Neuroculture, active ageing and the ‘older brain’: problems, promises and prospects

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Abstract
This article explores the characteristics of a newly emergent ‘neuroculture’ and its relationship to cultures of ageing; in particular, the social meanings associated with ‘active ageing’ and ‘cognitive health’ and the discourses and sciences around memory and the ‘ageing brain’. The argument proposes a critical perspective on this relationship by looking at the shifting boundaries between standards of normality and abnormality, values of health and illness, practices of therapy and enhancement, and the lines demarcating Third Age (healthy, active and agentic) and Fourth Age (dependency, loss and decline) periods of ageing. Conclusions offer further reflections on the complex questions that arise regarding expectations, hopes and ethics in relation to the promises and perils of a neurocultural future.

Keywords: neuroculture, active ageing, anti-ageing, cognition, memory, health, expectations, enhancement

Introduction
This article explores where and why a newly emergent neuroculture is recasting and re-imagining the older brain and, along with it, the ageing mind. In particular, we focus on the discourses and sciences of cognitive function and their newly formed relationship with a culture of active ageing, taking memory (decline) as our problematic. This relationship, we show, is deeply embedded in the changing medical and cultural boundaries between normality and abnormality, health and illness, and treatment and enhancement in old age. As our argument below elaborates, by neuroculture we refer to an agglomerate of mutually reinforcing fields connecting ongoing debates about mind and body, consciousness and intentionality, and nature and culture with new technologies, knowledges, subjectivities and cultural imperatives. Neuroculture, however, is also a practical field that bridges advances in the neurosciences or brain sciences – from molecular neuroscience to cognitive and affective neuroscience, psychopharmacology to behavioural and psychiatric genetics – with health, military, criminological and other regulatory policies that seek new forms of individualised risk management and social control (Vidal 2009, Ortega and Vidal 2010, Rose 2007). For example, by 2009, the American National Institutes of Health (NIH) was spending nearly 20 per cent of its total budget on brain-related projects (Carey 2009). Along with these
socio-scientific interests in the brain has been the growth of an array of hybridised popular
‘neuro’ disciplines (e.g. ‘neuroethics’, ‘neuroeconomics’, ‘neuroaesthetics’, ‘neurodidactics’),
enhancement products (e.g. brain-stimulating ‘neuroceuticals’), marketing strategies
e.g. ‘neuromarketing’), technologies (e.g. ‘neuro-prosthetics’), and social objectives (e.g.
‘neurodiversity’), some more legitimate than others. Thus, neuroculture is not simply a
question of the power or persuasive appeal of the neurosciences within the laboratory or
clinic, but of their wider social, cultural, political and economic salience and significance
about the future of humanity and potential for its optimisation.

Our concern with neuroculture is more precisely where it intersects an increasing emphasis
on ‘active’ ageing as a widespread objective of health and age policies that prioritise
individual ‘wellness’ as part of the risk-management of population health (WHO 2002).
Despite the ongoing debate as to the nature and status of active ageing and the factors
influencing it, the ideal of active ageing clearly articulates the goals of mental, physical and
social wellbeing in later life, including the maintenance of cognitive capacities across the
lifecourse (e.g. the recent Foresight Mental Capital and Wellbeing Project (2008)). These
goals, moreover, occur in the context of widespread personal and cultural concerns about
population ageing associated with age-related cognitive and memory decline, particularly
conditions such as mild cognitive impairment (MCI) and neurodegenerative disorders such as
Alzheimer’s disease and Parkinson’s disease. What this article contributes to the literature is a
critical reflection on how the intersection between active ageing and neuroculture is
consequential for the role played by cognitive health and memory in determining the onset of
the Fourth Age, a period marked by dependency, decline and loss of agency.

