Living well in the *Neuropolis*

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Abstract: This paper is about the relationship between cities and brains: it charts the back-and-forth between the hectic, stressful lives of urban citizens, and a psychological and neurobiological literature that claims to make such stress both visible and knowable. But beyond such genealogical labour, the paper also asks: what can a sociology concerned with the effects of 'biosocial' agencies take from a scientific literature on the urban brain? What might sociology even contribute to that literature, in its turn? To investigate these possibilities, the paper centres on the emergence and description of what it calls 'the *Neuropolis'* – a term it deploys to hold together both an intellectual and scientific figure *and* a real, physical enclosure. The *Neuropolis* is an image of the city embedded in neuropsychological concepts and histories, but it also describes an embodied set of (sometimes pathological) relations and effects that take places between cities and the people who live in them. At the heart of the paper is an argument that finding a way to thread these phenomena together might open up new paths for thinking about 'good' life in the contemporary city. Pushing at this claim, the paper argues that mapping the relations, histories, spaces, and people held together by this term is a vital task for the future of urban sociology.

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Introduction

In October 2012, Alison Abbott, one of *Nature's* regular editorial writers, published a News Feature in the journal, under the title 'Stress in the City: Urban Decay' (Abbott 2012). The article pointed out that while many of us intuit a connection between cities, stress and mental health, recent research has started to concretize this link: 'scientists are [now] tackling the question head on, using functional brain imaging and digital monitoring to see how people living in cities and rural areas differ in the way that their brains process stressful situations' (2012: 163). Abbott was referring particularly to work from the group of Andreas Meyer-Lindenberg, director of the Central Institute for Mental Health in Mannheim: a paper from this group, also published in *Nature*, showed how people who had been brought up in cities, or who lived in cities, had distinctive neurological responses to a stressful stimulus (Lederbogen *et al.*, 2011). The

genesis of this research was biographical: when studying in New York, Meyer-Lindenberg 'had been struck by the number of homeless mentally ill people on the streets' and began to wonder 'if city living was somehow making the brain more susceptible to mental-health conditions' (Abbott, 2012: 164).

This is not an unreasonable question. And yet those who work on the history of mental health in the metropolis might be forgiven some surprise. Because, of course, these issues have been extensively studied since the start of the twentieth century. Within that period, a loosely affiliated agglomeration of sociologists, scientists, psychiatrists and policy-makers, noting the preponderance of mental health problems in urban spaces, tried to understand *how it is*, exactly, that cities sometimes unravel people (Schroeder, 1942). Indeed, this was a foundational concern for sociology, becoming a defining focus of its first major North American school (Park and Burgess, 1967 [1925]). Relations between mental disorder and metropolitan living were also a regular concern of epidemiologists and social psychiatrists from the 1930s to the 1970s (Malzberg, 1930; Milgram, 1970). And for many, the key intermediary experience linking urban life with its mental consequences was – as it is for neuroscientists today – *stress*. So why now all this excitement about 'the brain'? What does neurobiology bring to our understanding of the good and bad consequences of city living? Why do we need a neuroscience of the urban, rather than a psychology, or a social psychology, to understand the impact that living in such environments actually *has* on the mental lives of urban citizens?

In this paper, we are trying to get some purchase on the intellectual landscape in which such questions are rooted – and this is the emergence of what is today (sometimes) called the 'biosocial'.[1] We will argue that there are reasons to be sceptical about a turn from the social and the mental to the neural, and especially about the mapping of specific forms of social and mental life onto their biological antecedents. But we will also suggest that a renewed focus on the 'urban brain' just might – perhaps in spite of itself – expand our understanding of the potential of these new 'biosocial' agencies. It might help us to think more carefully about both the scientific and political implications of their emergence, not least in terms of the possibilities and the responsibilities they present to the sociological sciences.

At the heart of the paper is an attempt to simultaneously track the emergence of two phenomena. The first is a broadly sketched intellectual space, developing over the last century or so, in which 'the city' has been narrated and theorized as a torrent of stress-inducing stimulation (visual, auditory, affective) – with the urban dweller, in her turn, understood as the fretful recipient of its hectic, and often pathological, energy. The second is a physical space of brick and brain, a historical relation, or set of relations, in which nonetheless real, present, *actual* urban subjects do, indeed, under certain conditions, exhibit measureable differences in brain function – differences which might well be traced to that subject's inhabitation of, or experience in, the tumultuous urban scene.

