Workshop *Imagining the Future*
At CPA London, 11 February 2010
jointly organised by
OU Centre for Ageing and Biographical Studies
and Centre for Policy on Ageing, London

Future Matters for Ageing Research

Barbara Adam

Abstract
The futurity of action is a challenging domain for social inquiry; it necessitates an openness to rethink the subject matter of sociology, its epistemology and its methodology. For ageing research the difficulty is intensified. To gain some anchorage points for study, the paper outlines past and present approaches to the future, maps the complexities involved, identifies some of the sensitive issues associated with studying approaches to the future in the elderly, and seeks to identify some openings for investigation.

Acknowledgements
The work presented in this paper draws on recent research on the social future which was funded by the UK's Economic and Science Research Council (ESRC) under their Professorial Fellowship Scheme (RES-051-27-0049; see www.cardiff.ac.uk/socsi/futures) as well as twenty-five years of research on social time. It was first presented to a Round Table discussion on 'Future Matters for Social Theory?' 29 October 2009 at the University of Cagliari, Sardinia and prepared for publication during a Fellowship at the same university during October 2009.

Biographical Note
Barbara Adam, PhD, DScEcon is Professor of Sociology at Cardiff University. She is the founding editor of the journal *Time & Society*. Her extensive publications on the social relations of time and the future include five research monographs. Her most recent book *Future Matters: Action, Knowledge, Ethics.* (Brill, 2007) is co-authored with Chris Groves and reports on some of the Future Project's findings.
E-mail: adamb@cardiff.ac.uk
web sites: http://www.cf.ac.uk/adamb
http://www.cf.ac.uk/socsi/futures/

Future Matters for Ageing Research

Barbara Adam

1. Introduction

Contemporary daily life is conducted in the temporal domain of open pasts and futures. It is enacted mindful of the lived past while projectively oriented towards the 'not yet'. We move in this temporal domain with great agility, pirouetting and swivelling to face both past and future, twisting and turning in the knowledge realms of perception, memory and anticipation. Without giving much thought to the matter, we operate with equal confidence in the action domains of choice and planning, where we are engaged in future making and future taking. Lived and performed, the future is part of our world of practice thus not easily accessed through the discursive route. Furthermore, approaches to the future have changed greatly with socio-historical contexts and they vary across the life course. As a person's position changes within the birth–death parameter the future will take on a different meaning. For elderly persons, for example, the impending end of life means that the future takes on the status of fact even though the when and how of the inevitable event may be as uncertain as ever.

While our practical understanding includes the future orientation as an inescapable feature of social existence, for the study of that life the future poses major challenges. First, it lacks the tangible materiality needed for empirical study. Second, its multi-layered complexity demands research tools that can encompass the fusion of matter, space and time. Third, the future as lived knowledge practice cannot be accessed with the methods developed for discursive knowledge. Fourth, for some sectors of society, such as some elderly, infirm, or terminally ill persons, the future may be a highly sensitive and painful issue which raises difficult ethical issues for investigators. These and allied difficulties have meant that both the social future and individual approaches to the future have been largely side-stepped in social science investigations.

However, if the future is an inescapable aspect of human being and social life, through action that is purposive, intentional, motivated and caring as well as goal and value orientated, then the future is *de facto* a subject matter for the study of that life. To address the disjuncture between social life and its academic modes of inquiry, social scientists need to adopt a multi-pronged approach: Among other research strategies, this involves historical understanding of every-day, expert and academic approaches to the future on the one hand and sensitizing to the complexity of lived futures at the every-day level on the other. On the basis of this understanding methodological challenges can be identified and openings for enhanced modes of inquiry explored. Clearly, this is a huge programme of work which requires extensive research. In this paper I can do no more than open a window on the issues, map some outlines of key arguments and show their pertinence for ageing and biographical studies.

2. The Future in Knowledge Practices Past and Present

To begin the sensitizing process, I have mapped four historically distinct understandings and assumptions about the future together with their associated

expertise and modes of inquiry: the future as *fate, fortune, fiction* and *fact* [1]**.** I have constructed these as Weberian 'ideal types'[2] so that the most typical features may emerge from the comparisons. Such ideal-typical historical understanding, it is hoped, will enable investigators to appreciate the depth of the challenge that futurity poses for the logic of social inquiry and open the issues for debate as a pre-condition to exploring how the gap between social action and empirical study of that action might be narrowed.