Critiques of active ageing have been part of the literature on both the ‘positive’ (Laslett
(Walker 1980, Townsend 1981, Arber and Ginn 1995) aspects of ageing, and of studies of the
social meanings and stigmatisation associated with cognitive loss and dementia (Goldsmith
1996, Downs 1997, Kitwood 1997). Other work in science and technology studies (STS) has
also explored the dynamic role of expectations in the mobilisation of socio-technological
futures or imaginaries (Brown and Michael 2003, Martin et al. 2008), including the
relationship between technological expectations and cultures of (anti-) ageing (Joyce and Loe
2010a,b, Mykytyn 2008, 2010). However, this wealth of critical literature, along with valuable
work on neuroculture within the social sciences and humanities (e.g. Vidal 2009, Pitts-Taylor
2010), has not specifically addressed intersecting issues between neuroscience and
neuroculture, and active ageing and the brain in any sustained depth or detail, nor has it
critically examined the relationship between enhancement and ageing cognitive decline. Thus,
in this article, by looking to cognitive ageing as our primary focus, we seek to explore these
gaps by articulating four key interrelated sociological questions in the sections that follow.
First, what are the scientific, popular and political elements of neuroculture and what role
does neuroculture play in the construction or mobilisation of various neuro-related futures?
Secondly, how has the drawing of a cognitive boundary between Third and Fourth Ages
shaped active ageing? Thirdly, how has the construction of memory as a brain function
recreated the ageing mind as an opportunity for research and intervention – ‘therapy’ or
‘enhancement’? Finally, to what extent are the neurocultural expectations and promises
articulated for groups usually considered under ‘enhancement’ rubrics, problematised in later
life? Together, these questions lead to concluding thoughts about the role of the
neurosciences and neuroculture as forces that both shape and are shaped by cultural concepts
of performance and function in later life or old age.

Three further points are also worth stressing at the outset. First, neuroscience and
neuroculture of course encompass more than simply cognitive functioning, just as cognition
encompasses more than simply memory. While we focus in this study on cognitive function in order to illustrate certain cultural trends, therefore, we do not imply a conflation of the neuro with the cognitive, or of cognition with memory. The neurologisation or neurobiologisation of memory, furthermore, is itself a fascinating socio-historical matter, albeit one beyond the scope of this writing to address adequately (e.g. Rosenfeld 1988).

Secondly, the arguments and materials presented in this paper are socio-historically bounded to contemporary societies and advanced economies such as North America and the United Kingdom, including both the intersections between neuroculture, active ageing and the ‘older brain’, and the spaces of development between cognitive performance and associated questions of health and illness, therapy and enhancement.

Finally, although in large part a conceptual piece and a theoretical contribution to this productive nexus of neuroculture, ageing and health, we nonetheless draw on a selected range of primarily US and UK sources in support of our claims, including funding trends in the neurosciences today, official policy documents and reports, key articles in leading neuroscience journals, pharmaceutical (trends and trials) data, and other popular and commercial material such as magazine articles, news printmedia, popular books and websites. Our data in this respect, and the arguments upon which they are based, are perhaps best regarded as exploratory, preliminary or provisional: a call, in effect, to further research in this emerging field in the decades to come. With these preliminary points in mind, we now turn to the first of these questions concerning relations between neuroscience and neuroculture and the various futures at stake at this juncture.

**Neuroscientific/neurocultural trends**

One of the most notable discursive features of the neurosciences and neurotechnologies today is their articulation and expression through the rehearsal of a variety of futures, some more hopeful than others. Through their research in behavioural and psychiatric genetics, brain imaging, and new generations of enhancing psychopharmaceuticals, for example, the neurosciences hold out the promise of treating, managing, protecting, even boosting or improving the cognitive powers of the brain and thereby ‘improving’, if not ‘optimising’, the human condition in various ways. This research is also produced in relation to other more feared futures, such as the risk of cognitive decline or neurodegenerative disorders, to which the neurosciences pose themselves as promising solutions.

The constructed and contested nature of these futures in turn alerts us to the dynamic role that expectations of various kinds play in this constellation of prospects and possibilities. Expectations in this respect, qua cultural objects or productions (Mykytyn 2010), are articulated and amplified in neurocultural ways and, as such, are critical to the construction of various futures, including both the ‘retrospecting of prospects’ and the ‘prospecting of retrospects’ through futures past, futures present and futures yet to come (Brown and Michael 2003). These anticipatory discourses or forms of promissory capital, together mutually bind visions, obligations and communities of promise (Martin et al. 2008), which extend to other non-biological fields such as aesthetics, ethics and theology, thereby adding secular neurophysical explanations to human existence, previously understood as mysterious or metaphysical.

It is also interesting to note in this regard, from the perspective of the history of the human sciences, where the neurosciences may be displacing other scientific cultures and their powerful claims to the future. For example, with respect to ‘psy’ cultures, Nikolas Rose argues that we are witnessing the demise or eclipse of one way of seeing or knowing ourselves.
and the emergence of a new one. Whilst discourses of psychological ‘interiority’ and ‘depth’, a ‘psy complex’ (Rose 1985) in effect, informed the understanding of ourselves during the first part of the 20th century, a growing recourse to biological or neurobiological ways of understanding thoughts, moods, wishes, desires, emotions and behaviours, Rose claims, is effectively reconfiguring ‘what we take ourselves to be’ (Rose 2007: 192; see also History of the Human Sciences 2010). Other recent expert essays and reports, such as the Royal Society ‘Brain Waves’ Report (2011), also point to the variety of ways in which these developments in neuroscience and neurotechnology are already impacting or may one day impact on society.