What would happen if we could hold these two figures together? What if we could thread a sociocultural attention to the scientific and intellectual emergence

of 'the stressful city' through a more organic interest in whether the inhabitants of that city are, nonetheless, living well? What if we began to think, empirically, about some of the ways in which a set of experiences, within a range of cities, made visible through a wide array of scientific practices, can marble the social and historical fixations through which those experiences have come to matter? (Barad, 2003). In what follows, we will use the term *Neuropolis* to help us think about these bio-political intersections: the *Neuropolis* is the city understood as a matrix of transactions between urban life and the always-developing, malleable brains of urban citizens. Its object is a real conurbation, and not an ideological fiction: it describes an organization of physical spaces and social lives, of interpersonal exchanges and chance encounters, of economic relations and commercial transactions – and all of these simultaneously lived and transacted through the embodied lives of *Neuropolitan* citizens.[2] But the *Neuropolis* is a historical and political space too: it encloses and emphasizes the continued salience of an urban existence that has been tracked by social historians and ethnographers, even as it refuses to separate this existence from the dynamic and mutable capacities of the urban brain. At the heart of this determinedly singular term is a proposal – maybe a hope – that the collaborations initiated by such a perspective could open up a new neurological politics of urban life.

Suturing the social to the biological in the *Neuropolis* has another purpose too. It is tempting to stress the novelty of new possibilities in the life sciences – in epigenetics, neuroplasticity, the microbiome – which disrupt long-standing epistemological and ontological divisions between the organism (bounded; unified) and the environment (exterior; distinct). We are sympathetic to the desire for intensifying these potentials. But we are less convinced by the temporalities that are sometimes mobilized on their behalf: if we, too, have been tempted to talk about a promise-filled, biosocial future displacing the doleful reductionism of the past – still, the more work that we do on the history of urban psychiatry, the more we are struck by the deep tangles of social and biological thought that have persisted *through* the century just passed. What we can today understand as urban neuroscience has long, complex, ambiguous relationships to psychiatry and psychology, to social epidemiology and human ecology, as well as to the social sciences more generally. We use the image of the *Neuropolis* – its inheritances as well as its novelties – to keep this temporality alive. We want to see if this image, and the intellectual and empirical trajectories that it holds together, can help us to think a new, democratic politics, for living well in the neurological city.

The neurotic city

Because, of course, there is nothing new in the idea that cities jar the nerves. In 1903, among a series of lectures delivered in Dresden to mark the first German Municipal Exhibition, Georg Simmel argued that understanding modernity meant understanding a profound acceleration of the individual's psychological and organic struggle vis-à-vis the social and historical forces that surrounded her (Frisby, 2002). It was the city, above all, that signified this shift:

modern metropolitan existence, Simmel argued, was distinguished by a sheer '*intensification of nervous stimulation* which results from the swift and uninterrupted change of outer and inner stimuli (1964 [1903]: 410; emphasis in original). The metropolitan citizen is endlessly caught up in a whirl of jarring stimuli – forcing 'the nerves so brutally hither and thither that their last reserves of strength are spent' (1964: 414). The crucial question for that citizen was how she was to adapt to 'the rapid crowding of changing images … and the unexpectedness of onrushing impressions' – as against 'the rhythm of life' in rural areas which 'flows more slowly, more habitually and more evenly' (1964: 410). To live well in a city of nerves, for Simmel, was to avoid being 'levelled down and worn out by a social-technological mechanism' – for 'man' (sic.) to 'develo[p] an organ protecting him against the threatening currents and discrepancies of his external life which would uproot him' (1964: 409–410). Of course, one might wonder what, exactly, Simmel meant by 'the nerves' – whether this was the 'nerves' of the nineteenth-century neurologists, the nerves of neurasthenia or nervous exhaustion, the nerves that were disturbed in hysteria, improved by so many elixirs, weakened by masturbation and vice, stiffened by discipline and exercise, and so on. Yet there is no doubt that, for Simmel, the space of action for urban experience was an organic one – it was the body that registered these sensations, and that formed the key line of defence against them.

