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Title	Cognitive fluidity and climate change: a critical social-theoretical approach to the current challenge
Author(s)	Strydom, Piet
Publication date	2015-04-24
Original citation	Strydom, P. (2015) 'Cognitive fluidity and climate change: a critical social-theoretical approach to the current challenge', European Journal of Social Theory, 18(3), pp. 236-256. doi:10.1177/1368431015579961
Type of publication	Article (peer-reviewed)
Link to publisher's version	https://journals.sagepub.com/doi/abs/10.1177/1368431015579961 http://dx.doi.org/10.1177/1368431015579961 Access to the full text of the published version may require a subscription.
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Item downloaded from	http://hdl.handle.net/10468/7539

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Cognitive fluidity and climate change: A critical social-theoretical approach to the current challenge

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Abstract

This article seeks to enrich the social-theoretical and sociological approach to climate change by arguing in favour of a weak naturalistic ontology beyond the usually presupposed methodological sociologism or culturalism. Accordingly, attention is drawn to the elementary social forms that mediate between nature and the sociocultural form of life and thus figure as the central object of a critical sociological explanation of impediments retarding or preventing a transition to a sustainable global society. The argument is illustrated by a comparison of the current situation of climate change to a similar situation some 10,000 years ago which conditioned the transition from hunting-gathering to farming. The crucial factor in the prehistoric transition had been the newly acquired cognitive fluidity which not only became the defining feature of the modern human mind, but is also foundational to the corresponding social form of life. The cognitively fluid mind made possible new generative practices and the imagination of counterfactuals possessing an incursive force which is capable of transforming existing practices and social structures. The ultimate question, then, is twofold: whether there is enough potential left in the cognitively fluid mind for its societal significance to be activated to the benefit of a transformation of the current recalcitrant social formation; and whether we today are able and willing to recognize such potential and corresponding realizable possibilities upon which to act.

Keywords

Anthropocene, climate change, cognitive sociology, critical theory, critique, explanation, farming, global warming, human mind, hunting-gathering, modernity, social theory, weak naturalism

Introduction

Despite the persistence of climate change denials, the United Nations Framework Convention on Climate Change unmistakably marks, as is well known, the general recognition of climate change as a new global risk. Eight years ago, the Intergovernmental Panel on Climate Change report (IPCC 2007) brought together the relevant scientific evidence and subsequently, as is also well known, mounting scientific evidence and modelling as well as governmental reports such as those by Nicholas Stern (2006) and Ross Garnaut (2008) confirmed that humanity is today facing by far the most serious and most complex problem concerning its life support system it has ever been confronted with. Recently, the IPCC Fifth Assessment Report of 2013-2014 (UNFCCC 2014) incontrovertibly reinforced this diagnosis by presenting a comprehensive account of the work of its three working groups on the evidence and the inferences drawn from it: the first group focusing on the physical science basis, the second on impacts, adaptation and vulnerability, and the third on the mitigation of climate change. Considering it from the viewpoint of those actually and potentially affected, Ulrich Beck (2010: 261) spoke earlier already of a challenge which 'may yet prove to be the most powerful of forces summoning a civilizational community of fate into existence'. What strengthens both the potency of this enormous challenge and the urgency of having to understand and meet it, ironically, is the fact that the problem is to a significant degree of humanity's own making.¹ It is the recognition of the fact that humans and their social form of life have become a force of nature, a geophysical force of a magnitude which has to be reckoned with, that has given rise to the proposal to call our current epoch the 'Anthropocene' (Crutzen 2002; Steffen, Crutzen and McNeill 2007) – thus adding a new geological epoch to the preceding Pleistocene (the last ice age) and Holocene (the subsequent warm

period) dating back to 10,000 years ago. This new epoch is regarded as having started in the eighteenth century, particularly due to the industrial revolution, and as having gone into a 'great acceleration' by 1950 when a wide variety of indicators, covering from basic earth system conditions to human activity, started to show a dramatic upswing in rates (Steffen, Crutzen and McNeill 2007; Steffen 2011).ⁱⁱ

The first need in response to this challenge is to develop the requisite knowledge, both interdisciplinary and transdisciplinary knowledge. Since it is obviously not just a problem of climate change in the sense of a natural event which needs stemming but also one of the transformation of societal practices and institutions as well as of cultural forms, the usually validated external, objectivistic, observer's type of knowledge alone will by no means suffice. What is urgently required is internal, reflexive, participants' hermeneutic and reconstructive knowledge of a sociocultural kind. To complement knowledge of the elementary physical, chemical and biological foundations and limits of life, investigations of a penetrating, sobering and critical kind are required into all aspects of contemporary society which have a bearing on its embedding in and changing relation to different aspects of nature: the basic mode of constitution and organization of society and the resultant structural components, from energy systems and forms of economic organization via practices, institutions and forms of governance, to lifestyles, values, normative orders, cultural models and their cognitive underpinnings. A wide-ranging academic effort is indeed already for some three decades underway which is complemented and intensified by a variety of programmes – for instance, programmes funded by the EU, the *Deutsche Forschungsgemeinschaft* and the British ESRC, the massive online UNESCO *Encyclopaedia of Life Support Systems* (EOLSS) launched in 2002 and, more recently, the programme for an 'Integrated History and Future of People on Earth' (IHOPE) (Constanza 2007a) which is itself linked to a wide range of other related programmes. In this context, the social sciences, including social theory and sociology, are called upon to rise to the occasion.