Caution, nonetheless, at one and the same time, should clearly be exercised here, given neuroscience is a complex and contested field, particularly when it comes to bold pronouncements of the ‘mind is what brain does’ kind, and the difficulty of getting from nerves and neurotransmitters to the mystery of consciousness (i.e. the so-called ‘hard problem’). Neuroscience, moreover, has become surrounded by considerable ‘hype’ as well as hope, including vague correlations between brain, self and behaviour which themselves, as Vidal comments, provide ‘a fascinating testimony to the power of the brainhood ideology’ (2009: 9). In brain-scanning technologies for instance, disparate technical, visual and personal expressions of and stories about human difference become condensed, correlated and co-ordinated, thereby fuelling their cultural power and popular appeal (Dumit 2004). Tallis’ recent remarks on so-called ‘neurotrash’ are also instructive on this count. Whilst contemporary neuroscience is one of ‘mankind’s greatest intellectual achievements’, he notes:

I am utterly dismayed by the claims made on behalf of neuroscience in areas outside those in which it has any kind of explanatory power; by neuro-hype that is threatening to discredit its real achievements. Hardly a day passes without yet another breathless declaration in the popular press about the relevance of neuroscientific findings to everyday life (Tallis 2009: 1–2).

Thus, even if triumphalistic neuroscientific pronouncements of ‘unprecedented transformations’ of the concept of the human are premature, misguided or misplaced (Vidal 2009: 9), these trends and transformations nevertheless inspire a popular and future-forward neuroculture of ideas and images, hopes and fears, understandings and explanations of the brain and mental worlds. These include: popular books, articles and advice literature on the brain, cognition, mood and emotion; media images and celebrity narratives about neuro-related matters, such as Alzheimer’s disease and Parkinson’s; ‘nutraceuticals’, such as fish oil supplements and Gingko Biloba; ‘brain training’ or ‘brain boosting’ devices and computer games, such as Nintendo DS and Wii devices (e.g. http://www.sightandmind.co.uk/brain-training/getting-started); language and logic exercises, such as crosswords and sudoku; and lifelong learning through the arts spanning everything from Shakespearean explorations of brain-based themes (i.e. ‘Bard on the Brain’) through neuro-choreographed dance, to the New York City Brainwave Festival (http://www.brainwavenyc.org). ‘Giving your brain a workout’ or ‘neurobics’, indeed, based on loose appeals to ‘neuroplasticity’, has become the mental or neural equivalent of aerobic exercise viewed as a brain-based body project towards ‘brain fitness’ (e.g. Fitzsimmons 2008, Friedman 2010). Thus, the brain has become or is fast becoming something of a ‘project’ in its own right, attended by attempts to stall, slow down, protect or prevent neuro-related cognitive decline and degeneration through a variety of cultural pursuits, commercial products, and self-help programs designed to boost, improve or enhance our brain power. While the efficacy of many of these practices may be in doubt and are more likely to stave off boredom than keep the brain sharp (Owen et al. 2010), our point nonetheless is that they are socially significant for
what they tell us about neuroculture today. How neuroculture and the relevance of its futures are related to expectations and cultures of active (cognitive) ageing is the subject of the next sections of this paper.

Neuroculture and active ageing: between Third and Fourth Ages

The most obvious nexus points between neuroculture and ageing are memory and cognitive decline, especially as dementia has generally come to represent a boundary issue in articulating participation in the Third Age or loss of self-determination in the Fourth Age (Gilleard and Higgs 2010). While the heuristic of dividing later life into the categories of the Third and Fourth Ages is not universally accepted, it does have considerable valency for examining this topic. Increasing life expectancy across the most affluent nations of the world has not only led to a demographic transition where the numbers and proportions of people aged over 60 have increased (Hyde et al. 2009) but has also been accompanied by a radical re-writing of the normative template of old age (Moynagh and Worsley 2009: 160–2). This is not simply because there are now more people living to a later age, but also that the levels of health and functioning that were once assumed to be constitutive of old age are no longer adequate interpretive structures on which to understand this period of life (Jones and Higgs 2010). Ideas such as the ‘compression of morbidity’ have been advanced to explain the combination of improvements in general health at later ages coinciding with a postponement of the onset of chronic disease (Cutler 2001, Fries 2005). The most notable aspect of this transformation is the emergence of what Laslett has termed the ‘Third Age’ (Laslett 1996) to designate the period after working life and family responsibilities have ended, but before a ‘Fourth Age’ of dependency and decline has made its presence felt in the lives of older people.

