeasurable or not-yet-measurable human traits; or the promotion of measurable data of negligible importance’ (Galloway and Thacker 2007: 136). Citizens on the smart grid might ‘go online but trick the server into recording a routine event’ (Galloway and Thacker 2007: 135), an example of ‘non-existent action’. Or they might ‘[a]llow [themselves] to be measured now and again for false behaviors, thereby attracting incongruent and ineffective control responses’ (Galloway and Thacker 2007: 136), thereby promoting ‘data of negligible importance’. They might go further and use the grid, consciously or not, for purposes or in ways other than those for which it was intended: for example, as a means of community action and communication about energy. Such tactics express the ‘unmeasurable human trait’ of counterpower – the ‘countervailing processes that resist established domination on behalf of the interest, values, and projects that are excluded or under-represented in the programs and composition of the network’ (Castells 2011: 778) – and constitute an energy commons,

⁴¹ It may be that, with the global population of several billions, protocological control continues to serve as an improvement over other types of control, most notably, communal ‘self-regulatory’ control that rigidifies biopolitical power hierarchies in the name of communal ‘democratic’ decision-making for that common good communities ‘self-determine’ they are entitled to obtain and enforce through their rules, norms and sanctions.

namely, a ‘shared identity’ (Gudeman 2001: 27), that would emerge not through oppositional resistance, but through tactics of nonexistence replicated across the smart grid. Such tactics subvert control to effect a gradual change in societies’ econological institutions toward participatory energy democracy. The energy commons thus draws on citizens’ ‘feeling for the inflections of power’ (Colebrook 2015: 126) that emerges intra-actively from the apparatus of smart grids – and reveals the limits of control.

6.3 Ontology as ethics makes a relational difference that matters

6.3.1 Why algorithmic governmentality matters?

Algorithmic governmentality implements an ontoepistemological shift from attempts to account for agency and causality in terms of premeditated judgements. In short, destabilising this shift from within enacts micropolitics and ethics of making a relational difference that matters because it does not implement the prejudged predestined future. Conversely, the ontologies of civic division have enabled scholars to render meaningless, and also embarrass, everyday practices, choices and actions of whomsoever, in essence, becomes framed as a citizen of social reproduction. To this end, future-oriented micro- and macropolitics has given rise to a predetermined civic existence, and precluded in advance some acts that have not yet been committed. Consequently, this type of politics has actualised a real world with foundational comparisons, such as one against many. But ‘[w]hat is really occurring is the creation of power by way of the illusion of substance in the hands of a few who are stealing the practice of exchange’ (Colebrook 2015: 151). This power has been put into practice, for instance, on algorithmic, civic and other markets of speculation. These markets have framed civic and other bodies as ‘substance and reality’ (Colebrook 2015: 151) that can and should be subsumed to the economies of risk, opportunity and reputation, including stock markets and markets for financial products akin to energy futures. To fully acknowledge this means to reject the political practices of framing some collective agencies as individual with the intention of creating a divisive difference between those who are/are not entitled to co-opt the provisioned future. Therefore, there is also a need to contrast education for micropolitics of civic divide and self-rule by implementing relational ontoepistemological education that goes athwart the micro- and macropolitics of co-opting agencies of change. This education makes a difference because it helps learners in rejecting an essentialist understanding of civic and other bodies, including purely non-human bodies, as ‘substance and reality’ (Colebrook 2015: 151) for an agency that can and should be individualised. In short, relational education that addresses ontology as ethics and builds on micropolitics of non-resistance helps in this task because it allows collective never-only-human agencies, including those of practices, with embedded civic recalcitrance to change real world institutions. I return to this discussion to conclude this chapter.

Algorithmic governmentality serves as ‘radicalisation and an immune strategy of capitalism and neoliberalism that is ‘purified’ or ‘expurgated’ from everything that would bring it into ‘crisis’, that is, from anything that would interrupt and make it bifurcate’ (Rouvroy 2016: 35). This qualification of algorithmic governmentality as an agentic strategy entails four intra-related aspects. Firstly, the strategy of algorithmic governmentality aims to minimise the financial damage for those who have invested in the markets of the algorithmically enhanced control society. It serves the contemporary practice of converting value to material-discursive money at the collective expense of nation states. Algorithmic surveillance data has served as substance matter that allows algorithmic governmentality to function. This is because it underlies the self-sustaining logic of converting the suspected value drawn from data into material-discursive money. To this end, investments in material-discursive developments have embedded hierarchical control over algorithmic surveillance data into rhizomatic collective agencies.

Secondly, the agentic strategy of algorithmic governmentality aims to outsource phenomena that might cause financial mishaps for its investors. Predictability creates or adds value by reducing the risk of loss, not because of actual predictions. Conversely, it pays to outsource the managerial responsibilities and consequent liabilities due to damages caused by unpredictability, unmanageability, uncontrollability and uncertainty. For instance, the on-going transition to civic accountability as the precondition for climate resilience outsources the management of pooled energy resources to self-regulatory communal control. But this transition ties material-discursive investments and civic capacities for change into communities for the ends of resilience as a stabilising strategy that complements algorithmic governmentality. Further, scholars have urged communities to enforce control for stability notwithstanding that ‘many of these structures and routines have been oppressive for various groups of people’ (Brinkman 2016: 126). These communities have established biopolitical hierarchies: institutional constraints and those conditioned by them (Jackson and Mazzei 2011). Consequently, communal control for normative stability has served, if indirectly, the profitable ends underlying algorithmic governmentality’s strategic aim of outsourcing the management of uncertainty. This intra-action means that relational ontoepistemological education for the micropolitics of relational non-resistance directly facilitates the participatory civic change of algorithmic governmentality. But to engage with intra-acting collective agencies and phenomena without assuming the axiom of essence means to perform micropolitics that advance the real world equality that does not yet exist.

Thirdly, and closely intra-related to the value drawn from predictability, pre-emptions that bring about that real to which they point have been, literally, written into the executable quotidian work algorithms do. Algorithmic pre-emptions at work present a profound ontoepistemological problem because by simply observing this work one cannot conceptualise exactly what it is that has been ruled out. Thus, algorithmic governmentality matters most because it affects simultaneously both knowing

and being. This change is ontoepistemological because ‘[w]e don’t obtain knowledge by standing outside the world; we know because we are of the world’ (Barad 2007: 185). It matters that citizens both ‘online’ and in person simply cannot tell apart whether their socio-economic-ecological contexts entail algorithmic governmentality. But algorithmic governmentality enhances volunteered civic control and ‘intentionality’ with premediated judgements in advance. Therefore, fourthly, algorithmic governmentality may facilitate actualisations that preclude creative connections – those that would bring into crisis that political and ethical status quo where capitalism feeds on algorithmic governmentality. It hence opens a scope for debates that ‘must identify what the central figure of that governmental rationality should be’ (Rouvrou 2016: 136). This presents a profound philosophical problem of actualising the virtual dimension of the real world while ruling out everything that might have happened in the absence of this actualisation.

As of yet, commercial and/or nation states’ organisations have typically owned both algorithms themselves and their execution; both have been considered as legally protected property. But citizens have mostly lacked the opportunities and right to learn about how algorithms function on everyday basis, as well as about the norms inscribed in this function. That is, algorithmic governmentality conforms to algorithmically enhanced states and capitalism in that it, too, is littered with publicly ‘known unknowns’. The traditional solution in this instance has been to establish that ‘making projects [...] is still peoples’ and communities’ responsibility’ (Rouvrou 2016: 218). But this does not mean shrugging off algorithmic governmentality as business as usual.

The everyday functioning of algorithms might also bring about an ontoepistemological ‘unknown unknown’. This might be because whatever data and information citizens ‘need to know’ and may access can be directly regulated via implementation of algorithmically enhanced contexts alongside their legal protection. Consequently, all but a selected few (who are legally prevented from disclosing what they know) are constrained by the everyday work of algorithms, which remains as an ontoepistemological ‘unknown unknown’ to them. To use the language of those who urge joint civic actions, this is an institutional constraint – but not as we know it.

Additionally, there is no way for citizens to differentiate technologies, infrastructures and practices from whichever intentional strategies might have been embedded in them. It has remained academically unexplored ‘what reconfigured understanding of criteria might help in this task’ (Barnett 2008: 198). Therefore, it is likely impossible for even the most competent action citizens to tell smart contexts apart from what the algorithms actually do, down to the very last detail, on an everyday basis. It is also likely impossible for them to turn what might have remained as an ontoepistemological ‘unknown unknown’ into a ‘known unknown’. These could be the most profound philosophical lessons to be learned from the National Security Agency’s (NSA’s) practices that were

‘unknown unknowns’ to both scholars and practitioners before Edward Snowden made them publicly known.