Social theory and sociology do have the inherent capacity to contribute to this endeavour and, indeed, have already done so at a number of different levels. However, certain limits to their contribution are nevertheless in evidence. One could agree that sociology's widely discussed 'methodological nationalism' (Beck 2010) is a factor in so far as it blocks the perspective necessary for appreciating the spectrum of global changes feeding climate change and, through their impact, opening avenues toward transforming society. But there is another still more deeply ingrained and debilitating orientation which hardly attracts attention – namely, sociology's methodological sociologism which cannot be offloaded completely onto the shoulders of the classics. To this should be added the popular modulation of sociologism into a form of culturalism. In practice, this methodological orientation gets expressed in a number of distinct directions which, on the one hand, do allow sociology to make a multilevel contribution but, on the other, threaten to let it fall into a series of tension-laden if not antagonistic isms which fail to keep the bigger picture in mind. Elizabeth Shove's (2010) introduction to the *Theory, Culture & Society* issue on social theory and climate change makes visible some of the most acute of these tensions. There are at least three prominent standpoints: the narrow attitudinal and behavioural approach adopting the policy-making frame; the middle-range theory approach turning on the concepts of 'practices' and 'transition'; and the more general social theoretical approach emphasizing the importance of routinely thinking about conceptual foundations and assumptions. The dimensions selectively stressed by these approaches are often treated in their own terms, but rather than isolating them or setting them up against one another, social theorists and sociologists would be well advised to keep in mind their interrelations and the concomitant distributed nature of knowledge production. But such a level of awareness, even if room is left for justified mutual criticism, would not yet overcome the implied sociologism. Here an important point regarding interdisciplinarity and transdisciplinarity should be stressed: sociology does not merely have the right to articulate its own knowledge with that of

neighbouring disciplines and the meta-problematic of knowledge itself, but it in fact has a duty to do so (e.g. Guillo 2013).

The need to broaden the social-theoretical and sociological perspective beyond the narrow and middle-range approaches so as to include the understanding of society as being an integral part of nature cannot be more obvious than today in the Anthropocene, but acknowledging and reiterating it and making only small adjustments in certain sub-disciplinary areas without basic innovation are not enough. The recognition and adoption of a new corresponding methodological orientation is imperative. It is what may be called 'weak naturalism' (Habermas 2003: 27, 2005: 157; also Strydom 2002, 2011)ⁱⁱⁱ which by no means harbours negative implications for sociology's central concern with the social, cultural and normative dimensions since it is complemented by an epistemology acknowledging the relative autonomy of the sociocultural world. The unjustifiable lack of understanding of and uncomprehending resistance against naturalism, even weak naturalism, and topics like evolution and phylogenesis which have become virtually anathema have to be set aside. It is necessary also to acquire an appreciation for the fact that justice cannot be done to a concern with global change as long as it is conceptualized in terms of globalization, as it is typically understood. The global change of which climate change is but one aspect and, hence, the nature and character of the nascent global society, become fully comprehensible only against the background of certain basic aspects of archaeological and geological time and periodization. This is all the more the case when temporal and processual considerations are theoretically taken into account, as they must be and to a growing degree are today.

In what follows, I do not pretend to be able to deal with this whole gamut of topics, but instead propose to focus on some implications that follow from the broadened social-theoretical and sociological perspective informed by a weak naturalist orientation for understanding and assessing the current challenge of climate change. This is done in three steps. In the first section, a cognitive social scientific perspective with the focus on phylogenesis is adopted in order to understand a certain remarkable aspect of the development of the human mind, namely the acquisition of cognitive fluidity. The central second section probes the role of cognitive fluidity in the human social form of life in two distinct situations of climate change structured by different temporal conditions. The first situation is a prehistoric one going back some 10,000 years. It occurred against the background of a unique development during the period 60,000-30,000 years ago – that is, geologically, at the end of the Pleistocene (the last ice age) and the beginning of the Holocene (the subsequent warm period) and, archaeologically, at the end of the Palaeolithic (old stone age) and the shift via the Mesolithic to the Neolithic (new stone age). In this case, social organization was radically transformed from the mobile hunting-gathering form to the sedentary farming form embracing both agriculture and the domestication of animals. The second is the contemporary situation of climate change early in the epoch recently called the Anthropocene where a very big question mark hangs over the viability of the current social form of life, potentialities for transformation and the possibility of a sustainable alternative. Considering that the freshly acquired cognitively fluid mind played a decisive role in the transition from hunting-gathering to farming, the question is whether there is any mileage left in it which could benefit efforts to deal with the current situation. To anticipate, my argument is that we could learn from the previous mode of change and social reorganization to make fuller use of the characteristic capacity of the modern human mind.

The third and final section of the article covers two intimately related topics. First, an account of weak naturalism is offered with the intention of identifying the primitive or elementary social forms rooted in nature that humans share with their *Homo* ancestors and contemporary primates.^{iv} These neglected social forms should be of special interest to social theory and sociology if it is a matter of making a fundamental contribution to activating the cognitively fluid mind in the service of transforming the social form of life in line with constructively meeting the challenge of climate

change. Having presented these social forms as representing crucial objects of social-theoretical clarification and critical sociological explanation, the argument shifts to the nature of critical sociological explanation, or explanatory critique, and the need for it – that is, mitigating certain debilitating limits nature places on the social form of life and enabling human beings to open a world which is yet to be realized. Here the cognitively enhanced critical sociology I have in mind should become visible.

The cognitively fluid modern mind^v

From one point of view, evolution is a process of the development of the form of the human species, or phylogenesis, which every individual acquires more or less under unique genetic and sociocultural conditions in the course of the process of individual development, or ontogenesis. Since Jean Jacques Rousseau, the latter process has received much attention from social theorists and sociologists, particularly through such concepts as socialization and individuation, but the process of phylogenesis and its outcome are largely taken for granted.^{vi} If it is a matter of the necessary and urgent transformation of contemporary society under the conditions of climate change, however, it is no longer possible to leave this pregnant presupposition in the dark. This is all the more the case if it is indeed necessary for social scientists to reflect on conceptual foundations and assumptions. A crucial aspect of phylogeny is the evolutionary growth of the hominid brain and, in particular, of the human mind, involving an increase of mental activity, thought, consciousness and reflexivity. Far from natural determinism, the importance of this from a social scientific point of view is that the phylogenetically shaped form of the modern human mind is not only a fundamental condition of the human sociocultural form of life and thus of modern society, but also serves as a horizon of potentialities and unrealized possibilities. Through careful reflection and consideration, therefore, we could reconstruct certain general indications of realizable possibilities not determined by nature from the form of the mind and critically compare them to actually realized possibilities.