In that same year, Ernest W. White, Professor of Psychological Medicine at King's College London, and Superintendent of the City of London Asylum at Stone, gave a Presidential address to the Medico Psychological Association (later the Royal College of Psychiatrists) in London. In his speech, White fixed on a rapid increase in the number of the insane in the years leading up to his sinecure – and especially of the *urban* insane. The Lunacy Commissioner's Blue Book, he told his audience, showed that the average annual increase of the insane in the county of London alone was then about 500 per year; that between 1859 and 1902, the rate of lunacy had almost doubled; and that, in spite of rapid improvement in the environments of the insane, as well as the application of rational principles of treatment, there had been 'no material advance in the recovery rate' of mental patients (E.W. White, 1903: 592–593). White had a number of explanations for this phenomenon (not least, needless to say, the weakening of the English 'race' via intermarriage with neurotic aliens). But it was the environment especially that caught White's attention: 'The population,' he pointed out, 'is urban rather than rural to-day …

> We are rapidly becoming town-dwellers. Overcrowding is common. The people breathe less pure air and have less outdoor exercise under the beneficent action of the sun's rays … the stress of life is far greater than formerly … late hours and overexcitement must leave their marks upon the race as well as upon the individual. (1903: 595)

The fact was, argued White, England was no longer a land of stout, neurosis-free, hamlet-dwelling yeomen. It had become overrun with 'needy town-dwellers of poor physique, with neurotic inheritance and frequently with constitutions undermined by disease' (1903: 593).

White's contribution reminds us that the relations between biological thought and urban life have often been grim. We are especially reminded of the nineteenth-century image of a degenerative urban underclass associated with the work of Bénédict Morel, which informed Emil Kraepelin's psychiatric nosology – and Kraepelin himself, of course, was trying to shift the relations between biological, psychiatric and social phenomena in this period (Roelcke, 1997). It was, moreover, the characteristically syphilitic and alcoholic nature of urban life that, for scholars in this period, warped the human 'germ': Kraepelin's student, Ernst Rüdin, who became specifically concerned with urban form, played an important role in the 1934 Nazi sterilization law (Roelcke, 1997). This is of course much too complex a history for us to do justice to (see Pick, 1989, for a comprehensive account). As Christopher Lawrence (2009) has shown, degeneration was a master concept of the Victorian and Edwardian world – cutting across the social and biological sciences in heterogeneous ways. Amid such indeterminacy, Lawrence argues, lines of causation are hard to deduce: 'such ideologies were contingent; there was no necessary move from the lab to the slum' (2009: 456). In what follows, we will not paper over this history. Nor will we suggest that what was at stake was 'really' a more benign account of urban neurosis. But we *are* trying to find new paths through this heterogeneous archive. If the degeneracy of the urban slum is one (often horrific) ending point for this story, one part of our question is about whether *other* narratives might yet be disentangled from this corpus.

At the beginning of the twentieth century then, and within the depths of the still-emerging modern metropolis (this is also the era of Charles Baudelaire's *Parisian Scenes*, of Walter Benjamin's *Arcades*, of Charlie Chaplin's *Modern Times*) a range of scholars, physicians and artists were beginning to notice not only a relationship between urbanicity and mentality; they were also starting to pick out some more specific, more pronounced, and more troublesome circuits of exchange. Why was it in the *city* particularly, as William White asked the National Geographic Society in 1903, that 'the weakling, the man whose mental faculties are not quite up to grade … goes to the wall?' (W. White, 1903: 278).

The psychological city

Such nervous tensions were felt in a great deal of scholarly work in the century that followed. In a related paper (Fitzgerald *et al.*, 2016) we describe how they were particularly important for what became known (in sociology) as the Chicago School, and the forms of ecological and urban sociology associated with it. Here, our focus is on imaginations of urban space – on what kind of thing the city is understood to be vis-à-vis the faculties, propensities and anxieties of the people who happen to live in it. One way that such concerns emerged was via images of the city as a *psychological* space. There is much to be said about the transition from the study of the neuroses to the discipline that we today call psychology – and about the historical weft in how we understand the objects that persist through these transitions. We cannot here do any justice to that story. But the seminal work of Louis Wirth is as good as any to mark the passage from an earlier

proto-sociological and proto-psychological literature into a full-blown psychology of the city. In *Urbanism as a Way of Life* (1938), Wirth insisted that a sociological account of the city must move beyond its physical form, to take note of the 'personality' that inhabits it. And this personality was not in a happy state: 'The necessary frequent movement of great numbers of individuals in a congested habitat gives occasion to friction and irritation', Wirth wrote: 'nervous tensions which derive from such personal frustrations are accentuated by the rapid tempo and the complicated technology under which life in dense areas must be lived' (1938: 16).