As a consequence of breaking his non-disclosure agreement, Edward Snowden has become a legal protégé of a nation state openly not ‘impressed by a Western, liberal culture’ (Rouvrou 2016: 218). His current status exemplifies how, to date, a citizen’s actions have been taken as individual and public, whereas ‘few can hack the intranets of the corporate and government worlds to discover what is being plotted therein’ Bonta (2009: 270). It also draws out what, at worst, may happen when algorithmically enhanced capitalisms and/or states subsume citizens to ‘economy of reputation, risk and opportunity’ (Rouvrou 2016: 34). But on a daily basis, this economy has been effected on their behalf by the precarious online mobs and in-person communal control that have enforced their self-determined rules, norms, and sanctions. ‘[N]othing is forgiven and everything is always forgotten’ (Rouvrou 2016: 23: 71); the winners continue rewriting history.

But algorithmic governmentality does not straightforwardly emulate its oppressive predecessors in that it precludes citizens from dissociating algorithms from their ontoepistemological experience. As participants of algorithmically enhanced contexts, citizens need to assume that ‘unknown unknowns’ can affect their ontoepistemological stance. This means the assumption that their chosen efforts might act in the interests of some ‘unknown unknowns’ that are not supportive to whatever they might have chosen to work for from within their communally oriented capitalisms and states. No citizen can assume that whatever it is they might not be able to know, understand, or access does not discount their awareness, knowledge and understanding, or their ‘self-determined changes and actions’ (Wals 2010b: 385). But neither can they assume that ‘known unknowns’ do not have a profound effect on their struggle and failure to bring about their self-fulfilling prophecies, including social transformation. It is equally relevant for those who frame themselves as citizens of transformative communities to decipher, down to the very last detail, what it is that their smarter and/or greener infrastructures, technologies and practices actually do. It does not help positive change if transformative non-‘idiots’ perpetuate the illusion of individual agency by holding only ‘the others’, the atomised ‘idiots’, responsible for social reproduction. Equally unhelpful is ignoring the fact that communally oriented control works for socio-economic hierarchies regardless of whether such control is dressed as democratic and/or non-vested self-regulation. ‘We have never been autonomous’ (Rouvrou 2016: 12: 31). Neither have we ever been individual agents of change, moral or any other. But we are part of collective agencies that are material-discursive; it is always a multiple voice who speaks (Deleuze and Guattari 1987).

As practitioners of algorithmic governmentality, we ‘voluntarily make what we want involuntarily’ (Rouvrou 2016: 14: 32), but by doing so, we are unlikely to implement the crisis of civic norms that brings about the deadly crisis of capitalism. More importantly, our cramped existence works for free

against our financial interests. Nation states worldwide experiment with ‘basic income’, not to mention the idea that robots should be taxed like local humans. This attention to taxable money as income of states coincides with the idea that value created in algorithmic markets may legally evade similar taxation. In short, there is a need to problematise the thriving relational money congruent with algorithmic governmentality. But this discussion is grounded in the real of law, not on the real of the data undergirding algorithmic governmentality.

There is scope for future studies that pay close attention to publicly disclosable investments that may imply how algorithmic markets are evolving. This scope is not entirely trivial because these investments may not be precursors, and because no investment necessarily discloses the most important intra-actions, including financial ones, at play. Neither may these analyses retreat to a moral high ground of depictions, or representations, because algorithmic governmentality gives rise to ‘a crisis of critique itself’ (Rouvrou 2016: 7). Rather, there is a need to problematise ‘what human is, and of what it can do’, and to embrace personal recalcitrances because they ‘might well give a few indications’ on these fronts (Rouvrou 2016: 219). This approach to analysing cramped civic existence does not frame ‘unknown unknowns’ as just another detail embedded in the capitalism of ‘known unknowns’.

However, it should not be discredited that algorithmically enhanced capitalisms, states, contexts, and governmentality also implement ‘unknown knowns’. This happens because the designers of algorithmic functioning know what type of information, even learning, about machine learning they need. Nobody knows every last detail of why and how the machine learning undergirding algorithmic decisions actually works (Castelvecchi 2016). For instance, one may ‘hack’ deep neural networks in order to consistently label images unrecognizable to human eyes as images of familiar objects (Nguyen et al. 2015). Consequently, the ‘unknown knowns’ of machine learning call forth detailed analyses overlapping arts and humanities, these notably include ontoepistemological understandings of learning about learning at work.

Most importantly, algorithmic governmentality exemplifies why there is a need to make the real of law matter. At present, it is already evident that the civic right to contest norms, or even disobey what is forbidden, needs regulatory protection amidst algorithmic governmentality (Rouvrou 2016: 79-80). One simply cannot contest norms that the machine learning algorithms do not disclose. And if one asks, and the algorithms disclose the norms, then how does one know whether they are disclosing what one has asked for? It is not possible to know.

Any scholar who claims an interventionist stance needs to take seriously the ontoepistemological shift implemented by algorithmic governmentality. A proposed EU regulation (2016/679) would make the owners of algorithmic work liable for disclosing ‘the logic involved in any automatic personal data processing and, at least when based on profiling, the consequences of such processing’, starting in

2018.⁴² This regulation translates as the need for both scholars and practitioners to know in detail. But the ‘unknown knowns’ of machine learning mean that the algorithmic logic involved will not be fully disclosed.

An interventionist scholar is also in a prime position to debate those strategies that may emerge in the absence of profound regulatory actions. For instance, there is already a need to debate ways of tackling algorithmic discrimination. Scholars in the field of algorithmic learning have usually approached this discrimination by building on the assumption that one does not know the parameters that result in discrimination. A common example has been the algorithmic discrimination of applicants who have been profiled as those who may default on a loan (Fish et al. 2016, Hardt et al. 2016). This profiling ‘give[s] existence in advance to acts that are not yet committed’ (Rouvrou 2016: 14), in this case defaulting a loan, and the bank’s decision induces pre-emption.

Pre-emption at work does not disclose norms, if any, embedded in algorithmically enhanced real world. ‘[I]t consists in acting not on the causes but on the informational and physical environment so that certain things can or cannot be actualised, so that they can or cannot be possible’ (Rouvrou 2016: 15: 34). This happens at the cost of any other actualisations of the virtual that could have happened in the absence of pre-emption. But to fail to address the known norms leaves citizens to deal with their aftermath, such as perpetuation of inequality via sexism and racism embedded in common use of English language. For instance, some recent algorithms have manifested sexism and racism because they have accurately, rather than inaccurately, learned common patterns of English language usage online. This learning bias has been, literally, written into the algorithmic learning about learning. The public was permitted to know about these discriminatory algorithms because they were allowed to speak freely online for a short while. But the real dilemma is how to alter this bias towards equality that does not yet commonly exist in the use of the English language.

That said, the more general dilemma of ‘how to best advance equality that does not yet exist’ may not be primordial if one is not committed to an actual positive change in line with ‘Western, liberal culture’ (Rouvrou 2016: 218). For instance, the 2016 UK and US election campaigns exemplify how an ontoepistemological real that is seemingly a ‘known known’ may be captured for political purposes that render this dilemma obsolete. But most importantly, this exemplifies what happens once biopolitical control – of ‘producing docile bodies according to a norm’ (Rouvrou 2016: 23) – implements the logic of algorithmic governmentality: ‘making the norms docile according to the body’ (Rouvrou 2016: 23). When taken together, these two approaches to control justify a compelling

⁴² ‘Every data subject should therefore have the right to know and obtain communication in particular with regard to [...] the logic involved in any automatic personal data processing and, at least when based on profiling, the consequences of such processing.’ (The European Union, regulation 2016/679).

ontoepistemological stance: the ‘evidence’ and the ontological justification for action seamlessly necessitate each other.

For instance, pro-Brexit mass media declared that ‘Britain is full’ (of people) because we can perceive the ‘real world’ ‘evidence’ that the infrastructure is ‘failing’ (in comparison to how it may have been designed to function). Acting against this ‘real world evidence’ of failing infrastructure meant making Britain ‘not full’ again, i.e., reducing the number of people. ‘[U]nlike human persons, human bodies do not lie’ (Rouvrou 2016: 127). But likening ‘extra’ human bodies to numbers strips from those human persons their ethical and moral agencies, including their ‘virtual dimension’ (Rouvrou 2016: 130-131): their potentiality yet to be actualised. It is not personal; simply that any extra numbers have to be removed: the ‘real world evidence’ dictates so. This exemplifies the logic of algorithmic governmentality in the service of biopolitical entitlement, or even ‘justice’, for those who self-determine it.