Having initially started from a single general intelligence, there developed a range of cognitive processes, faculties, specialized intelligences or cognitive domains over a very considerable timespan which eventually became interrelated. The mind evolved cognitively in conjunction with the increase in the size of the brain from 500 to 1700 cc. It took an incipient human form first around six million years ago and between 400,000 and 100,000 years ago it attained a level associated with archaic *Homo sapiens* with a brain size of 1100-1400 cc, followed by anatomically modern humans, *Homo sapiens sapiens*, who appeared for the first time around 100,000 years ago with a brain size of 1200-1700 cc (Wilson 2012: 44; Van Gelder 2005; Mithen 1998: 22-3). During the period 60,000-30,000 years ago, however, a most remarkable developmental spurt occurred. Without any further volume increase of the brain, the mind acquired a property which is characteristic, indeed, defining of humans as we understand them today – namely, the property of 'cognitive fluidity', as Steven Mithen (1998: 76) calls it.

The early ancestors of modern humans possessed minds consisting of a single general intelligence which enabled them to make general purpose decisions, learn slowly from experience and modify behaviour accordingly. Their descendants, archaic *Homo sapiens*, developed more involved minds by fine-tuning general intelligence into a series of specialized social, natural history, technical and possibly incipient musical-linguistic intelligences. These intelligences allowed relatively complex cognitive processes in these domains, yet remained sufficiently insulated from each other so as to foreclose their combination. Particularly the linguistic intelligence which would later facilitate such combination was as yet poorly developed, confined as it was to a kind of strictly social language lacking any contact with the remaining dimensions of reality. It is only roundabout 150,000 years ago that this separation of domains started to show the first signs of breaking down. This was due precisely to linguistic development in contexts in which the increasingly longer period of infant and child dependency rendered the provision of food critical in negotiating social relationships between

the sexes. Sexually mature females, lactating and nursing mothers apparently played a signal role in both this significant and subsequent linguistic and, hence, cognitive development.

Homo sapiens sapiens, who made their appearance around 100,000 years ago, furthered this process, but it was not until the period 60,000-30,000 years ago that the ability to interrelate and mediate the different cognitive processes and domains with one another was fully developed. It is this achievement that allowed what archaeologists regard as 'the Middle/Upper Palaeolithic transition', 'the cultural explosion' or 'the great leap forward'. Mithen insists that while this spurt was indeed marked by language, a reorganization of social relations, economic specialization and technological invention, this event cannot be accounted for by these factors since it is best explained by the newly achieved level of cognitive fluidity. Rather than a series of relatively separate and independent cognitive domains, the acquisition of an analogical, re-representational, meta-representational or reflexive ability made both the free flow of cognitive processes and knowledge among such domains and their combination or integration possible. Knowledge that was already in the human mind but hidden within the cognitive unconsciousness could now be brought to consciousness. This level of reflexive awareness represented a significant upgrading of social intelligence in so far as it enabled those involved to anticipate the behaviour as well as the expectations of others. This proved crucial for the emergence of art and religion as well as for the kind of changes of practices which are observable in the transition from hunting-gathering to farming. By then, language was by no means any longer a restricted social instrument.^{vii} It had not only more or less fully incorporated chunks of physical, biological, technical and psychological information and thereby considerably expanded the social domain. At the same time, it also provided for the articulation of a reflexive or meta-representational^{viii} interconnection of such information relevant to the social context as well as for the envisaging of virtual or counterfactual potentialities and the imagination of realizable possibilities. The founding of farming followed the Middle/Upper Palaeolithic transition some 20,000 years later, or about 10,000 years ago, but it could not have occurred without the conditioning of the cognitively fluid mind and the practices it generated by a protracted and severe episode of climate change.

Two situations of climate change compared

This section is divided into two subsections. The first is a reconstruction of the solution to the late Palaeolithic climate change situation which paved the way for humanity becoming a geophysical force in nature with consequences graphically observable in the present. It provides the basis for the proposal offered in respect of the current climate change situation in the second subsection.

The prehistoric transition as solution^{ix}

With cognitive archaeology, it can plausibly be assumed that the Palaeolithic transition is the key period that lies at the root of the modern world rather than the establishment of farming *per se*, as is often claimed. Farming followed in the trail blazed by the momentous earlier event which moreover provided it with a basis. Yet it is farming that is nevertheless of particular interest for the present purpose of coming to an understanding of the current challenge of climate change. The birth of agriculture and animal husbandry and thus the establishment of the concomitant sedentary form of life some 10,000 years ago have been linked firmly to dramatic global climatic fluctuations and change during the late Pleistocene which eventually came to mark the end of that last glacial period or so-called Ice Age (Mithen 1998; Easterbrooke 2013).^x In the wake of a long series of fluctuations between 15,000-10,000 years ago, which alternately subjected the planet to periods of warm-wet and cold-dry conditions, there followed a number of decades characterized by sudden rapid global warming of up to 7 degrees Celsius. This dramatic climatic change, plus the consequent urgent need to produce foodstuffs for relatively numerous local populations (Cohen 2009; Diamond 2005), conditioned the shift from the mobile hunting-gathering form of life to the sedentary farming one.

The fact that previous comparable climate events failed to trigger changes of this kind confirms that another decisive factor had been required for this shift actually to take place. This factor turns on the difference in the structure of the mind of the humans who lived prior to the Palaeolithic transition and those who lived through and beyond it. By contrast with the rigid architecture of earlier humans' minds which were to a significant degree still characterized by a number of specialized intelligences lacking interconnections, the transition from hunting-gathering to farming was predicated on an enhancement of the later humans' minds which allowed the interrelation, mediation, combination and integration of the different cognitive processes and their corresponding cognitive domains. This capacity, Mithen's 'cognitive fluidity', is the characteristic feature of the modern mind. The process of the establishment of linkages and of integration occurred in a series of steps over the relatively long period of time covering the Middle/Upper Palaeolithic. Linkages had begun to be made already in hunter-gatherer societies, but the final step to full integration of the different specialized intelligences can be dated to around 40,000 years ago when this mental or cognitive transformation became consolidated in the population at large. A crucial point for a critical cognitive sociology not mentioned by Mithen is that each and every one of these steps involved a learning process, not just individual learning but also and especially collective or societal learning.^{xi}