2.i The Future as Fate

Some of the earliest approaches to the futures can be gleaned from mythology (Littleton, ed. 2002). The myths of ancient and traditional cultures portray a world where people have dominion over space and matter only, while the temporal domain belongs to gods (or to ancestors as is the case in African and Australian myths). In this world gods and ancestors set the world in motion and move it in particular future directions. Here, the unknowable future is projected onto the sacred realm and has a particular status; it *pre-exists as fate*. To penetrate this opaque, pre-destined realm requires experts with special access to divine purpose, that is, knowledge about what god(s) and spirits have in store for individuals and collectives. Experts on the sacred, pre-existing future thus seek answers from external sources to specific questions about what is going to happen, in a certain situation, to a particular person or groups of persons. As such, their prophecies and divinations are to aid people's efforts to be prepared and ready for what is to be and come about.

Modernity has swept aside much of the universe of faith and people have been transmuted from recipients of fate to makers of their own future. This meant that the dominance of the future as pre-destined fate has been largely displaced and substituted with an unquestioned assumption that the future is ours to make, shape and exploit. With assumed ownership, the future begins to be approached as a source of fortune destined for the present while the future as fate begins to be lived and experienced in the shadow of this emerging knowledge practice.

2.ii The Future as Fortune

In western cultures this dramatic shift in perspective on the future from fate to resource and source of fortune occurred slowly over a period of some four hundred years. The French Revolution is a key exemplar of this changed futures perspective. During that period key thinkers from Condorcet to Comte saw themselves as moral agents for change. They were concerned not just to 'unveil' a pre-existing, pre-destined fate but to steer the future in a particular direction (Manuel 1962), which brought with it a fundamental change in understanding. The pre-destined realm of fate associated with unique individuals and groups has been transmuted into an abstract, empty and quantifiable entity available for unrestricted use and free exploitation. It is treated as resources to be traded and exchanged for wealth creation. As open realm of choice and action potential the future practically requires shaping and making. It becomes a task for planning, holding out the promise that it can be what we want it to be.

[1] This first part of the paper draws extensively on Adam 2010
[2] 'Ideal' not in the normative sense but 'ideal' as conceptual construct and heuristic device.

However, the very openness and emptyness of the future of fortune brings with it problems for knowledge and enforces significant changes in expertise. Without predestination the future no longer exists as *future fact* and knowledge about it has to be achieved from the standpoint of the present as *present future*. During the early phases of this transition, while social change was still slow and overall structures remained stable across the life times of individuals, a certain level of predictability could be maintained. However, with the pursuit of progress, the social goal was no longer stability but change. In fact, stability became associated with standing still and being out-moded. Thus, while the quest for progress produced futures that extended into ever more distant times, as well a providing increased wealth and prosperity, it simultaneously reduced the certainty of outcomes. Here we disern the development of a scissor movement: with the increase in human future making the future becomes ever less knowable.

In light of this difficulty, experts on the future had to find new approaches to knowing the ‚not yet'. They shifted attention from the *future present*, which had become unknowable under the modern conditions, to the *present future* as the outcome of human choice. Prophesy and divination were abandoned in favour of science. Experts on the future of fortune are no longer forewarning of an impending fate, or concerned with what *will* be happening in the lives of *specific* individuals and groups of people. Instead, the source of knowledge for this present future is sought in the *past*, in past occurrances and patterns of event associated not with specific individuals but collectives and avarages. Thus, the future of fortune is calculated on the basis of present and past collective data, projected into an empty future as general trend. Expert knowledge on this calculated future is no longer intended to assist people to adapt to their fate but to aid intervention and social engineering on the one hand and the pursuit of progress, innovation and growth on the other. Drawing on accumulated evidence, scientific and economic experts, for example, produce probability calculations about an avarage future, projected as trend or cycle (Bell 2003, de Jouvenel 1967).

This method of knowing the future works, up to a point, as long as change is moderate and sufficient past facts are available from which to calculate a probable future, that is, as long as the past can act as indicator for the present and future. However, as Aurelio Peccei (1982: 11) points out, when the future is no longer a continuation of the past, but a consequence of actions and choices in the present, it is no longer knowable on the basis of accumulated facts and lessons of from the past. A number of developments during the 20th century, especially ones associated with technological innovation, brought with it such significant changes and discontinuities with the past, that the belief in a calculable future became delimited and for certain conditions turned out to be a fiction (Colborn et al., 1996).