Wirth's paper was heavily criticized (Guterman, 1969), but his analysis provided one of the key reference points for Stanley Milgram's provocative paper of 1970, *The Experience of Living in Cities*. Milgram (like Simmel) was interested in the adaptive mechanisms necessary to protect the individual from the sensory overload of city life. But it was the *social* life of the city that started Milgram's analysis – and the question of how an urban personality, as well as a moral career, gets produced *by* that life (1970: 1462). Milgram especially tried to understand how cities reshape encounters with those categorized as friends and strangers – and how these categorizations influence whether or not a person intervenes in another's troubles, how they manage the conflicts between privacy, engagement and co-operation, and, in general, how they live within the tolerance generated by urban existence, the vicissitudes of vulnerability, the transformation of civility, and so on. Perhaps Milgram's most striking intervention was to refuse a demarcation of the city on the basis of demographic or geographic indices. Following the classic work of Kevin Lynch (1960), Milgram drew attention to how we apprehend the images and symbols with which urban experiences saturate our cognitive and visual faculties: 'Like the Sherpa', Lynch had written,

> we see only the sides of Everest and not the mountain. To extend and deepen our perception of the environment would be to continue a long biological and cultural development which has gone from the contact senses to the distant senses to symbolic communication. (1960: 12)

What distinguishes the cognitive map of the city, for Lynch as for Milgram, is that *we* make the environment: the biological and mental work of cognitive map-mapping is always in transaction with the physical (and political) labour of city-making. 'It is an ancient habit to adjust to our environment,' Lynch argued:

> Survival and dominance based themselves on this sensuous adaptability, yet now we may go on to a new phase of this interaction. On home grounds, we may begin to adapt the environment itself to the perceptual pattern and symbolic process of the human being. (1960: 95)

Milgram (1970) was very much alive to the socio-political potency of Lynch's proposal, drawing attention to how, for example, racialized housing policies might afford different teenagers, in a single city, very different cognitive maps of the same space.

This psychological and cognitive city made its presence felt in several literatures that developed through the 1970s, including an emergent environmental psychology (Craik, 1973), attentions to the crowded noise of cities (Altman, 1975), and anxiety about the forms of alienation engendered by those crowds (Seeman, 1975). For others who followed Milgram, *stress* was the key (Glass and Singer, 1972). Indeed, in a 1978 special issue of *Urban Ecology,* Amos Rapoport set out a new model of the stressful urban environment – insisting that a subjective perception of particular urban features and cues modulates the stress relationship: noise and density might well be stressors in a residential area, but they might equally be actively sought out in a theatre district (1978: 242). In the years that followed, the literature on urban stress developed rapidly – focusing on noise (Cohen and Lezak, 1977), crowds (Schopler and Stockdale, 1977), and information (Lipowski, 1971), among other topics. But perhaps the most distinctive contribution came from John B. Calhoun's experiments on the stressful effects of crowding in model *rat* cities (Calhoun, 1962, 1973). In his excellent history of Calhoun's experiments, Edmund Ramsden has shown how Calhoun's model environment – the 'rat utopia' – came to mimic a human city to the extent that it was made up of 'tower blocks, cafeterias, and congested stairwells', riven with 'social pressure' and 'social strife', populated by interweaving networks of 'social dropouts', 'bar-flies', 'autistics' and female 'amazons' (Ramsden, 2011: 661, 664, 668).

Of course, we can only skate thinly across a complex history. Nonetheless, we suggest that, by the 1980s, the idea that the physical and political contours of urban space shape the interior world of city dwellers was well established. A thick, multi-stranded literature showed, in many different ways, how the encounters experienced by those who live in urban environments (of many different sorts) actually *moulded* their interior worlds, leaving durable impressions upon their souls. And this process was well charted at multiple levels, from the ethnographic to the epidemiological. 'The city' had stopped being only a geographical, spatial, political, commercial and economic reality. It had become a psychological and a psychiatric phenomenon too.