The initial innovation to clear the way for cognitive fluidity was the experimental connection of social and natural history intelligences and then their integration in the context of the need to work out a lasting relation between hunting and the distribution of food. In this learning process, women played a decisive role. The combination of the social and natural historical had significant consequences in so far as it changed both the orientation and behaviour toward nature. On the one hand, animals were anthropomorphized by attributing human characteristics to them which, in turn, improved the anticipation of animal movements and facilitated the planning and increased the efficiency of hunting. On the other hand, totemism spread through virtually all hunter-gatherer societies as human groups identified with an animal from which they believed to have descended. A further related linkage and integration of the technical and natural historical intelligences followed, as is evidenced by the spurt of innovative developments of a variety of new types of hunting weapons. The next step involved the connection and integration of technical and social intelligences which allowed innovation in two different directions. On the one hand, social information was invested in both tools and weapons by way of carving and engraving and, on the other, this combination was extended to personal decoration which served to communicate social messages regarding status, relationships and group membership. Then in the final step, the cognitive fluidity of the human mind was fully achieved when the well-established complex of the social and natural historical intelligence was enhanced by the incorporation of the technical intelligence which itself had already been linked to the social and natural historical individually. This achievement provided the basis for the seminal cultural explosion some 40,000 years ago which would have been impossible without the flexible articulation of the different cognitive processes in the medium of linguistic communication. The birth of art, followed by religion, was the first and supreme index of this fecund combination and, hence, of the cultural explosion.

It is this capacity to perceive, think about, conceptualize, meta-represent and relate to the world in an entirely new way that made it possible for those living at the time to confront the challenge of climate change by thinking its implications through, envisaging potentialities, identifying realizable possibilities, and setting about devising and constructing a new way of co-evolving with nature. Initially, it took the form of what is known as the 'Natufian' culture (e.g. Byrd 2005) of experimental permanent settlements which appeared between 13,000-12,000 years ago and then made way for the first true farming settlements around 10,500 years ago. On all accounts, this was a very difficult transition not only because of the level of labour intensity it required, but in particular since the introduction of agriculture was accompanied by a marked decline in the quality of nutrition and thus in health indicators. Bioarchaeologists have established a surge of infections, a variety of health

problems, a fall in the average life expectancy and social problems to boot (Cohen and Armelagos 2013; Diamond 2005) at the time of the transition. As the independent appearance of farming around the globe in a relatively short timespan suggests, however, it could not have been avoided but had to be made out of necessity due to global climate conditions. To actually accomplish the shift from a mobile to a sedentary social form, however, presupposed a range of capacities which admitted of development into competences and skills and practical application. The freshly acquired, flexible, cognitively fluid mind embodied in the social environment of the time made these capacities available. Their development into useful competences and skills is evidenced by the practices in which those involved in meeting the climate change challenge engaged.

As the generative source of a full spectrum of capacities, the cognitively fluid mind made possible new ways of thinking about, of relating to, and of emotionally and motivationally engaging with the different dimensions of the world – whether the social environment, the land, the soil, plants or animals (Mithen 1998). The first and most fundamental was the capacity to envisage counterfactual potentialities and to select realizable possibilities from the available range. This was of course possible only with reference to the locally available resources and the local environmental conditions caused by the global climatic changes in the early Holocene. A whole range of new ideas resulted, including domesticating plants and animals, preparing the soil for planting, irrigation, digging storage pits, landscaping for settlement purposes, designing dwellings, reconfiguring social organization and so forth. Implied by some of these ideas was the need for technological innovation, for instance, to devise new tools to cultivate plants such as barley and wheat or to prepare the ground for and build permanent dwellings. The realization of other of these ideas demanded that relations analogous to social relations with other humans be established with both plants and animals. Such relations were on the one hand given the form of psychologically rich relations of care for plants and animals, but it also called for the quite different orientation and practice of the management or manipulation and the exploitation of plants and animals. As a rule, it may be concluded, we witness in the generation of such ideas and their practical realization the workings of integrative cognitive processes taking the form of analogical or meta-representational projections consisting of epistemic, moral and emotive components. The processes implicated not only individual psychology, but also social relations and especially culture.

A particularly remarkable feature of the transition to farming from a sociological point of view is the mobilization of the newly acquired capacities and tried competences and practices for particular social purposes. After 40,000 years ago, there is evidence that farming became a means for some individuals to gain social prestige, influence and power. Already at this early stage, there are signs of the emergence of a social structure of inequality which points to the presence of individuals who have managed to accumulate power and were able and willing to wield it. Archaeologists (Mithen 1998; Hayden 1990; Soffer 1985)^{xii} have assembled a range of evidence for this phenomenon. Among these are: stored resources such as meat, bone and ivory under the control of particular individuals or families intended not just as food and raw materials, but rather as a source of prestige and power; many of the first domesticated items, such as peppers, avocados and dogs, were by no means appropriate to serve general needs but were prestige items; the continual introduction of such products; and long-distance trade in prestige goods, approximating something like the contemporary luxury market. Overall, this tendency has been dubbed 'from egalitarianism to kleptocracy' (Diamond 2005: 265) – one in which religion played a crucial role. While the sedentary form of life undoubtedly served the purpose of meeting the challenge of climate change around 10,000 years ago, then, it seems that a major factor in its establishment and consolidation was the furnishing of particular individuals with opportunities to gain social control over certain processes and goods and to secure prestige, influence and power.

Searching for a contemporary solution

The contemporary epoch, the Anthropocene, is defined by humanity as a geophysical force which virtually equals the remaining forces of nature. While this force has come fully into its own recently, it owes much to previous generations of humans going back to the late Pleistocene and early Holocene. What we contemporaries owe to our *Homo sapiens sapiens* ancestors is first of all a mind characterized by cognitive flexibility, the outcome of a protracted process of cognitive evolution. To this must be added, secondly, a complex of practices which, while drawing on much older practices established by ancestral species like *Homo habilis*, *Homo erectus*, *Homo Neanderthalensis* and archaic *Homo sapiens* over a period of almost two million years, took on a particular shape on the basis of the sedentary form of life. In turn, this form of life allowed the extrapolation and development of that complex of practices – in certain respects, extrapolation and development in the extreme, as the indicators of an increasing rate of intensification of human activity confirm. As humanity recently became conscious of its global environment and the likelihood of its impact on the state of that environment, it emerged that there is a disturbing and undeniable correlation between these indicators of intensified human activity and those applying to global-scale changes in the earth system (e.g. Steffen 2011). Having become reflexive, having gained awareness of humanity's status as a geophysical force in nature, many contemporary people have become or are still becoming self-conscious, active agents in the functioning of their own life support system. The search for a solution to the contemporary event of climate change is thus well underway.