2.iii The Future as Fiction

The first problem for a future calculated on the basis of the past was the pursuit of progress itself since, as I already mentioned, it was tied to a commitment, a compulsion even, to innovate and change, with instability rather than stability being the inherent goal (Bury 1955/1932; Adam and Groves 2007). It meant that the less the present could be expected to be a repetition of the past, the shorter would be the potential horizon of planned action with predictable outcomes. With the persistent and intensified pursuit of progress, therefore, the past lost much of its unquestioned

position as knowledge base not only for *future presents* but also for *present futures.* At the practical level of daily life, however, the past continues to be utilised as source of knowledge for choices and decisions. Lack of viable alternatives means it is a strategy for action that remains prevalent despite its ineffectiveness.

To make matters worse, when one change chases the next, the pace of life becomes accelerated. Changes stack up and accumulate. As Karl Marx and Friedrich Engels noted so memorably in their *Communist Manifesto:*

> All fixed, fast-frozen relationships, with their train of venerable ideas and opinions, are swept away, all new-formed ones become obsolete before they can ossify. All that is solid melts into air... (Marx and Engels 1967/1848: 224)

In contexts of such all-encompassing change, the very emptiness of the future is compromised. The abstract, empty future is becoming a crowded space, a territory congested with intended and unintended consequences of our own and predecessors' dreams and desires. Consequently much of planned future making has to give way to future repair and damage limitation. Even this, however, is beset by problems since, outcomes and products of the abstracting, quantifying mode of knowing sit uneasily in the interconnected, interdependent temporal world of social and ecological processes, with their jarring often producing further unintended, indeterminable consequences. At the level of individual future relations, moreover, the assumed emptiness of the future changes during the life course as the certainty of finitude looms ever larger with advancing years.

The need to find a new approach to the future in conditions of high modernity is nowhere more apparent than with contemporary information and communication technologies (ICT) where succession and duration have been replaced by seeming instantaneity and simultaneity, which means that both time and space are altered in those relations of communication. Networked information is distributed *simultaneously across space* and *instantaneously across time*. With ICT, movement across space has been de-materialised; duration has been compressed to zero and the present extended spatially to encircle the earth. For people with access to ICT, and those implicated in their effects, therefore, the present has been globalised. This electronic present bestows on people powers that had previously been the preserve of gods, that is, it makes us 'all-seeing', and endows us with the capacity of supernatural beings to be everywhere at once and nowhere in particular (Adam 1995, 2004). Importantly, when in principle everyone has access anywhere with the potential to influence anyone, the probability of future outcomes, let alone certainty, is no longer attainable. This difficulty is further increased with the loss of time gaps between before and after, which means that the assumption of causality and sequences, which underpins daily affairs, is no longer workable. Knowledge practices and expertise on the future are in need of adaptation, alteration and reformation.

With other technologies such as the nuclear bomb, for example, which brought to an end the certainty of continuity, the fictional status of the future takes a different form again. Without assurance of continuity, humanity has to learn to live with the potential end in the present. This means that not just our individual but also our collective lives are 'lived unto death' in the Heideggerian sense. In a context where we are deprived of the taken-for-granted fundamental assumption that successor generations will carry on where we leave off, faith is required to maintain belief in this particular fiction.

For Helga Nowotny (1994/1989), finally, the contemporary future is fictional because it is being eliminated and replaced by an *extended present*. In a present overloaded with choices, she proposes, the future is being determined now. Stumbling from one correcting measure to another, Nowotny (1985) considers us unable to get beyond having to cope with the innovative present. Moreover, an incessant need for innovation creates obsolescence at an ever-increasing rate which poses problems for future absorption. Again these are difficult issues that have to be dealt with in the present, with the effect that the future is incorporated into the present. For Nowotny, therefore, today's preoccupations with the future signify nostalgia for something that is about to disappear.

Experts on this fictional future require new skills to supplement those of evidence-based science and economics where probable futures are calculated on collective data gathered from a known past. These new skills to access the fictional future and the extended present are tied to knowledge about complexity, and systems interdependence. As such they transcend the past binary modes of thinking.