There has, of course, we duly recognise, been much debate about the nature and extent of the so-called ‘Third Age’, with Bury (1995) seeing the term as too readily espousing a set of ‘middle class values’ and ignoring issues of resources which impact differentially on men and women in different classes. Gilleard and Higgs (2000, 2002), nonetheless, have taken a different approach to the term seeing it much more as a cultural phenomenon based on both the changing experience of growing old and the generational habitus of those who have lived through the ‘grey’ of the youth culture of the 1960s. Taken from this perspective, they would argue that two dramatically different discourses of old age have come into existence. One is a discourse associated with the Third Age, which puts an emphasis on choice and agency in the construction of post-work lifestyles and activities. Such a discourse is heavily dependent on the maintenance of personal health and vitality as ways of demonstrating a continued capacity to participate in Third Age culture (Gilleard and Higgs 2005). The Third Age for Gilleard and Higgs is thus a somatic culture where at least one strand is involved in pursuing ‘anti-ageing’ strategies and techniques which in different ways create tensions between what is seen as ‘natural’ ageing and what becomes ‘normal’ ageing. Jones and Higgs (2010) make the case that increasingly what constitutes ageing and later life is itself contested with contradictory notions of what constitutes ‘normal’ ageing competing not only with older ideas of the natural lifecourse but also with a number of different ideas of normativity. Within this, they further argue that the more that body maintenance as a project is pursued, the more the idea of passively accepting what has been seen as the ageing process is denied. This is not to claim that there is an implicit belief in transcending mortality itself but rather that dependency should be as foreshortened as possible. This point is also made by James Fries in relation to what he terms the modifiable aspects of the ageing process:
When questioned about fears about growing old, individuals over the age of 50 usually do not cite fears of death … As more significant concerns, they first describe a dread of approaching chronic illness, pain, and inability to physically get around. Second they report fears of approaching senility and loss of memory. And third, they describe a fear of total dependence upon others (Fries 2005: 815).

In all of this, there is now a rich and diverse literature that seeks to address the parameters of this new reconstruction of later life. These range from transformations of the understandings of sex (Calasanti and King 2005, Katz and Marshall 2003, 2004, Marshall 2010) through to work exploring embodiment (Clarke et al. 2009, Paulson 2005, Slevin 2010) and, finally, to the work of John Vincent who provides a critique of the whole anti-ageing project (Vincent 2006, 2009). These writers have tried to show how the interconnections between embodiment, culture and technology have not only led to contradictory consequences but also have thrown the increasingly dichotomised reality of later life into stark relief, with many of the technological advances serving mainly to create divisions between aspiration and actuality (Jones and Higgs 2010).

This brings us to the second discourse of old age, namely that of the Fourth Age. This alternative discourse has its roots in traditional assumptions about old age but has become a more alienating discourse as it becomes synonymous with high levels of both physical dependency and mental decline. Again, Gillear and Higgs (2010) have attempted to outline the features of the Fourth Age in ways that demonstrate its undesirability and its powerful social role in articulating a denial of agency and personhood, whether this is in terms of the admission to a nursing home on the grounds of profound physical dependency or the confusion associated with Alzheimer’s disease. Not all writers on the Third and Fourth Ages, of course, as already noted, would subscribe to the distinction made above. Grenier (2007), for example, sees the procedures of separating ‘frail’ older people from the non-frail as a ‘dividing practice’ not only to control access to resources but to also to mask the connections between the different groups of older people who may not be so different after all. However, it is impossible to deny that the status of frailty is one of both personal and social dependency (Gilleard and Higgs 2011).

The effect of the dual discourses of the Third and Fourth Ages, we would argue, impacts in a number of ways on contemporary neuroculture. In the discourse of the Third Age a premium is put on the exercising of agency and choice, not just fully to exercise the opportunities afforded by the Third Age, but also to head off one of the principal forms through which ageism is enacted in contemporary societies, namely the implied mental rigidity and lack of adaptability of older people. While this chimes with certain aspects of consumer culture of which it is a part, it is also the case that these notions carry with them aspects of the generational field in which the Third Age is rooted such as openness to new experiences and a capacity to develop over time (Gilleard and Higgs 2000, 2005). Cognitive health becomes, effectively, a new aspect of the ‘will to health’ which pervades the culture of the Third Age and is thus an accomplishment to be worked at as well as a marker of potential decline (Higgs et al. 2009). Considerable research effort, as well as lay belief, is invested in the search for mental health promoting behaviours, such as completing crosswords, that can act for the brain in the same way that a low-cholesterol diet can for the heart. However, unlike conventional health-promotion practice there is no conclusive evidence that it has any protective effect.