In keeping with its evolutionary formation, the cognitively fluid mind embraces a number of specialized processes and domains as well as a general capacity which allows connections between these specialized components. Language and thus communication, which is the vehicle for feeding information, meaning and structure into the mind, is of key importance in such general mediation. The cognitively fluid mind does not merely interrelate specialized cognitive processes and domains, however, since it also allows connections between its own specialized and general capacities and social life at a practical level. In other words, it has behavioural consequences which reflect the realization of a selection of possibilities from certain of its potentialities. Cognitive processes relative to physics, biology, chemistry, sociality and psychology, for instance, could find expression in modes and patterns of behaviour, action, practices and outcomes or products of different kinds. An early macro-level example is farming or the sedentary form of social life and another is the global capitalist-industrial society of our own time. At the meso-level, the consequences of the cognitively flexible mind are visible in a variety of different institutions and corresponding practices, from economic through political to social and cultural ones. At the micro-level, its impact is evidenced by individual personalities, orientations, motivations and emotions.

The potentialities kept available by the cognitively fluid mind are obviously of the first importance in a search for a solution to the current climate change event. To clarify these potentialities, at least in a formal manner, one would have to identify them with reference to structures that became stabilized in the wake of the mental transformation which culminated in the cognitively fluid mind and then became refined in the subsequent period. These stabilized cognitive structures are of course to be found in the minds of the individuals involved, but in so far as they are common to many individuals they must be available also in the virtual cultural form of reflexive expectations, meta-conventions or universal principles – what may be called the cognitive order of society. In the case of modernity, this meta-level cultural-structural dimension of expectations or principles began to emerge in the twelfth century and was stated in some detail and clarity since the eighteenth – whence its more specific form of the cognitive order of modernity (Strydom 2000, 2013, in press a). A closer look at these different cognitive structures could shed light on the potentialities in question.

As regards the formation of the cognitively fluid mind, following Mithen, we saw a number of biologically based yet socially shaped specialized intelligences – the social (implying also the

psychological), the natural historical and the technical – which became interrelated, mediated, combined and integrated when the linguistic intelligence reached an adequate level of development in the Middle/Upper Palaeolithic. Now, these different cognitive processes with their corresponding cognitive structures and types of knowledge are more or less part of every individual mind. They are capacities, competences and skills that carry potentialities which individuals could realize to some degree in behaviour, action and practices of corresponding kinds, but this is not possible without being embedded in culture – and of course also in mediating regulative social institutions. By contrast with the individual micro-level, therefore, the cultural forms embraced by the cognitive order of society – today, the cognitive order of modernity – must be regarded as the principal repository of potentialities. These macro-level potentialities, on which the individual properties thus depend more or less directly, are kept alive culturally in the categorial form of whatever pertains to the social world, the objective world and the subjective world respectively.^{xiii} More specifically, the potentialities that these cultural forms harbour include the following meta-level principles: (i) socially – rightness, freedom, equality, solidarity, legality, legitimacy, sovereignty, critique; (ii) objectively – truth, efficiency, effectiveness, instrumentality, control; and finally (iii) subjectively – truthfulness, authenticity, self-reflexivity, needs, emotion. When it is a matter of the cognitively flexible combination and integration of different intelligences for certain purposes, therefore, it actually amounts to a selection from among these cognitive order principles as indicative potentialities and their interrelation for the realization of whatever corresponding social, political, economic, aesthetic or other possibilities are feasible in or required by the given situation.

To gain greater clarity about the relevance of these potentialities for the purpose of meeting the climate change challenge it is necessary to take a closer, indeed, a critical look at prevailing contemporary practices as well as at their structuring by particular cultural models. Not only do practices to some degree realize in a given situation possibilities disclosed by the potentialities preserved meta-culturally, but they may also impede or block such realization and even obscure certain potentialities and realizable possibilities or render them unrecognizable. It is certainly the case that it is impossible to discount the fact that increasing general energy consumption as we know it must in the long run result in a rising global temperature, but the important point is that various prevailing practices and their outcomes undoubtedly contribute disproportionately to such a rise and thus to the climate change problem. The transition to and establishment of the sedentary form of life is suggestive in this respect and the indicators of global-scale change in the earth system bear this out.

While the sedentary social form indeed proved pivotal to meeting the challenge of climate change thousands of years ago, it was simultaneously grasped by some individuals, as we have seen, as an opportunity to serve their own interests in monopolizing prestige, influence and power, obtaining ownership of common resources and in amassing wealth. The resulting social contradiction mirrored by the emergence of inequality millennia ago foreshadowed the reproduction of this very asymmetry in its rather extreme contemporary manifestation. Seeing analyses of the current problem of a lack of climate justice (e.g. Dryzek et al. 2011: Part VI) in relation to global change makes clear that the institutionalized contradictory reproduction maintaining this structural asymmetry is a core factor in the current climate change problem. If one starts from inequality and follows the money, as it were, the accumulated resources forming the basis of power, then phenomena such as the following loom large on the horizon: unnecessary domination, the *raison d'état*-driven nation state, the exploitative capitalist economy, the over-complex global financial system with its opaque double-edged legal-illegal instruments, the fat-cat global corporation with its bloated legal personality often operating illegally almost with impunity, a science which is technologically driven and capitalistically dynamized, and a whole series of reified and distorted cultural models providing orientation and justification for such practices. A theoretically informed, critical sociological approach to the current climate change situation must certainly focus on positive

practices that would allow the activation and realization of new possibilities under contemporary conditions. It cannot justifiably do so, however, without taking these negative features of authority and power, core political institutions, the economic system, the financial services, the economic enterprise, the legal system and cultural orientation complexes into account and subjecting them to a thorough analysis and a penetrating explanation and critique.