The systems perspective facilitates an appreciation of how the tiniest change can ripple through the entirety of a system with unintended, unknown and unknowable consequences. Moreover, this understanding of connectivity and interdependence needed to be expanded to apply not just to ICT and other contemporary technological future productions but to all of life's processes since all creatures produce futures through their mere being in the world. Every breath they take, every blade of grass they eat, impacts on their world and creates chains of effects that ripple out into an open future (Adam 1998). Humans are integrated into this inescapable future-producing capacity of living beings. They too are tied into a boundless web of interdependent relations of doing and receiving, giving and taking. As Hannah Arendt noted more than half a century ago,

> […] the smallest act in the most limited circumstances bears the seed of… boundlessness, because one deed, and sometimes one word, suffices to change every constellation. (Arendt 1998/1958: 190)

Cleary, the trusted dualisms of past *or* present, present *or* future, local *or* global, individual *or* collective can no longer be relied upon to provide appropriate understanding[3] at both the collective and individual level.

However, while systems-thinking is clearly an important corrective to the knowledge of possible and probable futures, it is not sufficient to understand contemporary *social* relations of the future. From a social theory perspective there are still numerous issues that require further exploration and discussion. In particular there is the question about the reality status of the future: is it ideal or real, fiction or fact?

2.iv The Future as Fact

Contemporary future making may have indeterminate outcomes for us in the present but it has outcomes never-the-less. As such it is real in its consequences, even if these are opaque to the people producing those impacts and effects. Every future making, we need to appreciate, does *not only* send ripples through the entirety of the system

[3] See Adam and Groves 2007 for an extended discussion on systems thinking and its limitations for understanding futurity; also Adam's 2005 conference paper on complexity theory, futurity and social theory www.cardiff.ac.uk/socsi/futures

across space and time, it *also* inevitably involves future taking: it prefigures, shapes and forecloses *future presents* of successors. This important fact is easily forgotten once the idea has been naturalised that the future is empty and ours to make and take to our desire. Despite this collective amnesia, however, the assumption of the future as free resource for present use becomes today difficult to uphold as the empty futures of predecessors begin to impose themselves on our present, restricting our choices and options. Amidst debates about climate change, environmental degradation and pollution, we are beginning to recognise that our own present is our predecessors' empty and open future: their dreams, desires and discoveries, their imaginations, innovations and impositions, their creations. Our progress as well as our climate change, our colonial and contractual responsibilities as well as our global institutions, markets and corrupt financial systems are their empty, open, commodified futures in progress, are their creative imaginations working themselves out in and as our embodied and embedded present. Our war memorials are their political aspirations, their pursuit of ethnic cleansing. Our present was their uncertain future, where all that was solid melted into air, their discounted future, exploited commercially for the exclusive benefit of their present. We realize that we are the recipients of their empty-future illusion, which is for us inescapably real in its consequences.

Claims are being filed today for some of the results of their past pretences of emptiness. Accusations accumulate about past wilful blindness, for example, about asbestos, smoking and Thalidomide. Our predecessors' glorious creations rebound as nightmares. The costs have to be paid, the disasters rectified, the cancers endured. Successor recipients shoulder the burden, are required to forgive and remedy past follies and pretences. Yet, despite all this, we still hold on to the same illusion, still live the same make-believe: The future is empty and open, we say. Ideal and unreal, the future exists only in our minds. It is ours to forge and shape to will, ours to colonise with treasured belief systems and techno-scientific products of the mind, ours for the taking.

As social scientists we are charged to address this illusion, take it out of the invisible domain of implicit, naturalised assumptions and raise it to a conscious level of understanding where it becomes available as subject for public debate. Difficulties arise, however, because the established conceptual tools that guide contemporary social science expertise on the future are no longer appropriate to the new task. That is to say, the future as fact does not yet have its accompanying expertise but still relies on theories and modes of inquiry that cannot access it.

What then is the difficulty? Conventional wisdom says that the future as the 'not yet' is not fact but belongs to the realm of ideas, to imagination, plans and desires. As such it is not accessible to the senses; thus falls outside the competencies of empirical investigation. Moreover, it is located outside economic and political frames of reference and concern: those not yet born exist neither as consumers nor as voters on the action horizons of economists and politicians. Issues of future persons' rights and justice are discounted and their potential world considered useful only insofar it can advantage the present. Sustainability debates have begun to recognise the injustice but assumptions about the reality status of the future prevent progress being made in the factual domain of futures in the making that may materialise some time somewhere.