The emergent algorithmic governmentality means that there is a need to take the axioms of law very seriously (Rouvrou 2016): to be compelled by the real of the law. This means to conceptually separate the ontoepistemological real that is and was happening from any depictions, including recalcitrant fabrications. For nation states bound by civil law (Roman law), this means to separate that which is or was happening from a depiction of a citizen’s character, which is a moral judgement against pre-existing standards. And it means to prompt philosophical rigour in analysing whether communally oriented self-determination and control without any legally binding obligations to equality is the ‘governmental rationality one wishes to have ruling our society’ (Rouvrou 2016: 136). But this does not mean that motivations should not be heard (Rouvrou 2016). Though scholars have largely rejected the word ‘truth’ in referring to that which is or was happening (Rouvrou 2016: 14-15), neither is everything an ‘untruth’.

For a New Materialist and Deleuzoguattarian scholar, the ontoepistemological phenomenon of failing infrastructure reveals the collective agency of practices at work. In the wake of smart urbanism, it is most empowering that infrastructure, the operating system of a city, fails to function as a smooth and ubiquitous milieu that falls into oblivion. This failure means that what has been assumed and inscribed into sociotechnical designs neither conclusively regulates nor defines the collective agencies of practices that inter- and intra-act with it. It exemplifies how the collective agency of practices is evading pre-emption as it leaks from the cramped niches assigned to it. It reveals how the collective agency of practices actualises the virtual dimension of the relational real, including real socio-economic-ecological contexts. A rhizomatic assemblage of practices at work evades the central idea of algorithmic governmentality when it manifests recalcitrance associable with human persons. It reveals how the spacetime-matter of the world is not rendered as ‘predictable but insignificant’ (Rouvrou 2016: 222).

Neither technophobia nor technophilia transforms algorithmic spacetime into a creative utopia for people yet to come to inhabit (Deleuze and Guattari 1987). But '[t]hrowing the dice is something that must, from time to time, be dared (Rouvroy 2016: 137). It may actualise the creative connections of the virtual real. That is, collective agencies of practices may push systems with partially unknown agencies beyond the unknown thresholds of change. This type of bifurcation happens because a collective agency of a practice functions as a chaotic attractor that destabilises agentic phenomena from within is emergent, not pre-existing. For instance, the operation of a smart grid as an emergent patchwork, or archipelago, of islanded and/or connected microgrids has presented its primary advantage and challenge. As soon as they have been successfully islanded, microgrids function as stand-alone networks, but the dis- and re-connecting operations have triggered both inter- and intra-vulnerabilities to both the microgrids and the smart grid as an emergent whole, a network of networks (Colak 2016, Mahmoud et al. 2014, Patrao et al. 2015, Ou et al. 2014). This implies that some recalcitrant non-human agencies have become embedded in infrastructures, technologies and practices originally designed for manageability and pre-emptive intra-actions. But an intra-action differs from a relational phenomenon because the complexity of a rhizomatic network well-exceeds the sum of its parts. Consequently, education for relational ethics and non-resistant micro politics embedded in actualising the virtual real cannot simply resort to repeating the cliché that non-human agencies exist and become visible as soon as systems cease to function in their customary way. Rather, there is a need for an ontology that embraces those opportunities, inbuilt in systems, which allow collective agencies, that are never solely only human, to actualise creative connections athwart control. Next, this study considers the personal recalcitrance embedded in everyday practices that entail ethical and micropolitical agency of going athwart rigidification of hierarchical power institutions. These practices show education and learning as ethics of choosing to act ontologically works.

6.3.2 Ethics of relational ontoepistemological education and micropolitics of non-resistance

Ontology as ethics challenges 'laziness' (Colebrook 2015: 147, Rouvroy and Stiegler 2016: 26) of accepting the micro- and macropolitics that have co-opted future-oriented changes, agencies and actions. This happens because ontology as ethics allows the creative potential [puissance] of personal recalcitrance (Rouvroy 2016a, 2016b, 2016c, Rouvroy and Stiegler 2016). This creative potential can be embedded in the collective power [puissance] of everyday changes, agencies and actions to make a difference. As part of collective everyday agencies, personal recalcitrance entails potential to 'feel, perceive and think' (Colebrook 2015: 126), to have 'a sense or feeling for the inflections of power' (Colebrook 2015: 126). This is the potential of choosing to choose to go athwart the projected future that algorithmic, political and other agencies have decided on our behalf. To enact ethics by embedding this potential into the collective power of practices to differ resounds Deleuzoguattarian

and New Materialist ontologies of how change happens. It entails a relational ethical question: what can we do (Bogue 2007: 12). Firstly, we can reject essentialist conceptualisations of everyday phenomena (Bogue 2007: 7-9), including those which frame intra-actions and phenomena, such as the collective agency of practices, as individual. This profound choice challenges us to not rigidify the more equal open-ended future, neither the past, nor the present that acts change. Secondly, we can ethically experiment (St. Pierre et al. 2016) with virtual real in order to actualise creative connections (Bogue 2007: 9-15). This means to intra-act in order to differ rigidification of agentic phenomena, including algorithmic control societies, from within them. In short, we can adopt 'Deleuze's attempt to think, within difference, of a difference that makes a difference' (Colebrook 2015: 139) and, in harmony with this thinking, enact 'possibilities for life' (Bogue 2007: 15). The participants' insights show how, for instance, this can be done.

For instance, participants concluded that nobody involved in the field of independent gaming knows anything in regard to what is happening, or what is going to happen in the near or more distant future (L.W., V.K.)⁴³. This conclusion confirms the indeterminate change of relational networks that feature algorithmic agencies. Notwithstanding hierarchical investment structures at play, this change goes well beyond the handy black boxes labelled as unintended consequences because relational complexity well-exceeds the sum of its parts. That is, a high degree of indeterminacy facilitates scope for the collective agencies of humans and non-humans to actualise and proliferate material-discursive change that is non-deterministic. But this participant's viewpoint also confirms Deleuze and Guattari's (1987) discussion about a grass stem as one exemplary conceptualisation of how change happens. A grass stem grows from the middle, which makes it very difficult to perceive change from the middle of it (Deleuze and Guattari 1987). But no matter where you look, everything is changing (Deleuze and Guattari 1987). This ontoepistemological stance makes it visible how citizens are unlikely to fully know in which ways their everyday cramped existence constraints them from making the institutional changes they may wish to make. But this does not mean the citizens cannot make change; it means that the agency of intra-actions changes from within phenomena that are akin to a grass stem that grows from the middle, (and Deleuze and Guattari (1987) also use the term 'margins'). Consequently, one can experiment with collective highly distributed agencies, bodies, to use another term, that are never merely human. These collective agencies entail education and learning. For instance, a participant summarised that any game development project is like an expedition or a journey full of discoveries, and another one suggested that there is always something new to be found.

⁴³ 'Just like the real world, the systems [in the field of gaming] function in a chaotic way. One cannot know anything for sure in advance.' (L.W.).

'The profound premise is, in the field of gaming we do not know anything. Nobody knows anything.' (V.K.).

It is not at all self-evident in advance what I [the game developer] might be unable to resolve. [...] a game development project is like an expedition or a journey full of discoveries, like, to discover. Each and every of them is always a research and development project. (L.W.).

One needs to discover something new. And while a million independent game developers tries something new, there is always something new to be found. (K.O.).

But how, then, to conceptualise the creative potential of practices with embedded recalcitrance to go athwart that which may have been decided on our behalf?

For instance, most participants told about their efforts of tapping into both current and upcoming opportunities for pushing gaming content to creative ends that might open up the field of independent gaming for more versatile experiences of gaming. One participant made an analogy between new types of gaming content and music. ‘Is it possible that any new music will be born? Of course [...]. There is no problem whatsoever. It only needs to be a bit different.’ (N.T.). This quotation echoes the New Materialist and Deleuzoguattarian understanding of difference in the making as that which eludes representations – until it is captured by them. Further, it exemplifies how independent game developers might embed their recalcitrance into their practices of altering the field of gaming by creating content, including, but definitely not limited to, the previously-discussed development of female gaming characters. This can be done.

To this end, some participants discussed new types of gaming experiences that might help one in further acknowledging one’s sedentary feelings of the familiar, including habitualised conceptualisations of real. Different types of gaming content and experiences have been typically evolving in relation to new types of user interface, and these include emergent interfaces of augmented and virtual reality. One participant described in detail their profound experience of interplay between augmented vision and haptic sensation. They concluded it had been a surprise how quickly their habitualised senses had accepted the virtual reality world as that which truly existed.