In the Anthropocene under the conditions of which humans have become reflexive, self-conscious, active agents in the functioning of their own global life support system, the key question is what such participation implies. Charles S. Peirce (1991) suggested an answer already in the nineteenth century which contrasts sharply with the 'organized irresponsibility' of the current core institutional complex diagnosed so acutely by Beck (1988). Drawing a wide-ranging conclusion regarding responsibility from his penetrating logical analyses, Peirce insisted that the signs which of necessity mediate between reality and those who interpret signs and engage with reality are by no means simply a concatenation of figments of the mind, but rather essential material or embodied elements in the process of evolution and hence in the constitution of the universe. This means that it is incumbent on us, the sign interpreters, to use signs correctly and appropriately, and to learn to do so is to acquire the ability to participate responsibly in the process of evolution, both social and natural. Not only rising temperatures and sea levels are relevant material signs, but every vulnerable person exposed to such eventualities is an equally relevant embodied sign. Against this foil, the colonization of Australia and the Americas by *Homo sapiens sapiens* after 60,000 years ago (Wilson 2012; Diamond 2005; Mithen 1998), which coincided with the acquisition of the cognitively fluid mind, appears in quite a different light than the colonization of space which was inaugurated in the 1960s. At least in so far as the space colonizers, by contrast with the earlier population movements, are motivated, as they partially are, by an anticipated flight from a planet which they themselves helped overheat and contract a climate unfavourable to life on earth, they expose themselves as a symptom of a not altogether responsible participation in evolution, a symptom of an inability to read the signs and thus of the irresponsibly organized core institutions of contemporary society.^{xiv}

A comparison of the prehistoric and the contemporary situations of climate change graphically yields a key insight. The acquisition of a cognitively fluid mind was a precondition for meeting the climate change challenge of 10,000 years ago. It was central to the solution which consisted of a momentous transition to a new sedentary social form of life, yet what cannot be overlooked is that this form of life soon in the course of its emergence practically took on a number of related negative features. Over the subsequent millennia, this sedentary form of life animated by the cognitively fluid mind and realized through a complex of practices proved to provide the basic ingredients for the emergence of modernity, including the contemporary global version of a reflexive modernity.^{xv} The latter is characterized by a series of advanced properties which could be traced back to the cognitively fluid mind, yet these nevertheless suffer from negative features comparable to those associated with the original sedentary form. On investigation, it becomes apparent that while the mind has become cognitively flexible so that everything could be related to everything else, this capacity to open up and to facilitate connections in multiple directions has not been sufficiently translated into the actual organization of social life. What is urgently required, therefore, is the opening up and connection of the different components and sectors of social life while focusing intently on the persistent negative features which serve as indices of fossilizations, reifications, impediments and blockages requiring to be dissolved. Potentially positive practices of transition to a sustainable society of shorter-term relevance must be studied and facilitated in a concerted manner, but of utmost importance is the relentless pursuit of the social-theoretical analysis and critical sociological explanation of the range of negative features associated with contemporary society for the purposes of a longer-term transformation of social practices and societal processes and structures. Above all, the learning process which perfected the cognitively fluid mind but stopped short before penetrating the collection of questionable and unjustifiable practices, needs to be

unblocked and continued.^{xvi} Given this requirement, there is one thing in particular that must be watched out for. If farming 10,000 years ago proved to be just another strategy for some individuals to gain and maintain power, then it is part of the task of the contemporary social sciences to guard against any transition strategy toward a sustainable society falling foul of such instrumentalization, corruption and subversion. The envisaged end-state serving as lodestar for social scientific study,^{xvii} analysis and explanatory critique is a form of the creation and organization of society that reflects the cognitively fluid mind which lies behind it, penetrates all its components and sees to their adequate mediation. In sociological and philosophical terms, the task of the present generation is to make a determined effort toward the counterfactual projection, construction and institutionalization of a society which approximates more closely the potentialities harboured by its own species mind and meta-cultural cognitive principles – not only an existence in a cared-for planetary biosocial ecosphere, but one also characterized by equality, cosmopolitanism and justice.

For social theory and sociology to make a contribution of this kind, it is necessary to adopt an appropriate approach – one that focuses on the social forms in need of transformation in the light of the meta-cultural principles extracted from society itself and, on that basis, provides the type of analysis and explanation capable of assisting in the necessary transformation.

Weak naturalistic ontology and explanatory critique

In this final section, the peculiar ontological assumptions underpinning a cognitively enriched social theory and sociology is first brought to attention and then, secondly, the conditions and nature of explanatory critique are clarified. In addition to complementing a critical approach, the indispensability of a weak naturalist position is confirmed by the fact that it simultaneously takes care of the interdisciplinary and transdisciplinary responsibility of social theory and sociology. It is not just a matter of actively relating to the natural science – including cognitive science – neighbours in order to learn from them, but also one of countering where necessary their strong, if not crude, naturalism with the knowledge it produces itself (Guillo 2013).

Weak naturalism

By contrast with widely accepted sociologistic and culturalistic presuppositions, the central thesis of weak naturalism^{xviii} is that there is ontological and cognitive continuity between nature and nurture or between natural historical processes which gave rise to *Homo sapiens sapiens* and the human sociocultural form of life. Over time, the sociocultural form of life emerged from nature and in an important respect it remains firmly rooted in nature due to forming an inalienable part of it. To this must immediately be added that the kind of naturalism at issue here should not be confused with strong naturalism which entails an epistemological reduction of society to nature according to which the latter fully determines the former (Habermas 2003; Strydom 2011). Although indeed forming part of nature, the sociocultural form of life is nevertheless epistemologically primary for social theory and sociology and, therefore, rightly occupies by far the larger part of the attention of social theorists and sociologists. On weak naturalistic assumptions, though, it is appreciated as still being open to the impact of nature and vulnerable to its interference. This is where the crucial social theoretical question of the nature of social forms enters.

The weak naturalistic thesis of continuity entails that natural historical processes give rise to emergent properties such as ontological props and cognitive structures, frameworks or forms which in turn make possible social forms which allow sociocultural learning processes and the development and articulation of sociocultural forms of life. Learning processes taking place within human sociocultural frameworks are regarded as an extension of evolutionary processes on the assumption that natural evolution is a process analogous to socio-cultural learning processes. For example, the human mind, an emergent property of natural evolution, is an intelligent adaptive solution to problems which developed within the constraints of reality. This, as we have seen, is the way in

which the level of the cognitively fluid mind was attained through the process of phylogenesis. Implied here is that naturally evolved structures or forms themselves possess 'cognitive content' (Habermas 2003: 27) and as such make possible human sociocultural forms of life and learning processes within such contexts.