Herein then lies one of the principal dilemmas, if not contradictions, of neuroculture in later life because what it draws attention to is the ‘black hole’ identified by Gillear and Higgs (2010) that lies at the heart of the Fourth Age, a metaphorical collapsed star from...
which nothing can escape, but also from which little can be gleaned. The existence of the Fourth Age exerts what could be termed a gravitational pull on those otherwise capable of maintaining a distance from the signs of dependency. Signifiers of potential failure may arrive in the shape of a declining memory or a too slow response to an everyday traffic problem. The testing and the medications/therapies aimed at this group, however, returning to the various futures at stake here in these cultural constellations, do not usher in a positive view of the future, rather they seem to suggest at best a possibility of slowing down the negative outcome; a traversal of what Gillear and Higgs (2010) describe as the ‘event horizon’ of the Fourth Age proper with all its attendant fears of dementia. The pharmaceutical compounds trialled and marketed by drug companies, for example, have limited efficacy and indeed diagnoses such as ‘mild cognitive impairment’ seem to be differentiating out a group of people whose decline is going to be less severe than those with more ‘classic’ dementia trajectories. All in all, the problem for the Third Age is the existence of the ‘threat’ of the Fourth Age.

A notable feature of the contemporary ageing experience, therefore, is the increasingly sharp demarcation that is being made between the Third Age of relatively active later life and the Fourth Age of decline and dependency. In this arena, the Fourth Age becomes a status that is defined in terms of lack most notably in relation to the loss of short-term memory in Alzheimer’s disease. Moreover, because its diagnosis is reduced to capacity in a number of memory tests, this means that dementia almost represents the polar opposite of the neuroculture that we have been describing. It is the antithesis of the agentic mentally competent individual; it represents the collapse of the mental competencies that mark out the reflexive self in the modern world. While the consequences for the individual who is now seen as being defined by the evaluative discourses of the Fourth Age are catastrophic they are probably even more so for those who surround them whether they are carers, families or friends. This is not just because of the loss of the person with dementia’s memories and practical capacities, but also because in a very real way the Fourth Age acts as a powerful ‘social imaginary’ regarding a potential trajectory of ageing. This trajectory might be most pressing on those participating in the Third Age, but it also has an existential impact on the rest of the lifecourse.

In a significant way, the diagnostic tests that focus on memory impairment, which are such a feature of the assessments for dementia, become important markers for those existing outside it but who become fearful of it. The social imaginary of the Fourth Age ensures that large numbers of people in middle age are fearful of dementia’s ‘ascribed’ status being applied to them. As the cognitive boundary between the Third and Fourth Ages has emerged as a crucial part of the territory of decline, delaying its approach has become a lifelong project that neatly fits the neurocultural promise of a hopeful, neuro-protected future.

Memory, the ‘ageing brain’ and enhancement in a ‘hypercognitive’ society

As we argued in the previous section, the image of memory decline in the ageing brain is consequential for how we conceive of the boundary between Third and Fourth Ages. The scientific interest in memory and the brain of course has a long history, the documentation of which extends far beyond the scope of the present paper (e.g. Star 1989). The acceleration of neurological research since the late 1960s nonetheless has certainly been remarkable (Kandel 2006). It is perhaps not surprising then in this light, as conditions such as Alzheimer’s disease become such a powerful articulation of concerns about ageing, that the neurosciences would
become key knowledge-making authorities in the ageing field in the closing decades of the 20th century and the early 21st century.

Problems remain nonetheless. Where this work has impacted research on the biochemistry or neurobiologisation of memory associated with the hippocampus, for example, problems and disputes about the workings of memory have arisen, which cognitive psychologists and psychogeriatricians have recognised. Some critics, for example, have pointed out that there are different kinds of memory (episodic, semantic working, autobiographical, etc.), with each having unique characteristics and interdependencies (Draaisma 2004). Others have shown that the neuroscientific paradigm neglects the social determinants of recall memory, such as ‘stereotype threat’ (Hess et al. 2003) where the social stigma associated with being ‘old’ can affect memory performance, or the benefits of collective contexts where memories are recalled through shared interactivity (Bassett and Graham 2007). With these and other issues in mind, brain scientist Steven Rose sums up the state of neuroscientific memory research today:

Despite decades of theoretical and experimental work, the application of the entire contemporary range of neuroscientific and psychological tools, from genetic manipulation via pharmacology to imaging and modelling, we don’t know how memories are made, how and in what form they are stored in the brain (if ‘storage’ as in a filing cabinet or computer memory is even an appropriate way of speaking) or the processes by which they are retrieved (Rose 2005: 212).