It took only 15 or 20 seconds for my brain to accept that what I see on the headset display is my objective sense of vision. [...] It was an experience that was technically still unripe but conceptually well beyond comprehension. (S.T.).

This quotation exemplifies how intra-actions with algorithmically enhanced milieux change how we ontoepistemologically experience that which these contexts and environments decide for us. Further, it implies how non-revolutionary changes in experiencing agentic phenomena that enact algorithmically enhanced control societies matter. Therefore, it highlights the importance of relational ontoepistemological education that unpacks non-revolutionary embodied experiences that alter pre-decided conceptualisations of where the difference lies and whether it matters. In order to do this,

relational ontoepistemological education explicitly rejects the colonising tradition of judging the character of ‘the non-I’ (Barad 2014: 169); neither does it build on those ‘[c]lassifications or taxonomies’ that predetermine how ‘x is not y, and y is not z, and z is to be preferred to x and y’ (van der Tuin 2009: 28). These categorisations undergird the idea that ‘the non-I’ can, and should be, identified, analysed and violated ‘by eliminating or dominating what it takes to be the other’ (Barad 2014: 169). Conversely, civic education for advancement of the predestined revolutionary atmosphere (Anderson 2009: 77) has traced it back to the volition and cognition of competent action citizens who have accumulated all the revolutionary resources to take back control from their counter-citizens: individualised ‘idiots’ of social reproduction.

But relational understanding of embodied experiences that matter defies the traditional political divide between communities and looser associations. Rather, ‘[i]nstead of installing oneself somewhere and then that will constitute who one is, “we are the people who occupy”, rather than “we occupy because we are the people”.’ This means to assume, as a collective agency, or body, an identity of much like the oft-theorised identity of becoming-woman: there is no space outside that which one wishes to destabilise (Colebrook 2015: 155). Colebrook (2015) does not make this point, but the same argument applies to 21st century communities that work for the equality yet to come. We can assume an identity of becoming-community: we are the people who, as best as we can, enact ethical micropolitics – not ethical micropolitical people who act. This collective civic recalcitrance at work eschews civic divide if it becomes embedded in bodies that act: highly distributed, collective and never only human agencies, including practices.

For instance, most practitioners mentioned that during public gatherings, Finnish game developers had generally shared learning experiences on various topics very openly. These include tacit knowledges of how various algorithmic systems function and hints on useful contacts, notwithstanding that one could argue these may be covered by their non-disclosure agreements with commercial entities, such as publishers or owners of application markets (E.P.)⁴⁴. Due to their civic practice of open-ended peer learning, the practitioners have created changes in the established practices for the development of games, notably including the practices of programming (T.H.)⁴⁵. In short, their unofficial, even micropolitical, learning has channelled the participants’ recalcitrant agencies from within the rules aimed for rigidifying the field of independent game development. But

⁴⁴ ‘There are, of course, differences amongst Finnish independent game developers and organisations, but my contact network is extensive, and we share most of the details, excluding the sales and retention numbers’ (E.P.).

⁴⁵ ‘I’ve mostly talked in detail about game development, such as the real world problems we’ve had with touch screens or usability. It’s definitely mutual. This could be done, but ok, you did it that way. But maybe we could find a middle ground, could that work? And of course you learn yourself as well’. (T.H.).

their formation of a relational and largely unstable community has certainly not revolved around predetermined political changes (I.K.)⁴⁶. Rather, it attests that the micropolitics that matters because it changes institutions, not least because civic experiments with algorithmic systems, including programming, intra-act with agentic networks and form new collective agencies. The formation of these types of complex more-than-human collectives (Bogue 2007: 12-14) hence echoes both the ethical and the pragmatic question, what can be done, rather than moral truths of what must be done (Bogue 2007: 12). Therefore, the main focus has been on on-going and experimental differentiation of the real world from within it in order to form more complex collective bodies, including ontoepistemological communities, for affecting and being affected.

Hereto, everyday intra-actions of persons with each other and with algorithmically enhanced infrastructures, technologies and practices are embedded with ethical and micropolitical choices from which to choose. Most importantly, algorithmic governmentality makes visible the 21st century practice of framing identifiable and comparable differences as substance of value that can be turned into money. This practice retains both the algorithmic and in-person economies of reputation, risk and opportunity, as being part of that with which civic ‘characters’ are measured in comparison with one another. In short, essentialist divisive ontologies render citizens as being collectively entitled to implement that future world to which their pre-judgements point. As a response to this profound philosophical dilemma, relational ontoepistemological education and learning makes a difference that matters because it explicitly rejects identifiable comparable differences and the consequent micro-fascist hierarchies, including those which undergird classism, sexism, racism and xenophobia. But it acts ontology as ethics as it allows creative potential of personal recalcitrance to effect institutions and their emergent effects as part of collective agencies of practices aimed for actualising the creative connections of the virtual ‘real’. This micropolitical non-resistance accounts for our collective ethical responsibility to act meaningful change in favour of being affected by the on-going power to differ not all of which can be associated with human persons.

⁴⁶ For instance, one participant concluded the role of IGDA Finland (the local Finnish chapter of non-profit International Game Developers Association) as follows. ‘[IGDA Finland] as a host facilitates an opportunity for the game developers to gather, [...] an opportunity for everyone to act together. [...] There is no pressure to please the key players of the nation state, neither the funders; nothing like that.’ (I.K.).

7 Conclusion: New Materialist environmental education

Civic environmental education has promoted agentic citizenship that drives institutional change to tackle complex socio-ecological problems. Therefore, it matters whether or not this education itself allows for agency and change, and what type of ontology and ethics it entails. As agents of educational, civic and institutional change, New Materialist and Deleuzoguattarian ontologies and ethics reveal the relational power of collective agencies that are never only human – in particular, everyday practices – to make a real world difference that matters. In short, they allow for the power of micropolitical non-resistance, embedded with the creative potential of everyday recalcitrance, to alter the on-going implementation of institutions and their constraining effects, most notably, the on-going transitions to algorithmic control societies with algorithmic capitalisms and governmentality. But this is a choice to adopt relational ontology as ethics in action.

Relational ontoepistemology, or onto-ethico-epistemology, functions as not only a conceptual approach for understanding agentic phenomena, but also a methodology for finding out about the intra-actions they entail. These intra-actions neither divide nor fully separate agencies from changes; intra-actions are cutting together-apart, that is, they are ‘differencing’ as they are entangling. They entail a Deleuzoguattarian understanding of agentic changes from within institutions and their effects on co-constituted collective agencies, or bodies for short, that are never individual but always highly distributed through a range of material-discursive registers, including the physical, chemical, biological, neural and social. For New Materialists and Deleuzoguattarians, the agency of ethics is thus immanent in every intra-action and phenomenon. Consequently, we scholars must explicitly account for our own responsibility in making the material-discursive ‘real’ existent – and changing it – by studying it. We are part of the real world, and understand it while being part of it. For example, instead of the dichotomy of observer and observed, there is a mutual relationship of becoming-observation, as is the case in the intra-action of the collective agency of civic energy resilience and smart grids, that entails an emergent entanglement of matter and spacetime, human and non-human, matter and discourse. Consequently, we as citizens/practitioners or scholars and educators/learners, cannot assume that we can fully understand how our positionality has been co-constituted throughout all the material-discursive registers. That is, we cannot claim to be objective, or sufficiently undetermined, to be able to promote a fixed scholarly position. Neither can we prescribe how a civic society should enact profound change in its economic and ecological, or ‘econological’, institutions: what should be done, what path to follow to the predetermined future, which collective experiments matter because they alter the open-ended future from within the socio-economic real world. The insights and analysis presented in this study emerged through my ‘diffractive’ scholarly intervention of reading and re-reading multiple scholarly insights through one another and with my participants’ insights in a way that I hope does justice to the intra-active phenomena at hand. I embedded this

reading with my relational micropolitical choice to enact institutional change via ethics as ontology and with my ethical responsibility of being affected by agentic phenomena and intra-actions that entail human-non-human collective agencies. I also enacted this micropolitical choice and ethical responsibility as I interviewed independent game developers based in Finland. Algorithmically enhanced contexts such as online or smart communities entail social, economic and ecological relations: highly distributed, interdependent networks that are agentic, constantly changing and material-discursive. Education for real-world change that makes a difference that matters needs to take account of the nature of these networks. New Materialist and Deleuzoguattarian understandings can do so because they can account for more-than-human collective actions. In what follows, I show my analysis of agentic phenomena for the educational openings on agency and change that my analysis entails.