It is not just the process of evolution in the form of hominization and phylogenesis which is cognitively significant, however, since there is a whole range of more specific natural processes which underpin and are reflected in the sociocultural form of life. The early twentieth-century American sociologist Robert Park (1936), for instance, proposed the study of processes falling in the domain of 'human ecology', and in the intervening period right up to the present a manifest concern is observable with processes such as reproduction, alliance formation, cooperation, competition, rivalry, dominance, subordination and conflict (e.g. Goffman 1974; Hirschfeld 1995; Conein 2005; Kaufmann and Clément 2007). These are all processes that humans share with their *Homo* ancestors and contemporary primates. To such ecological processes Jean Piaget (e.g. 1983) added a range of coordination processes which we likewise have in common with our predecessors and primates, including comparing, relating, ordering, combining, interacting, evaluating and judging. The importance of these ecological and coordination processes resides in the fact that they provide both primates and humans, as they did our *Homo* ancestors in the past, with elementary or primitive social and practical forms which are categorially graspable. These forms are the ontological vehicles that secure the continuity between nature and the human sociocultural form of life. It is due to this particular nature of theirs that such elementary or primitive forms become the focal concern of a social theory and sociology that seeks to make a contribution to the transformation of society under the conditions of climate change in the epoch of the Anthropocene.

Given the above, there is a basis for introducing a distinction between first and second nature – first nature being *natura naturans*, a creative, productive and serendipitous nature,^{xix} and 'second nature' in the sense of society and culture as a second or quasi-reality building on and potentially stretching beyond first nature. As critical theorists (Lukács 1971; Adorno 1970; Marcuse 2011; Apel 1979; Habermas 2005) who employ the expression well appreciated, second nature – the subject matter of the social sciences, including of social theory and sociology – is an inherently ambivalent phenomenon. By the same token, this very ambivalence of course also afflicts the central object of the growing number of practice theorists. On the one hand, society is composed of common-sense, habits and conventions among which are psychic systems, social practices, institutions, systems and cultural models – that is, a whole range of historically sedimented quasi-nature, social forms which derive originally from the primitive forms shaped by ecological and coordination processes. Through these forms, nature not only makes possible and substructures sociocultural life, but simultaneously also shapes it, intrudes upon it, limiting and tying it down. On the other hand, humans have proved able to free themselves to some degree from the fetters of such primitive social forms, through disenchantment in the sense of both disillusionment and enlightenment emancipating themselves psychologically, socially, institutionally and culturally so as to be able to construct and communicatively articulate meaningful social and cultural – especially meta-cultural – forms.

To reiterate this crucial distinction, on the one hand elementary or primitive social forms deriving from processes such as for example dominance, subordination and conflict mentioned as ones humans share with the primates continue to intrude upon and exert themselves in social life and become fixed by reified or distorted cultural models which ensure their odious efficacy in the structuration of social practices, relations and structures. The negative developments associated with both farming and contemporary society discussed above fed and still feed for the most part on such elementary social forms. And when Beck (2010: 256-7) takes a shot at currently dominant 'repertoires of behaviour' and constructs like 'the national' and 'economic growth', he has to be understood as having in mind exactly the same debilitating historically sedimented and culturally

fixed social forms which need to be overcome. On the other hand, humans were indeed able nevertheless to become sufficiently emancipated to formulate such meta-cultural cognitive principles as truth, rightness, freedom, equality, solidarity, truthfulness and authenticity and, on that basis, to co-responsibly generate knowledge and construct constitutional democracies of different kinds and international regimes of civil, social, cultural and human rights, however inadequate these might still be at present. We owe both the establishment of the cognitive order of society and the emancipated practices corresponding to it to such achievements.^{xx}

Now, it is precisely at this meeting point of encumbering and emancipated social forms defining the ambivalence at the core of society and culture as second nature that sociology in its critical moment enters.

Explanatory critique

It is generally recognized that the behaviour of any animal or human is partly influenced by its genetic make-up and partly by its developmental environment, partly by nature and partly by nurture. The relative weighting between these two forces varies markedly not only between species, but indeed also between different aspects of behaviour within a single species (Mithen 1998). As regards humans, as we have just seen, certain practices are much more prone to remain unnecessarily caught up in primitive social forms deriving from nature than others which attain higher degrees of emancipation and freedom within the sociocultural world. The weak naturalistic perspective sharpens the appreciation for the relation between nature and the sociocultural form of life and, especially, for the tension within the latter between the limiting impact of primitive social forms and the possibility of gaining emancipation from such limits. In this respect, weak naturalism is an essential presupposition of the explanatory critique exercised by a cognitively inspired critical sociology (Strydom 2011). This kind of critique is concerned with the negative consequences nature has for the sociocultural form of life – to take an example intimated above: a primitive social form such as primate dominance extrapolated beyond the necessary limiting marginal condition it represents and being reproduced in the human sociocultural world in the form of a social pathology such as unjustifiable domination which violates every relevant normative criterion.

Explanatory critique, as the previous statement implies, requires the backing of an abduction-led normative reconstruction which in the first instance allows the identification of a problem situation and the diagnosis of the social pathology at its core.^{xxi} Its central concern, however, is the relation of determination manifested in the historically sedimented second-nature in the form, say, of an unjustifiable or badly justified social practice, institution, system or cultural model. To recall, persistent problematic features of modern society which undoubtedly contribute disproportionately to climate change were mentioned earlier, such as the *raison d'état*-driven nation state, the exploitative capitalist economy, the over-complex global financial system, the fat-cat global corporation, biased law, a technologically and capitalistically deformed science, and reified and distorted orientation and justification complexes for practices. More specifically still, however, the focus of explanatory critique is trained on the causal mechanism or mechanisms behind these problematic features.

Generally speaking, such mechanisms over-determine some aspect of society and culture, turning them into opaque, compulsive and fateful quasi-nature. The mechanisms themselves could vary, as the above adjectival descriptions suggest, from culpable agents and socially insensitive political power and ideology or economic self-interest, through functional hollowing out of social life, criminality, legally secured class selectivity and institutional instrumentalization, to pathological rule complexes and cultural models governing personalities, practices and relations. Such mechanisms are typically rooted in elementary social forms made available by deep-seated ecological and coordination processes, with the result that the intrusive structure of the natural order reveals itself

as quasi-nature in the guise of regularities such as widely assumed yet unjustifiable common-sense, habits or conventions. The explanation of a pathological state of affairs by uncovering the mechanism producing it is at one and the same time a critique of that mechanism which could contribute to its transformation or dissolution. This is a major part of the task of social theory and sociology in the epoch of the Anthropocene.