Another important and increasingly obvious issue is that especially recall memory ‘sharpness’ has become socially essential. Memory loss, as noted above, not only indicates a possible slide from Third to Fourth Ages, but recall memory skill is also crucial to successful identities in our so-called ‘information society’. Technologies, to be sure, may both help and hinder here, including the possibility of new digital forms of ‘memory storage’. Forgetting in the neuroculture of active ageing, nonetheless, we might say, is increasingly regarded as an act of ‘failure’ or at least a potential problem ‘in the making’, so to speak. Were it not indeed for the ‘hypercognitive society’ we are fast becoming, Post asks, ‘would we fear dementia enough to label it AD [Alzheimer’s disease] at a certain threshold?’ (2000: 249). Thus, behind the dialogue between neuroscientific memory research and its critics lay greater social expectations for cognitive performance, if not the boosting/banking of cognitive or mental ‘capital’ (cf. Foresight Report (2008)), and advanced treatments for cognitive decline.

This in turn has led to some confusion between acceptable levels of normal ‘forgetfulness’ and memory ‘deficits’ that has surfaced, as previously noted, in debates around cognitive enhancement and Mild Cognitive Impairment (MCI) in older adults – the latter a feared cross-boundary category of pre-dementia memory loss and cognitive decline that has, in effect, become a convergence point for the neurocultural, pharmaceutical and gerontological communities (see Bennett et al. 2005, Frissoni et al. 2006, Katz and Peters 2008, Leibing 2009, Moreira et al. 2009, Petersen et al. 1999, 2001, Whitehouse and Moody 2006, Whitehouse and Juengst 2005). A range of drugs and supplements for MCI, for example, has been trialled over the past decade, including medicines already licensed for the treatment of Alzheimer’s disease, completely new chemical entities that are thought to modulate memory function such as Ampakines (Lynch and Gall 2006), a series of putative drugs based largely on natural products and a small number of dietary supplements, the latest of which are high doses of vitamin B supplements. Addressing or arresting cognitive decline is also seen as a ‘huge priority’ in the previously mentioned Foresight Mental Capital and Wellbeing Project (2008), which emphasises: (i) ‘starting early in life’ in middle age through education and life
long learning; (ii) the development and use of ‘new methods for early diagnosis (biomarkers) of cognitive decline and dementia’; and (iii) the ‘effective and timely use of new treatment to arrest the progression of dementia’ in early stages. ‘Consideration should also be given’, the Report continues, ‘to the development and use of pharmacological and other types of cognitive enhancers for older people experiencing decline … particularly when the balance of risks and benefits may be quite different compared to use by children’ (2008: 34, our emphasis).

The reference here to pharmacological cognitive enhancers is timely and telling. Kandel, for example, in his account of Memory Pharmaceuticals (a company he co-founded in 1996), notes how this and similar biotechnology companies have not simply ‘bolstered the hope of alleviating memory loss’ but have also ‘raised the ethical issue of cognitive enhancement’ (2006: 332–3). Clearly, however, we must also ask what precisely cognitive enhancement actually means or might mean here? Like sexual enhancement and ‘virility surveillance’ (cf. Marshall 2010), is it a response to real pathological disorders or is it a technical and pharmaceutical identification/imagination of a ‘dysfunction’ that really falls within the parameters of ‘normal’ cognition? And where do treatments fall in relation to the shifting border between prescription-only medicines (POMs) and other types of drugs, especially since many enhancement products are manufactured as poorly regulated ‘supplements’ or ‘remedies’ to complement drug medications. How indeed did cognition itself become imagined as modifiable through enhancement? Current commentators and critics cite the issue of enhancement as central to medical, cultural, and ethical concerns about biosocial technologies because of their redefining of normal standards of health (Hogle 2005, 2007, Greeley et al. 2008, Harris 2007, BMA 2007). Enhancement in this regard is commonly defined as that which ‘improves’ human functioning beyond what is deemed necessary to sustain good health (DeGrazia 2005: 263), or more to the point, ‘enhancements are upgrades’ (Hogle 2005: 703). However, the boundaries between treatment and enhancement, and health (or ‘wellness’) and illness are far from clear-cut, especially where such boundaries cross those between the Third and Fourth Ages.