To complicate matters further, the different perspectives and attendant knowledge practices identified with respect to the future as fate, fortune fiction and fact did not replace each other but continue to co-exist, if in particular hierarchical relations. None of the earlier futures relations, for example, are lost. Thus, the future as fate continues to play a powerful role in understanding and decisions. Equally, in many domains of life and situations the future as fortune is still the dominant perspective. That is to say, belief in an empty future, that is to be filled with our desires, is as strong as ever, tempered only by the awareness that outcomes are not fully amenable to human design. Additional complications arise, finally, because the dominance and prevalence of these diverse approaches changes with context and during the life course of individuals.

For the social sciences this layeredness of futures relations makes investigation of that domain very complex indeed. Moreover, expertise and modes of inquiry have not caught up with all the mutating knowledge practices and their complex interrelations. However, if sociologists are to play a central role in contemporary societies' self understanding and if their investigations of collectives and individuals are to be appropriate to their contemporary condition, then they do need to engage with this difficult subject matter and get involved in conceptual and methodological revision. Beyond understanding the knowledge practices associated with approaches to the future, this involves recognition of some of the key structural features encompassed in the way futures are lived and enacted.

3. Futures Lived and Enacted

The title of the workshop suggests that futures are imagined, that they encompass the world of anticipation, expectation, plans and desires. As such it seems to bracket the lived, practical and performative side of relations to the future, the fact that futures are made, shaped and created with every action, interaction and transaction. Study of relations to the future in every-day life and over the life course, however, necessitates that the future is understood not just as an aspect of mind but as lived practice that makes a difference in the world. Approached in this way, it becomes apparent that futures are lived and enacted with reference to *repetition*, *finitude* and *change*. Each of these structural features of our lives affords people different means to engage with and produce futures. *Repetition* provides structure and a level of predictability. *Change* and the associated unpredictabilities tend to produce social strategies for stability and permanence. *Finitude*, finally, directs attention to future endings and as such tends to facilitate counteractive measures through socio-cultural creation of continuity. I will briefly look at these three future structuring features, starting with repetition.

3.i Repetition

Our environment, our bodies and our social lives are structured through patterns of repetition, all of which facilitate predictability. The daily and seasonal cycle of sun and moon around the earth provide the *environmental rhythmicity* within which social life is conducted with a measure of foresight and planning. Our bodies, which contain their own internal *bio-rhythms*, pulse in synchrony with these external repeating structures. Research has shown that this entrained rhythmicity is 'hard-wired' into our physiology (Adam 1990; Aschoff 1965; Aschoff, ed. 1981) and endows us (and fellow beings) with an embodied capacity for foresight. Superimposed on this are the

daily, weekly, monthly and annual *socio-cultural rhythms*, which enable routines and habits to be established. This elaborate structure of external, internal and socio-cultural rhythms makes the future predictable and as such constitutes a key basis for ontological security. With loss of securely predictable structures the future becomes increasingly precarious, for example, during times of transition, periods of dramatically changing rhythmic organisation, or life phases. In addition, anchorage in rhythmic structures is neither fixed nor stable but changes with context and over the life course. Knowledge about *how* relationships to the future are enacted through repetition, therefore, requires investigation.

3.ii Change

With the structural feature of *change*, very different future-enacting strategies come into play. Every repeating cycle, no matter how similar in its return, contains within it the seeds of change. This inevitability of change has fostered an array of cultural practices in response to the associated uncertainty and indeterminacy. Thus, for example, when cycles are closed, the resulting circle symbolises sameness since it always takes you back to the beginning. In myth and ritual, therefore, change is kept at bay and the indeterminate future is rendered knowable by ensuring that the future is a sacred re-enactment of the past. This tremendous cultural achievement, which provided islands of certainty in the vast sea of change, has been largely abandoned with modernity and the pursuit of progress, with the consequence that unpredictability, uncertainty and insecurity become an inevitable feature of the modern way of life. Here, social promise, explicitly created interdependencies and contracts can act as countervailing structures, creating what Emile Durkheim called ‘organic solidarity’. However, promises bind the future to the present *only* long as they are kept. Equally, contracts offer future security *only* to the extent that they are honoured. Moreover, location in the life course as well as status, class, race and gender will position individuals differently with respect to their means to access and utilise such change-negating, socially secured futures. This applies particularly for older members of society who are no longer tied to contractual relations of work.