Another part complementing explanatory critique, however, is the decidedly positive one of a disclosing critique which, with recourse to human capacities and the meta-cultural principles specified in the cognitive order of modernity, has the aim of drawing attention to potentialities and making visible realizable possibilities and alternatives to current psychological structures, social practices, institutions, normative orders, cultural models and interpretations of cognitive principles. In this respect, sociology with the backing of social theory seeks to open up culture in the emphatic sense of the word as that part of the world which is yet to be realised by human beings. The contemporary climate change challenge demands nothing less than such an achievement.

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Notes

ⁱ In the IPCC's (2014) latest report adopted by more than 120 governments and presented by the UN in Copenhagen in early November 2014, it is submitted that experts are at least 95 percent sure that man-made emissions of greenhouse gases, rather than natural variations in the climate, are the main cause of warming since 1950.

ⁱⁱ That the current situation cannot be assimilated to the prehistoric one by claiming that it is just another example of a natural process in train, as the climate change deniers typically do, is confirmed – besides these indicators – by the time factor: by contrast with protracted natural shifts in conditions, the escalation characterizing the Anthropocene involves a very short timescale. If one acknowledges that humans are part of nature, a geophysical force, this escalation indeed also represents a natural process, yet not one in the conventional sense insisted on by climate change deniers.

ⁱⁱⁱ Habermas (1999: 38) is the original source of the expression *schwachen Naturalismus*. Elsewhere (Habermas 2005: 157), he also speaks of a *nicht-szientistischen oder 'weichen' Naturalismus* ('non-scientistic or "soft" naturalism').

^{iv} The attentive reader would have noticed that this proposal is in a sense related to Durkheim's (1976) inquiry in his last great work yet simultaneously goes well back behind his treatment of 'the elementary forms' in terms of religion. Moreover, he proved rather ambivalent about the relation between society and nature.

^v In dealing with the cognitively fluid mind in this section, I depend on the important synthetic work of the cognitive archaeologist Steven Mithen (1998) who coined the term 'cognitive fluidity'. Related literature is also called upon to support the argument.

^{vi} Habermas (1987) is an exception in so far as he undertook to reconstruct Durkheim's concept of moral authority in phylogenetic terms, but since he accepted the latter's focus on religion the account remains truncated.

^{vii} For the importance of music – sound plus embodied movement – in the development of social interaction, language, the emergence of culture and hence of 'cognitive flexibility', see Cross (2001).

^{viii} 'Metarepresentation' is Sperber's (2000) term. It resonates with critical theory's emphasis on the counterfactual imagination which is underpinned by its key concept of 'immanent transcendence' (see Strydom 2011).

^{ix} For the prehistoric details in this subsection, I am again indebted to Mithen (1998), supported by related literature.

^x Easterbrooke provides a summary of exact Pleistocene climate data but, contrary to the assumption accepted here, concludes by denying any causal relevance to human generated carbon

dioxide in the contemporary case. In July 2014, incidentally, the UN climate chief, Christiana Figueres, expressed grave concern when for the first time in at least 800,000 years average CO₂ levels reached a concentration of above 400 parts per million as greenhouse emissions from human activity continue to increase each year (UNFCCC 2014).

^{xi} On learning, see: Eder (1982, 1999); Miller (1986, 2002); Strydom (1987, 2009). See also Richerson and Boyd (1999) who stress culture and learning from an evolutionary perspective. My hypothesis is that societal learning shows most importantly in the establishment and enhancement of the meta-level cognitive order of society.

^{xii} Byrd and Monahan (1995) showed that in the immediately preceding Natufian culture, by contrast, no evidence could be found for hereditary social inequality.

^{xiii} With this threefold classification of worlds, I follow Habermas' formalization of a long tradition in terms of his 'formal pragmatics', but I give it a decisive sociological twist (Strydom in press b).

^{xiv} For a radical feminist critique of the general patriarchal trend toward taking leave of mothers who give birth and of the planet, see Claudia von Werlhoff (Projektgruppe Zivilisationspolitik 2009).

^{xv} In the broad pattern of history, Diamond (2005) relates the emergence of such features as endemic diseases, stratification, political organization and guns to the sedentary form of life.

^{xvi} Despite the global protest organization Avaaz having organized the biggest world-wide anti-climate change demonstrations yet on the occasion of the UN's Solutions Summit in late September 2014 in New York, it would seem as though the November US election which resulted in the Republican capture of the Congress is set to jeopardise the achievement of the universal climate agreement projected for COP21 in Paris in 2015 (Moskowitz 2014).

^{xvii} Here we can do no better than to take Weber's (1977) advice that sociology should not only remain sensitive and open to transformation and change, but should in full awareness follow the key issue of the time which serves as its proper lodestar.

^{xviii} Drawing on Habermas (1999), I defended weak naturalism in Strydom (2002 and 2011). See also my discussion of naturalism in cognitive sociology in Strydom (2007). In French-language sociology, a comparable understanding is represented by Conein (2005: 143) who pleads for a *naturalisme modéré* and by Kaufmann and Clément (2007: 47) who likewise speak of a 'moderate naturalism'. Recently, Kaufmann and Cordonier's (2011) proposal for a *naturalisme social* gave rise to a heated debate in French sociology.

^{xix} *Natura naturans* is the concept that the nineteenth-century Romantics opposed to the objectivistic concept of nature, but in more recent times it has found a certain rehabilitation through theories of the implicate order, chaos, self-organization and synergy.

^{xx} By complementing the weak naturalistic ontology with the equally important meta-level cognitive order it is indicated that no reductive tendency to two-valued Aristotelian logic is implied. Beyond the latter, transcendental logic related to both Kant's transcendental and Husserl's phenomenological philosophies is presupposed.

^{xxi} In Strydom (2011) I offer a detailed presentation of this involved methodological complex of relations.