The neurological city

In 2005, in Chiba prefecture in Japan, a team of researchers took 17 female participants out for a walk. First they went to a forested area. Then they walked around an urban station in Chiba City. At different points during the day, the researchers used a new brain-imaging technology, Near-Infrared Time-Resolved Spectroscopy, to measure absolute volumes of haemoglobin in brain tissue – thus comparing the effects of walking in the two different areas, vis-à-vis the participants' brain physiology (Tsunetsugu and Miyazaki, 2005). As it happened, significantly lower levels of haemoglobin were detected for the forest as opposed to the city areas after walking – showing, the authors argued, 'that in a forest environment, the activity in the prefrontal region was calmer than in a city environment' (2005: 469). Interestingly, what concerned these researchers (from

Japan's Forestry and Forest Products Research Institute) was not the neural effects of urban experience, but that of the *forest* (cf. Tsunetsugu *et al.*, 2007). A few years later, a group of researchers at Chonnam University in Gwangju, South Korea, used fMRI (functional Magnetic Resonance Imaging) to measure the brain activation of a series of participants, while they looked at images of variously rural ('forests, gardens, parks and hills') and urban ('high buildings, offices, electrical cables, garbage collections') scenes (T.-H. Kim *et al.*, 2010). In this case, while viewing rural scenery, the participants showed greater activity in areas of the basal ganglia, 'important for positive emotions'; by contrast, when looking at urban scenes, participants showed activity in brain areas associated with aversive imagery and with evaluating cues that might predict danger (2010: 2606). Thus, the authors argued, participants showed 'an inherent preference towards nature-friendly living' (2010: 2607). Their findings, they concluded in another paper published the same year,

> support the idea that the differential functional neuroanatomies for each scenic view are presumably related with subjects' emotional responses to the natural and urban environment, and thus the differential functional neuroanatomy can be utilized as a neural index for the evaluation of friendliness in ecological housing. (G.-W. Kim *et al.*, 2010: 507)

If the city jangles the nerves, then so might swards of green give the opposite effect. At least, this seems to have been the intuition behind an experiment conducted in Edinburgh a couple of years later (Aspinall *et al.*, 2013). First, these researchers mapped a short walk that would take twelve people (individually) through three distinct areas of Edinburgh: an urban shopping street with light traffic, a green space with lawns and trees, and a busy commercial district. Participants wore a portable Emotiv EPOC^{TM} 'wireless EEG' headset – which recorded electrical activity at 14 different locations on the skull, using a proprietary algorithm that translated EEG data into four 'emotional parameters', namely frustration, engagement, excitement and meditation. Following the walk, the researchers correlated the output from the devices with the participants' presence in the different zones: how did different experiences of the environment correlate with the algorithms representing people's emotional states? The most significant finding showed a marked difference in activity as people moved from busy streets to quiet green areas: 'the transition from Zone 1 to Zone 2 (urban shopping street to green space) … [shows] reductions in arousal, frustration and engagement (i.e. directed attention) and an increase in meditation' (2013: 5). The authors proposed that, in the future, studies like theirs might be 'particularly beneficial in exploring the health improving potential of environments while people are on the move' (2013: 5).

No doubt there are many remarks that may be made here. But what we want to focus on is the form of reasoning through which something like an 'urban brain' gets brought into being, as well as the set of spatial and topographic relationships within which that organ is suspended. At its heart, what this paper does is sketch out the 'urban brain' as a kind of linear and ambulatory organ – one shaped and

mediated by the directly affective relationship that it co-constructs with the environment in which it finds itself. If this kind of 'co-construction' is now something of a truism in brain research, the process seems to be especially potent in relation to cities, presenting the urban experience as a transition through shifting, changeable zones of jarring hubbub and restorative calm. But more importantly, these studies – and they are only a small selection – offer us a novel way of imagining and mapping the shape of our cities. They provoke us to see those cities as intertwined zones of arousal and meditation, even to map the city *in the brain,* as the urban citizen winds her way – here, noisily frustrated; there, calmly restored – through its different spaces.