This uncertain terrain between age, cognition, memory and enhancement in turn begs further important questions, themselves in need of more fine-grained empirical investigation, as to what exactly ‘enhancement’ means in later life. Is enhancement, for example, only applicable to the agential time or window of the Third Age where it is more possible for ‘improvements’ of some kind or other? What about the Fourth Age? Are these people somehow ‘beyond’ enhancement? Do societies, for instance, want to ‘improve’ functioning for those entering the Fourth Age or allow them to lose function ‘naturally’ so they may not prolong unnecessarily the final years of ‘decline’? Are these ‘dignity’ or ‘healthcare rationing’ issues moreover, and what policy and ethical implications do questions of this kind raise?

These, to be sure, are big questions that extend far beyond the scope of this paper to fully address. Suffice it to say that the particular configurations of expectations embedded in this nexus of neuroculture and (active, anti-) ageing may constitute an important and indeed instructive counterweight to some of the predominant discourses and debates on the promises and prospects of cognitive enhancement to date, which often take as their primary reference younger groups in good ‘health’ such as children, students or adults in competitive work environments. To the extent, moreover, that biomedical ‘enhancements’ range from attempts to ‘normalise’ (up to the norm), or to ‘restore’ or ‘rejuvenate’ (back to the norm), right through to attempts to ‘augment’ or ‘upgrade’ performance in some way beyond the norm (Conrad 2007), and to the extent that expectations regarding any such enhancements are likely to differ in significant ways across the lifecourse, then many if not most ‘enhancements’ in later life, we venture, will likely fall at the ‘restoration’ or ‘rejuvenation’
rather than the performance ‘upgrade’ end of the spectrum. Perhaps most importantly of all, to the extent that people in later life come to think in these terms at all in the context of their everyday lives, it may very well be through the language or discourse of ‘entitlements’, rather than ‘enhancements’ or even ‘improvements’ of some kind, that their hopes and fears for the future are articulated and conveyed. To the extent, furthermore, that fears or experiences of ageism, loneliness, isolation, stigmatisation and the like, also weigh heavily in the balance sheet of later life and the transition from the Third to the Fourth Age, then the perils of ‘cognitive decline’ let alone the promises of cognitive ‘enhancement’ may not be uppermost in older peoples’ minds compared to these other social dimensions and dynamics of ageing (Turner 2009, Vincent 2009).

At stake here, then, to summarise, is a series of complex relations between neuroscience, neuroculture and cultures of (active or anti-) ageing, which in turn involve complex relations, at multiple levels, between expectations, norms and values. These developments in neuroscience and neurotechnology both shape and are shaped by the dynamics of contemporary neuroculture and its intersections with cultures of ageing, and as such create a fascinating interplay between positive and negative images of ageing and associated expectations, and norms and values tied up with the Third and Fourth Ages. Such interplay also suggests reciprocal relays that, taken together, rework existing notions of normality and abnormality, health and illness, treatment and enhancement. In our case, memory research may stimulate new hopes and fears, predictions and expectations, images or ideals of what a new ‘normal’ is or should be, as well as the practices and consumption patterns that may follow it. Reciprocally, such hopes and fears, predictions and expectations may drive consumer culture in both anticipated and unanticipated ways, including the selectivity of certain kinds of enhancement technologies and the assumption of new kinds of identity. For example, authors who write about ‘neurochemical selves’ (Rose 2007), ‘neuronal selves’ (Pitts-Taylor 2010) or ‘cerebral subjects’ tied to ‘brainhood’ ideologies in contemporary neuroculture (Vidal 2009, Ortega and Vidal 2010), while their ideas may be under debate (Pickersgill 2009), critically attempt to identify the consequences of neuroculture and technologies on who we take ourselves to be and how we come to know and govern ourselves. Where all these matters become intimately bound to and condensed within the experience of ageing is where they become embodied and materialised in people’s everyday expectations of wellbeing and longevity, amidst their anxieties about negotiating the boundary between the Third and Fourth Ages.

**Conclusion**

This paper has argued that relations between neuroculture, active ageing and the older brain are complex, dynamic, multi-layered and multi-sited and constitute an emerging field or space of problems, prospects and possibilities which defies simple summary or premature conclusions. In our case, we have identified this neurocultural space with an expansion of both neuroscientific and psychogeriatric expertise and cultural problems and anxieties about the ‘ageing’ or ‘older brain’. As such, we wish to emphasise four particular points both as summaries of our argument and as questions to be further explored in future research.