Phenomenon: Algorithmically enhanced control societies entail environmental strategies: together-apart

Material-discursive investments in civic climate resilience intra-act with investments in the transition to algorithmic governmentality, an overarching strategy for ensuring the profitability of markets that feed on both crisis-ridden capitalisms and nation states' regulations for safeguarding these capitalisms. The markets of control societies increasingly rely on algorithmic data to draw out comparable differences: out of characterisations, categorisations and judgements that bring about the real world to which they point. These comparable differences have been taken as characteristic to an identifiable body, irrespective of whichever human and non-human agencies this body may entail, in comparison to other bodies. These bodies are subsumed to algorithmic, civic and other economies of reputation, risk and opportunity that draw value out of speculation and facilitate future-oriented measures that co-opt the actualisations of a virtual real. These economies privilege transformable marketable products, including financial derivatives akin to energy futures, over the practices and work of production, including the self-determined biopolitical control of citizens to ensure the smooth functioning of resilient energy management. Thus, they privilege the profit value of speculative products, such as pre-emptive measures, previsibility and/or predictability, over their productive value, such as preventive actions, visibility and/or predictions. Therefore, civic investments in communally oriented control societies that are algorithmically enhanced facilitate communal divide and self-rule that aims to control and manage what is uniquely different. Yet this work generates both data and value for the markets of control societies that turn comparisons of identifiable differences to profits.

As an agentic phenomenon, algorithmic governmentality implements an ontoepistemological shift away from attempts to account for agency and causality in terms of premeditated judgements. It does

this to safeguard markets of algorithmically enhanced control societies against the crises of crisis-ridden capitalisms. Because it thus co-opts the actualisation of a virtual real, algorithmic governmentality presents a profound dilemma for those who wish to actualise the creativity of the virtual to bring about a more equal world. Civic communities may not step outside of their cramped existence as part of capitalist nation states, but they implement, not necessarily willingly, intra-actions of civic climate resilience and communally oriented states and capitalisms because uncertainty has been outsourced to communal management and control. Their communal actions never exist independently, but rather interrelatedly: that is, these actions cut algorithmic control societies together-apart with environmental strategies; traditional acts of resistance sustain control societies. This political and ethical status quo entails both institutional opportunities and constraints for institutional change. But a new type of civic communal education is needed to unpack and build on collective agencies with the collective capacity, or power, to destabilise communally oriented societies of control from within. A New Materialist and Deleuzoguattarian relational understanding of intra-connected agencies and change can enable us to analyse and put into practice this need to go against the everyday control that is implemented through institutions and their constraining effects on embodied persons. This is because it can build on relational ethics and micropolitical acts of non-resistance to achieve real world changes and actions that make a difference that matters, from within communally oriented states and capitalisms.

Phenomenon: Cramped civic existence as part of a capitalist control society with global algorithmic markets

Institutional investment in the transition to smart contexts, environments and communities continues to embed algorithmic agencies into infrastructures, technologies and practices, and to foster on-demand energy-reliance as an integral part of everyday living. These investments embed the ubiquitous presence of online contexts that ensure access to the data the communal patchwork of capitalist nation states engenders. They promote a profound shift from civic management of their algorithmic practices to full civic reliance on on-demand access to server-end resources, or ‘services’. Simultaneously, material-discursive investments in the transition of communal biopolitical control for the management of pooled energy resources have framed this transition as both transformative civic good, and the foundation of civic climate resilience. But communally oriented control societies have fed on civic economies of self-regulation, management and control with short intra-communal relations of production, consumption and prosumption, including peer-to-peer economies: smart and green economic growth reliant on civic investments and entrepreneurship. Earlier, civic economies and markets were framed as a civic critique of the dominant relations of production and consumption, and transformative communities were educated to invest their resources, actions and desires into a

communal turn inwards. These investments have imbued the patchworks of communally oriented control societies with an intra- and inter-communal inequality of civic divide and self-rule. The transition to smart and/or green communal lifestyles, notably civic climate resilience, is increasingly embedding market practices that have succeeded in online contexts into in-person infrastructures, technologies and practices that have not been previously algorithmically enhanced. This transition entails markets for speculative products that feed both on algorithmic data and on the value of communal self-regulation, management and volunteer work for the predetermined common good.

In this study, I assessed how the lack of obvious determinacy on these fronts may or may not inhibit citizens from working to meaningfully change algorithmic practices that implement on-demand energy-reliance. I interviewed independent game developers based in Finland to find out what they thought and felt about institutional change in disconnected and indeterminate social, economic and environmental relationships that are well-beyond the direct influence of their communities. The assembled insights of these participants described their cramped civic existence as part of global algorithmic markets for gaming content. Their choices to choose whether and how to participate in these markets seemed to entail the intra-action of these markets with global regulations that advance international tax planning: the value of algorithmic data, unlike the value of 'producing' gaming content, entails financial profits on an intergalactic scale. But their insights into the agentic change of capitalism did not fit well, if at all, with the focus in the literature on transformative civic/environmental education, which has tended to focus on a proactive communally-oriented citizenship that projects an ideal of the demise of capitalisms and states. But my reading of these insights with New Materialist and Deleuzoguattarian perspectives on agentic relational phenomena that intra-act points toward a need to re-think educational philosophies and change the practices for everyday institutional change that they imply to enable them to be actualised from within 21st century capitalisms and states. With their focus on relational institutional changes, New Materialist and Deleuzoguattarian approaches to education are already working to this end. They are opening up educational opportunities to understand and transform collective agencies from within, without purporting to disentangle themselves from communally oriented societies of control. This opens up a scholarly opportunity to problematise and re-imagine the future-orientation of civic environmental education. It matters that algorithmic, civic, political and other actions preclude some creative connections of a virtual. But Deleuzoguattarian and New Materialist ontology and ethics can help in addressing how, where, when, and from what viewpoint that matters.

Phenomenon: The limits of 21st century control

Relational ethics promotes the creative power of practices to destabilise control hierarchies that implement institutions and their constraining effects on collective civic agencies, or bodies. These

hierarchies bring about the predictable but insignificant, not too engaging, real world to which they point. By reading a Deleuzoguattarian and New Materialist understanding of agency and change with literature on the transition to smart grids, I showed where the limits of control may lie. The transition to smart production and consumption of energy as a communally pooled resource reveals how communally oriented control works to attract money on a scale exceeding the budgets of small nation states. But it does not do this because collective civic actions for resilient resources management have been outsourced to atomised individuals; it does so rather because they have been outsourced to communal measures that implement their self-determined common good. Civic investments in communal turn inwards never exist independently, but rather interrelatedly: they cut crisis-ridden capitalisms together-apart with communally oriented control. This presents a profound dilemma of outsourcing crises of democracy to communal divide and self-rule. This is because atomised idiots have been framed as those withdrawn from democratic decision-making for common good (Jickling and Wals 2008: 7-8); transformative communities have been entitled to predetermine their preferred real world grounded on their self-ascribed meaning and values. But civic energy heterarchy entails opportunities for citizens to channel their desire and capacity for change without juxtaposing their collective agency, intentional or not, with the functions of algorithmic control societies and data available to them that shape their intra-actions with algorithmic agencies.

The transition to smart grids for electricity distribution holds out the promise of civic energy autarkies; namely, self-sufficient local electricity networks based on renewable sources, low demand and citizen participation. But I presented a set of critical propositions that attend to the ways in which investment in a transition to the infrastructures, technologies and practices of smart grids has instead served to deliver so-called ‘civic energy resilience’ as a means of self-regulation to others’ ends, or control. It has done so through the mechanism of 21st century algorithms that may learn, act, and learn about learning and acting, which facilitate minimal investment in, and maximal profit from, the grid infrastructure – not only by monitoring the behaviours of individual users and networks, but also by channelling citizens’ desire and capacity to act for socio-ecological change. In short, institutional investment in civic energy autarkies is unlikely to change given the way the state and capitalism are currently configured. Past institutional investment in microgrids has not advanced them as a sustainable civic good, and investments in microgrids are unlikely to promote citizen-led institutional change to civic energy autarkies. Rather, the shift towards pooled energy resources as the basis for civic energy autarkies has promoted a greater degree of civic accountability. Further, institutional investment in pooled energy resources is unlikely to change the state and capitalism because it relies on entrepreneurialism. Neither does institutional investment in smart energy networks benefit those citizens who cannot afford to invest in them, but algorithmic operation of smart energy grids facilitates critical energy infrastructure. In short, institutional investment in smart energy grids does

not promote electrical energy as a reliable public good, but rather promotes fractured energy networks that imply a different mode of social control.