3.iii Finitude

When we explore the structural feature of *finitude* we find that the inevitability of death has spawned a plethora of means to transcend finitude (Adam 2004; Adam and Groves 2007; Reanney). Some cultures have posited an afterlife in a different realm of existence, others believe in reincarnation, others still expect life to be bounded by nothingness or followed by re-absorption into the great pool of life from whence they came. In addition to religious beliefs people have looked for solace to both the cosmos and nature, finding there evidence of the *eternal* that is lacking in their individual lives. In nature, for example, death is the condition to life and immortality: dying plants produce seeds that burst into new life, blossoming until their time has come to produce seed and return to the earth as nourishment for the next generation of seedlings. Culture too affords means to transcend mortality. Thus, for example, a life marked by bravery, courage, fortitude and great wisdom is remembered in myth, legend and history books. Alternatively people are remembered and outlived by their creations, such as the great inventions of science and engineering, conceptual innovations in philosophy, and the artifacts of music, literature and poetry. In a globalised society, however, the pool of death-transcending creations is getting ever larger, which means that the significance of individual action is diminishing proportionally. Immortality by socio-cultural means is thus ever harder to achieve. In

such a context, keeping death at bay by banishing it to special places like hospitals and hospices tends to be a widely used substitute for creating immortality by cultural means.

What finitude means in an individual's life, however, is once more context, biography and life-course specific. Martin Heidegger's work (1927) is of interest here as it draws attention to the way birth and death variably permeate our lives during the life course. Life is lived unto death, Heidegger (1988/1927) argued, and this lived futurity is what marks us as humans and characterizes our projects. Where a person is located within this birth-death horizon clearly matters: the closer they are to the beginning of their lives, the more distant is finitude. With advancing years, in contrast, the future takes on a very different, possibly threatening, meaning. When looming finitude turns the personal future into fact, the less discomfiting focus on the past may substitute the future orientation with memories of younger years. Research on the future in elderly people, therefore, may take investigators into uncharted emotional, moral and spiritual territories, requiring that they tread lightly and with the greatest of care.

On your handout I have summarised in bullet points some of the methodological challenges that emerge from the issues I have raised and discussed in this presentation. 4600

References

Adam, Barbara 1995. *Timewatch. The social analysis of time.* Cambridge: Polity Press; Williston, VT: Blackwell.

Adam, Barbara 1998. *Timescapes of modernity. The environment and invisible hazards.* London/New York: Routledge.

Adam, Barbara 2004. *Time*. Cambridge: Polity Press; Malden, MA: Polity Press.

Adam, Barbara and Chris Groves 2007. *Future matters. Action, knowledge, ethics.* Leiden: Brill.

Arendt, Hannah 1998/1958. *The human condition.* Chicago: Chicago University Press.

Bell, Wendell 2003/1997. *Foundations of futures studies. History, purposes, and knowledge*. Two volumes. New Brunswick: Transaction Publishers.

Bell, Wendell and James Mau eds. 1971. *The Sociology of the future: theory, cases, and annotated bibliography.* New York: Russell Sage Foundation.

Bury, John B. 1955/1932. *The idea of progress. An inquiry into its growth and origin.* New York: Dover Publications Inc.

Carson, Rachel 1965. *Silent spring.* London: Penguin.

Colborn**,** Theo, Dianne Dumanoski and John P. Meyers**,** 1996. *Our stolen future. How man-made chemicals are threatening our fertility, intelligence and survival.* Boston: Little, Brown & Company.

Jouvenel, Bertrand de 1967. *The art of conjecture*. Trans. N. Lary, London: Weidenfeld and Nicolson.

Littleton**,** Scott C., ed. 2002. *Mythology. The illustrated anthology of world myth and storytelling.* London: Duncan Baird.

Luhmann, Niklas 1982. *The differentiation of society.* New York: Columbia University.

Manuel, Frank. E. 1962. *The prophets of Paris,* Cambridge, Mass.: Harvard University Press.

Marx, Karl and Friedrich Engels 1967/1848. *The Communist Manifesto.* Harmondsworth: Penguin.

Nowotny, H. 1985. From future to extended present: time in social systems. In *Time preferences in interdisciplinary, theoretical and empirical approaches,* eds. G Kirsch, P. Nijkamp and K. Zimmermann, 1-21. Berlin: Wissenschaftszentrum.

Nowotny, Helga 1994/1989. *Time: the modern and postmodern experience.* Trans. N. Plaice. Cambridge and Cambridge, MA: Polity.

Peccei, Aurelio 1982 *One hundred pages for the future. Reflections of the President of the Club of Rome.* London: Futura.