First, neuroculture, we have argued, encompasses and expresses both ‘hopeful’ and ‘feared’ futures and as such mobilises people to think about themselves in terms of various risks, hopes and fears associated with cognitive health, mental capital and wellbeing. Where active ageing and neuro-cultures intersect, lies the expectation that later life is something that can and should be prepared for earlier in life, not just because of the negative effect on the
individual of not doing so, but because it is also now culturally appropriate to do so. This expectation, moreover, may become all the more important when contextualised and set against the shadow of dementia and the ‘black hole’ represented by the social imaginary of the Fourth Age and the emergence of other new clinical conditions and cultural problems such as mild cognitive impairment (MCI) which serve, we have argued, as an example of the intersection between neuro-active and anti-ageing cultures, and sit precariously between the Third and Fourth Ages.

Secondly, neuroculture carries with it a confusing array of new values and standards of enhancement. The growing industry of efforts to boost, improve or enhance cognition in various ways takes us beyond a concern with ‘therapy’ to the promise, prospect or temptation of mental optimisation that extend conventional definitions of health and illness, normal and abnormal, and function and dysfunction. If growing older becomes a subjective/somatic project guided by cultural and technological values around cognitive protection or prevention, prudence or providence, problem or pathology, treatment or enhancement, new gerontological ideals around ‘successful’, ‘active’ and ‘independent’ ageing and health may result. To this relationship we must add the role of living in a consumer society. As Bauman (2001) suggests, one of its key features is the promotion of bodily fitness as an aspect of lifestyle choice; however, as with many of the dimensions of neuroculture outlined above, the goal of fitness is ultimately unachievable even if consumer culture demands that it is an end to be continually sought. In this context, normal ageing, even at enhanced levels, becomes problematised. Not only does the demand for enhancement lead to new levels of disappointment, failure to engage with this process can lead individuals into potential incorporation within a restored field of old age dependency (Bauman 2005).

Bearing all this in mind, the extent to which expectations are important in situating the prospects and promises of enhancement further underlines the point that contemporary neuroculture, in its intersections with cultures of ageing, health and risk, embodies and expresses a variety of different standards and values of ‘enhancement’ which themselves merit further empirical investigation within and across the boundaries between the Third and Fourth Ages. The situating of this particular field of expectations constitutes one of the prime contributions of this paper. Furthermore, the grounding of recent debates on cognitive enhancement in the problems and prospects of active ageing is a corrective to some of the predominant ways in which these debates have been framed and understood to date.

Thirdly, whilst the prime focus in this paper has been on convergences or overlaps between a newly emerging neuroculture, and its intersection with cultures of ageing in the US and UK, further comparative research not simply on similarities but differences between these and other countries would clearly be valuable.

Last but not least, there are also important ethical and political questions here about the neurocultural field and its constellation of problems, prospects and possibilities. On the one hand, many of the foregoing issues signal the ways in which the ageing process involves a socio-political imperative that we govern ourselves and our bodies in healthful and responsible ways: a new ‘somatic ethics’ in effect, as Rose (2007) puts it, tied to new actual or potential biosocial or neurochemical forms of selfhood and identity. These benevolent and positive longevity-promoting practices also resonate with prized neo-liberal/neo-conservative individual values of hard work, enterprise, choice and self-improvement (Maasen and Sutter 2007). They also promise lucrative consumer markets in the present and near future, which reinforce these self-management practices and policies, including current and near-future neurotechnologies, courtesy of the newly emerging ‘neuro-industry’, designed to monitor and manage emotion, modify behaviour or enhance cognition (Neurosociety 2010). On the other hand, we should remain mindful, in a more reflexive vein or self-critical fashion, of our own
role *qua* social scientists – alongside that of other newly emerging or self-appointed branches of neuro-related expertise today, such as neuroethics – in the co-construction of the very neurocultural problems and prospects, hopes and fears, concerns and anxieties, we profess to study. Such vocabularies, as they continue to develop, articulate new worlds of meaning around the ‘neuro’ matrix and in doing so point to some of the conceptual work that lies ahead. Perhaps most importantly is the ethical imperative, incumbent upon us all *qua* researchers and fellow human beings, to avoid thinking in terms of ‘ageing brains’, plaques and tangles or ‘neurochemical’ deficits’ alone, when it comes to the mental worlds of older persons which remain *mindfully embodied*. Even so-called ‘neural plasticity’ is a life-long attribute that is conditioned within specific material contexts. Ageing brains might be different but not necessarily deficient or pathological, not least because, as Whitehouse so rightly states, ‘we owe it to those who have aging brains not to reduce their humanity to one organ’ (2008: 17).

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