Through control, smart grids produce not energy autarkies, but hierarchies. The transition to smart grids does not deliver the civic energy autarkies it promises, because such autarkies and fractured energy networks exist together-apart, independently but interrelatedly, in the service of civic control for networked energy management. The acts of differentiating self-sufficient energy networks, or civic energy communities, from other networks or communities, are simultaneously acts of entangling them through the creation value and algorithmic data that entangles human with non-human agencies. As part of these civic energy apparatus, citizens control, or manage, themselves via voluntary self-regulation, and preclude some actualisations of a virtual real. For instance, citizens may preclude any other options with a decision to draw energy from energy pools supplied from renewable intermittent sources whenever abundantly available. But this availability depends on the weather and climate. Thus, for instance, a community may self-determine rules, norms and sanctions of control that allow members to do their laundry only when the windmill is turning. These choices demonstrate the civic management of uncertainty at work: the everyday control of embodied persons serves energy-reliant practices and the availability of energy. Further, the apparatus retains the ultimate sanction: the power to connect and disconnect energy-reliant civic bodies, both manually and algorithmically, from energy production and management resources. In short, material-discursive investments in the transition to civic energy autarkies and fractured energy networks exemplify how citizens may invest resources, actions and desires into a communal turn inwards, but these investments directly serve the ends of communally oriented control societies that may be algorithmically enhanced. The civic energy apparatus thus highlights the need for educational opportunities that do not shy away from addressing this dilemma.

This control can best be countered not by oppositional resistance, but by tactics of ‘nonexistence’, such as acting ‘unaccountably’ by, for example, avoiding being tracked or using the grid to network, that replicate across the smart grid and reveal an energy commons at work. Such tactics rely on the feeling for the inflections of power that emerge, via intra-action, from smart grids and reveals the limits of control. Such non-resistance implies that smart grids are potentially not energy hierarchies, but heterarchies: dynamic, relational networks of power – and also an arena that opens up possibilities for participatory energy democracy. This analysis suggests that civic environmental education benefits from a complex understanding of how institutional changes happen from within processes that implement both institutions and their constraining effects.

Most importantly, it shows the need for civic environmental education to foster practices that can enable citizens, if not to quit, then at least to admit their debt of existence to the control society. The regulation of capitalist nation states instantiates the axioms of capitalism, and it is the circulation of an

infinite debt rather than the rule of law that keeps nation states together. While some economic bodies may choose to not opt out of taxation, citizens have a duty to repay their debt of existence through money and taxation. Yet, the state only has the option to lend to them through ‘welfare’, and citizens can never quit repaying their debt of existence to their nation state. Energy-resilience exemplifies this debt, because energy-reliant citizens are indebted to the state as guarantor of the grid and the other econological institutions that undergird it. They cannot opt out from their status as citizens of a control society, since they never repay their debt of existence to their nation state, despite their investments in the communal turn inwards, no matter how much energy they consume or generate. In short, we need to reconceptualise education that paves the pathway to the profound change of capitalist states with civic investments in communal resources, actions and desires.

Therefore, there is scope for education that does not preclude the real world where citizens have learned how to think; that enables them to understand that algorithmic, civic, political and other agencies are deciding on their behalf, and that does not allow them to claim that they are not part of social reproduction. But any resistant politics that co-opts future-oriented changes, agencies and actions misses the root problem of algorithmic governmentality that undergirds agentic strategies, like civic climate resilience, that outsource risk and loss to communal divide and self-rule. This opens up scope for the kind of education that entails agentic citizenship that does not rely on the illusion of stepping outside of socio-economic reproduction or dissociating the material-discursive agency of its practices from the actions and work it does. These agentic intra-actions are cutting together-apart complex relational phenomena, including, for example, civic climate resilience: it is the present that acts change.

Phenomenon: It matters how education frames actualisations of a virtual real from within capitalist states

Transformative civic education implies two forward-looking questions and their educational answers. Firstly, an educationally transformed citizenry is what we want in order for us to bring about the projected profound change of states and capitalisms. Secondly, an educationally transformed citizenry is how we get there, because this citizenry is developing action competences for the projected profound change. To mobilise these two definitions that intra-act, transformative educators have traced civic capacity to advance the profound institutional change back to the educational transformation of their citizenry. Therefore, citizens have been educated to invest their resources, actions and desires in the communal turn inwards. But it is impossible to realize an action competence prior to the profound change it is supposed to enact. Consequently, educational transformation of the citizenry becomes the orthodox path by which to predetermine civic futures – even though transformative authors have defined that their education is not deterministic but transmissive

education is. Thirdly, by definition, transformative educators are doing good and important work in transforming citizens from individualised ‘idiots’ to an educationally transformed citizenry (non-‘idiots’) who ascribe meaning and values to individualised transformations from idiots to educated citizens of social transformation. The interplay of these definitions ensures that the transformation of practitioners’ senses of subjectivity serves as empirical evidence that the projected profound change is happening. Ontology of the civic divide undergirds this transformation: individualised idiots of social reproduction are, in their essence, counter-citizens to communities of social transformation.

Therefore, the educator’s characterisation, categorisation and judgement determines who is or is not an idiot to be educated. But it also determines the evidence of whether or not this transformation has happened. In short, the theory of change and the empirical evidence that justifies it seamlessly necessitate each other.

The self-referential system of transformative education bets on the future. On the one hand, development of action competence towards the projected profound change is happening because these competences can and should be traced back to educationally transformed citizens. But on the other hand, self-determined changes and actions that can and should be framed as individual are resisting the projected demise of capitalisms and states. Further, to mobilise these definitions, transformative educators have subsumed civic experiments to educational mediation facilitation and design in order for them to learn to ascribe transformative meanings and values to their agencies for change, and life-changing transformative experiences to their learning. In short, the educators’ conclusive system of how change happens limits non-human participation in collective agencies of change, and subsumes the creative potential to actualise a virtual real to transformative educational agendas. This self-referential and future-oriented system creates scope for future studies to re-conceptualise education as an agency of a profound institutional change. Most importantly, it highlights the educational need for genuine calculations in order for us to address how citizenry, as a collective heterogeneous agency, occupies a cramped niche of machinic capitalism: there is no outside. The relational ontoepistemological understanding of education as an agent of civic change helps in this task, because it allows us to unpack the self-referential phenomenon of transformative education and the intra-actions it entails.

New Materialist educators reject the concept of the sovereign individual agent who has the right to transform learners into agents of social transformation. Rather, they account for change, for making a difference, through the concept of learning as a continuous process of becoming-other. They do not conceive of critical thinking as the product of detached bodies competing with each other for intellectual hierarchical standing. Neither do they claim an epistemic entitlement to teach learners how to think or how to ethically experiment. Therefore, their understanding of education and learning allows the participants’ insights that made it evident how some practitioners have already learned how to think. That is, they allow practitioners not to be framed as disembodied impressionable minds in

which governments, special-interest groups and industry can implant an engineered message, agenda, ideology, or consumer preference. The enemy, in short, is no longer bourgeois ideology and the putative benevolence of the market, but comes in the form of regulations that facilitate neo-feudal hoarding of money at the expense of every nation state worldwide. This happens because nation states have rewarded excessive risk-taking on markets of speculation with public safeguards, most notably bail outs, subsidies and regulation that advances international tax planning. For instance, the participants in this study volunteered their genuine calculation that showed how money provides a foundational institutional constraint on projected transformative change. Yet civic participants of algorithmic markets may take the minoritarian civic position of choosing to choose; this is a sustainable position because one cannot opt out. It matters that nation states collectively regulate in favour of opportunities to draw money on an intergalactic scale from the communal production of value on an intra-atomic scale. But this educational stance may neither resist nor replicate the divisive logic of algorithmic, civic, political and other comparisons that enact micro and macropolitics to co-opt a predestined future. Rather, it entails education that aims to foster a collective politics expressed in the form of ethical experiments.

Phenomenon: It matters that climate protection is already everyone's responsibility

Transition to civic climate resilience is largely outsourcing the dilemma of climate to communal control of civic bodies, management of resource pools, and concurrent crises of democracy. Consequently, climate protection might end up being no one's responsibility because it already is everyone's responsibility. Further, with its ontology of civic divide, education for civic transformation has largely left unaddressed communal participation in social reproduction and the role of communities as both objects of consumption and as net consumers of capitalist control societies that sustain global capitalism and its socio-ecological effects. This exemplifies the profound mismatch between communally oriented control societies and how transformative education has framed the development of civic action competences to foster future change. But the dilemma of climate protection that is already everyone's responsibility can be addressed with education that rejects the division of 'one against many', individual actions against collective actions, and thus allows everyday intra-actions of citizens and milieux to matter. With its understanding of practices, New Materialist education can enable us to account for the profound relational problem that it is communities, not atomised individuals, that reproduce the socio-economic hierarchies of inequality that undergird the communally oriented capitalist state. Further, this type of education fruitfully addresses the agentic phenomenon of complexly intra-connected emissions to climate that arise from the cumulative, unintended effects of a vast amount of seemingly insignificant decisions and actions. These include practices reliant on ubiquitous algorithmic resources and on-demand access to energy. In short,

neither these practices nor the environmental effects and concerns they entail are localisable. But in order to change them, one can experiment with algorithmically enhanced infrastructures, technologies and practices: agentic networks that are themselves changing and educational. The participants' insights into their practices suggest how this can be done.

During the interviews, the participants shared their insights into institutional change from within communally oriented states and capitalisms embedded with algorithmic agencies. They depicted the intra-actions that are differencing and entangling agentic phenomena of independent game development, including their participation in algorithmic markets that sustain control societies. The participants' intra-actions with algorithmic agencies do not support material-discursive engineering. Rather, they entail learning with relational real world phenomena in the making; that is, education about collective agency and differing in the making. But this learning does not mean that the participants can assume a transformative educational leadership role in their communities. Contra to the straightforward transformative agenda of environmental education, the participants cannot claim the moral high ground of transformative citizenship. This compromises their agency as 'natural' civic educators. The relational learning that is needed is the willingness to acknowledge that heterogeneous rhizomatic agencies utilise collective power in the processes that make and unmake the material-discursive orderings of the world, even though the utilisation of this power is not always intentional.

The participants' insights informed understanding of how one can adopt a minor position of choosing to choose, which allows transformations from within machinic capitalism without any illusion of stepping outside of one's participation in everyday social reproduction. In short, everyday ethical and micropolitical recalcitrance embedded in collective agencies of practices transforms algorithmically enhanced control societies that entail complex relational networks of intra-connected infrastructures, technologies and practices. This perspective on everyday agencies for change entails education and learning that defies both technophobia and technophilia, but provides an ontological description of on-going changes and actions. Most importantly, this education and learning fully accounts for non-human agencies; systems may be pushed beyond thresholds of change that are unknown, because no agency is ever only human. This perspective on agency and change entails choosing to act ontologically and an opening for civic education to this end.

Notably, algorithmic agencies at everyday work do not conform educational understanding of agencies and change by revealing which norms underlie it. Citizens who act to change the norms that underlie algorithmic pre-emption cannot simply disobey or contest these norms unless they somehow find out which acts become im/possible because of this algorithmic pre-emption. Their civic agency intra-acts with the phenomenon of algorithmic pre-emption in a complex rather than straightforward causal manner. New Materialist education on relational agency and agentic phenomena as a mutual intra-action, real world in the making, helps us to understand and change this complexity because it

reveals how and why it matters that algorithmically enhanced contexts change our knowing and being simultaneously. In doing so, it emphasises how implementation of a self-fulfilling reality carries with it the implicit danger of micro-fascism, even if this world was self-determined democratically.

Phenomenon: What can we do to not perform a predictable but insignificant real world?

In short, what can we do now in order for our civic agency to enact a real world that matters; to put in practice our ethical responsibility? We can begin by fully acknowledging that everything is changing, and that these changes do not connote divisive ontologies but resemble the hardly observable growth of a grass stem from its middle. We can re-conceptualise the ongoing relational changes and agencies that intra-act without stepping outside of our ontoepistemological presence. But we cannot fully know what changes a collective agency, a body, may enact. Thus, we can ethically experiment with reality to transform it beyond thresholds that were previously unknown to us. This can be done by putting in practice relational philosophies and civic education for relational ethics and micropolitical non-resistance that neither adopt nor resist the everyday implementation of hierarchical institutions and their constraining effects. In short, ontoepistemological education at work problematises social reproduction of divisive comparisons on account of co-opting the future. This education performs the non-resistant micropolitics that is changing social reproduction of divisive comparisons, which is performing a predictable but insignificant real world. This ontoepistemological understanding of agency and change helps in problematising the foundational ontological problem of algorithmic governmentality rather than its everyday effects. We cannot know which comparisons undergird the everyday algorithmic work, actions and learning - including learning about learning. To problematise them, though, we need to reject ontologies of divisive comparisons. We can do this by embedding the creative potential of recalcitrance, personal and non-human, into everyday collective agencies that are never only human and entail the power of practices at their everyday work of actualising a virtual real. This choice to choose to enact the relational micropolitics of non-resistant intra-actions makes a difference that matters, because it transforms agentic phenomena from within. It enacts ontology *as ethics*; education to this end makes a difference that matters.

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Auckland, New Zealand

PARTICIPANT INFORMATION SHEET (Manager)

Project title: Interaction between business practices and environmental strategies for new media technologies and services

Name of Researcher: Enni Suonio

Researcher introduction: Enni Suonio is a PhD Candidate at the School of Environment, Faculty of Science, The University of Auckland.

Project description and invitation

The proposed research examines how the programmers and gamers of computer games conceive the relationships, interactions and prospects of gaming.

The aim of this Participant Information Sheet and associated consent form is to seek your permission for

- recruiting your employees to participate in this research
- conducting a group discussion with those of your employees who might wish to participate in this research

If permission is given, I will invite those of your employees who are interested in this research to take part in a group discussion, which takes place in premises reserved solely for this purpose. These group discussions will be referred to as focus group discussions in all the documentation related to this project, and those participating in the research are referred to as participants.

If permission is given, the researcher will deliver the advertisement of this research to you to be distributed to those forums where it can be seen by those of your employees who might be interested in participating in this study. A copy of The Participant Information Sheet is provided to you to be accompanied with the advertisement. In addition, a copy of The Consent Form is provided to you.

Project Procedures

The focus group discussions take place during the working hours if you so wish. The aim of this research is to form eighteen focus groups in total. Each of the focus group discussion sessions lasts for a maximum of two hours. The number of participants for one discussion session will be three to seven. Participating in the focus group discussion is completely voluntary. All the participants need to be 16 years old or older.

Only the participants who have signed The Consent Form can take part in the research. The signed Consent Form will be delivered to the researcher in person preceding a focus group discussion session. Every participant who has signed The Consent Form agrees not to disclose anything discussed in the focus group. The researcher will follow up the potential participants' expressions of interest and provide them the practical details about the timing and specific location of the focus group discussion session. The researcher will moderate the focus group discussion. The focus group discussion will be recorded to create a record for analysis.

Data storage/retention/destruction/future use

The audio recordings will be transcribed, and the work load is divided between the researcher and the transcribers who have signed the Confidentiality Agreement. The Confidentiality Agreement the transcriber signs necessitates that confidentiality of information and participation will be preserved. During the writing of the PhD thesis two copies of the focus group discussion recordings will be kept on two separate flash disk drives. These flash disk drives will be stored by the PhD researcher in a locked cabinet at The University of Auckland's premises. After that these flash disk drives will be stored by the main supervisor in a locked cabinet at The University of Auckland's premises for six years. My supervisor and I will be the only people allowed to access these flash disk drives. After six years the recordings will be deleted and the flash disks will be completely re-formatted. The Consent Forms will be stored separately from focus group discussion recordings and kept for six years by the main supervisor in a locked cabinet at The University of Auckland's premises. My supervisor and I will be the only people allowed to access these forms. After six years The Consent Forms will be destroyed under The University of Auckland's protocol of destroying confidential documents.

Right to Withdraw from Participation

All the participants have the right to withdraw from participation at any time. This means that any participant may decide not to answer a question or leave the discussion at any time. However, focus group discussion does not allow the possibility to withdraw information once provided since communication is interdependent and shared amongst multiple participants.

Anonymity and Confidentiality

By its nature, focus group participation prevents total anonymity and confidentiality even though the researcher does her best to protect them. During the focus group discussion there is no need for any participant to reveal more personal details about them than what they would reveal during their other group discussions of a similar nature. My supervisor and I will be the only people allowed to access the information collected during this research process. No information that might make it possible to identify a participant is used during any documentation of the results in this research. All participants undertake to maintain confidentiality of any information shared during the focus group discussion. However, the participants of specific focus group discussion sessions might be able to memorise direct quotations from their session and recognise them from within the summary of findings. Should you be interested in the results of this research, a digital copy of the summary of findings will be made available to you. Should the participants be interested in the results of this research, a digital copy of the summary will be made available to them. This research is funded by The University of Auckland's internal funding initiatives only so there are no conflicting interests and I assure the loyalty to all the participants of this research only.

Contact Details and Approval Wording

Thank you very much for your time and support in making this study possible. If you have any queries or wish to know more please email me at e.suonio@auckland.ac.nz, phone me at +64 9 3737599 ext: 82924 or write to me: Enni Suonio, School of Environment, The University of Auckland, Private Bag 92019, Auckland.

This research is supervised by:

Dr Brad Coombes

School of Environment, The University of Auckland, Private Bag 92019, Auckland.

Tel.: 64 9 373 7599 extn. 88455

The Director of School is:

Professor Glenn McGregor

School of Environment, The University of Auckland, Private Bag 92019, Auckland.

Tel.: 64 9 373 7599 extn. 85284

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of the Vice Chancellor, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 extn. 83711.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 29-Oct-2013 FOR (1.25) YEARS REFERENCE NUMBER 6689



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Auckland, New Zealand

CONSENT FORM

(Manager)

THIS FORM WILL BE HELD FOR A PERIOD OF 6 YEARS

Project title: Interaction between business practices and environmental strategies for new media technologies and services

Name of Researcher: Enni Suonio

I have read the Participant Information Sheet and have understood the nature of the research. I have had the opportunity to ask questions and have them answered to my satisfaction.

- I give / do not give the researcher permission to advertise her research to my employees.
- I give / do not give the researcher permission to conduct focus group discussions with those of my employees who wish to participate in her research.
- I give / do not give an assurance that participation or non-participation will not affect participant's job status.
- I give / do not give the researcher permission to conduct the focus group discussions during my employees' working hours.
- I will / will not allocate a room at the premises of the company I am working for to be used as a room where the focus group discussion takes place.
- I understand that a focus group discussion session lasts for a maximum of two hours.
- I understand that the participants of the focus group discussion have given their permission for the researcher to record the discussion.
- I agree that any information related to this research project is confidential and must not be disclosed to, or discussed with, anyone other than the researcher and her supervisor.
- I understand that the participants may receive a summary of findings.
- I wish / do not wish to receive a digital copy of the summary of findings.
- I do / do not provide an email address below to receive a digital copy of the summary of findings.
- I understand that a third party who has signed a confidentiality agreement will transcribe the audio recordings.
- I understand that discussion recordings will be kept for 6 years, after which they will be destroyed.

Name _____ Email address _____

Signature _____ Date _____

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PARTICIPANT INFORMATION SHEET
(Informant)

Project title: Interaction between business practices and environmental strategies for new media technologies and services
Name of Researcher: Enni Suonio

Researcher introduction

Enni Suonio is a PhD Candidate at the School of Environment, Faculty of Science, The University of Auckland.

Project description and invitation

The research examines how the programmers and gamers of computer games conceive the relationships, interactions and prospects of gaming. I welcome all those programmers and gamers who are interested in this research to take part in the group discussion. This group discussion will be referred as focus group discussion in all the documentation related to this project, and those participating in the research are referred to as participants.

Project Procedures

The focus group discussions take place within premises reserved solely for this purpose. The aim of this research is to form eighteen focus groups in total. Each of the focus group discussion sessions lasts for a maximum of two hours. The number of participants for one discussion session will be three to seven. Participating in the focus group discussion is completely voluntary. All the participants need to be 16 years old or older.

Only the participants who have signed The Consent Form can take part in the research. The signed Consent Form will be delivered to the researcher in person preceding a focus group discussion session. Every participant who has signed The Consent Form agrees not to disclose anything discussed in the focus group. The researcher will follow up the potential participants' expressions of interest and provide them the practical details about the timing and specific location of the focus group discussion session. The researcher will moderate the focus group discussion. The focus group discussion will be recorded to create a record for analysis.

Data storage/retention/destruction/future use

The audio recordings will be transcribed, and the work load is divided between the researcher and the transcribers who have signed the Confidentiality Agreement. The Confidentiality Agreement the transcriber signs necessitates that confidentiality of information and participation will be preserved. During the writing of the PhD thesis two copies of the focus group discussion recordings will be kept on two separate flash disk drives. These flash disk drives will be stored by the PhD researcher in a locked cabinet at The University of Auckland's premises. After that these flash disk drives will be stored by the main supervisor in a locked cabinet at The University of Auckland's premises for six years. My supervisor and I will be the only people allowed to access these flash disk drives. After six years the recordings will be deleted and the flash disks will be completely re-formatted. The Consent Forms will be stored separately from focus group discussion recordings and kept for six years by the main supervisor in a locked cabinet at The University of Auckland's

premises. My supervisor and I will be the only people allowed to access these forms. After six years The Consent Forms will be destroyed under The University of Auckland's protocol of destroying confidential documents.

Right to Withdraw from Participation

All the participants have the right to withdraw from participation at any time. This means that any participant may decide not to answer a question or leave the discussion at any time. However, focus group discussion does not allow the possibility to withdraw information once provided since communication is interdependent and shared amongst multiple participants.

Anonymity and Confidentiality

By its nature, focus group participation prevents total anonymity and confidentiality even though the researcher does her best to protect them. During the focus group discussion there is no need for any participant to reveal more personal details about them than what they would reveal during their other group discussions of a similar nature. My supervisor and I will be the only people allowed to access the information collected during this research process. No information that might make it possible to identify a participant is used during any documentation of the results in this research. All participants undertake to maintain confidentiality of any information shared during the focus group discussion. However, the participants of specific focus group discussion sessions might be able to memorise direct quotations from their session and recognise them from within the summary of findings.

Should you be interested in the results of this research, a digital copy of the summary of findings will be made available to you. Those participants who wish to receive a summary of findings are asked to consent that the researcher can use their email addresses in order to notify them when the summary is ready to be delivered. In her message the researcher will ask the participants to confirm that they wish to receive a summary of findings. There is no obligation to answer this email. This research is funded by The University of Auckland's internal funding initiatives only thus there are no conflicting interests and I assure the loyalty to all the participants of this research only.

Contact Details and Approval Wording

Thank you very much for your time and support in making this study possible. If you have any queries or wish to know more please email me at e.suonio@auckland.ac.nz, phone me at +64 9 3737599 ext: 82924 or write to me: Enni Suonio, School of Environment, The University of Auckland, Private Bag 92019, Auckland.

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CONSENT FORM

(Informant)

THIS FORM WILL BE HELD FOR A PERIOD OF 6 YEARS

Project title: Interaction between business practices and environmental strategies for new media technologies and services

Name of Researcher: Enni Suonio

I have read the Participant Information Sheet, have understood the nature of the research and why I have been selected. I volunteer to participate in this research. I have had the opportunity to ask questions and have them answered to my satisfaction.

- I am 16 years old or older.
- I agree to take part in this research.
- I understand that I am free to withdraw from participation at any time.
 - I understand that the focus group method by its nature does not allow me possibility to withdraw information once provided, but I may decide not to answer a question or leave the discussion at any time.
- I understand that a focus group discussion session lasts for a maximum of two hours, but I may decide to leave the discussion at any time.
- I understand that by its nature, participating in the focus group discussion prevents total anonymity and confidentiality. I therefore recognise that the total anonymity and confidentiality of participants cannot be completely protected.
 - I understand that there is no need to reveal more personal details about me during the focus group discussion than what I would normally reveal in group discussions of a similar nature.
- I agree to not disclose anything discussed in the focus group.
- I agree that any information related to this research project is confidential and must not be disclosed to, or discussed with, anyone other than the researcher and her supervisor.
- I wish / do not wish to receive a summary of findings.
- I consent / do not consent that the researcher can use the email address I have provided in order to notify me when a digital copy of the summary is ready to be delivered.
- I understand that a third party who has signed a confidentiality agreement will transcribe the audio recordings.
- I understand that discussion recordings will be kept for 6 years, after which they will be destroyed.

Name _____ Email address _____

Signature _____ Date _____

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Appendix

My name is Enni Suonio and I am a PhD student at The University of Auckland, New Zealand. I invite you to take part in my PhD research which examines how the programmers and gamers of computer games conceive the relationships, interactions and prospects of gaming. I therefore welcome all of you who are interested in this research to take part in group discussions ('focus groups'). In order to find out more details about the project, please refer to the Participant Information Sheet accompanied with this advertisement. Should you be interested in taking part in this research, please do not hesitate to contact me.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 29-Oct-2013 FOR (1.25) YEARS REFERENCE NUMBER 6689



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TRANSCRIBER CONFIDENTIALITY AGREEMENT

Project title: Interaction between business practices and environmental strategies for new media technologies and services

Name of Researcher: Enni Suonio

Supervisor: Dr Brad Coombes

Transcriber:

I agree to transcribe the audio recordings for the above research project. I understand that the information contained within them is confidential and must not be disclosed to, or discussed with, anyone other than the researcher and her supervisor.

Name _____

Signature _____ Date _____