But, of course, we hear the critical voice stirring: why the brain? What does what we here call the *Neuropolis* add to what we have known from those such as Simmel, and Wirth, and Calhoun, and Milgram, and indeed a much vaster sociological, psychological and social psychological literature on urban experience than we have been able to parse here? In the short space that remains, we will offer an account of why we take this neurological turn to be significant, as well as what we think is added by insisting on this vexed, equivocal portmanteau, the *Neuropolis.* We will make two moves: (1) following some now-classic arguments in the sociology of the biosciences, we will argue that there is an important form of political subjectivity at stake in the *Neuropolis*: more directly than even the very rich and nuanced social psychology of the 1970s, what we call the *Neuropolis* signifies an important space of intervention within the nexus of urban subjectivity, sociality and governance. (2) At the same time, this neurobiological research calls attention to the materiality – and presence – of the space in question. Confronted by that presence, and working in its shadow, we want to find some more creative modes for thinking with, through, along and around the *Neuropolis* – even to seek some affirmative possibilities within the assemblages that comprise it. Recalling the hopes that figures as diverse as Georg Simmel, Louis Wirth and Stanley Milgram sustained for improving city life – could a turn to the *Neuropolis* even tell us something about living *well* in the stressful city?

Shaping the nervous city

Let us return to the *Nature* commentary by Alison Abbot. In her article, Abbott suggests that nothing less than 'the future of the city' is at stake in the neuroscience of urbanicity (2012: 164). 'We know far too little about the city at the moment,' an architect and city-planner tells Abbot: 'We need these new technologies and approaches to help us make decisions about how the city should best be developed' (2012: 164). 'The question is an urgent one,' Abbott herself goes on ' ... as well as helping in the design of future cities, [Lederbogen's and his colleagues'] work might also pinpoint the most stressful parts of an existing metropolis – and help to make a case for urban regeneration' (2012: 164). A highly stylized and abstracted model of an 'urban habitat' accompanies the article, showing a small, triangular, green space, boxed in by grey buildings. A series of blacked-out human figures are dotted around, with

captions describing their affective states: one, marked as 'Relaxed', is depicted on a green square beside a tree; a huddle of figures in the middle distance are identified as 'Anxious', while two more forlorn figures, far off to the right of the image, are marked as 'Isolated' and 'Lonely', respectively. A caption hovering above the last of these informs us that 'feeling different to neighbours – owing to socioeconomic status or ethnicity – may be a factor. Immigrant populations have an increased risk of psychiatric disease' (see Abbott, 2012: 164).

The urban, here, is figured not as a space of cosmopolitan mingling, of civilized living, commercial vitality, cultural effervescence, and so on, but as a medicalized (or rather 'psychiatrized') space of potential pathogenesis, whose effects might yet be rendered visible, first in the forms of comportment that are peculiar to pathological urban subjects and, second, in the development and function of those subjects' wounded brains. And in the same moment as disorder is mapped onto urban spaces, intervention and management are called for. The *Neuropolis*, that is to say, is not merely a mode of representation; it is a call for action. Launching a programme by the International Council for Science in late 2014, Anthony Capon explained to journalists how cities were associated with growing problems in non-communicable disease and mental health: 'The essence of this [Urban Health and Wellbeing] programme,' Capon said, is about:

> scientists working with urban decision makers. It is about identifying problems together, and how we might better understand those problems and developing better ways of responding to rapid urban population growth. (quoted in Kinver, 2014)

Indeed, the psychiatrist Mazda Adli has argued that

> if major social stressors, such as certain aspects of population density and hazardous social gradients, are proven to be health-threatening, we should be able to moderate population exposure and have an impact on the urban population's … increased risk of mental health problems. (Adli, 2011)

Pointing out that brains and cities are equally – and independently – complex structures, and that very different kinds of stressors are likely to be present in low- and middle-income countries, Adli is careful not to be more prescriptive than this. Richard Coyne, a professor of architectural computing at Edinburgh College of Art, and a co-author of the paper that tracked mobile EEG measures in Edinburgh, drew some clearer conclusions from that paper on his blog. 'Our study,' wrote Coyne,

> has implications for promoting urban green space to enhance mood, important in encouraging people to walk more or engage in other forms of physical or reflective activity. More green plazas, parkland, trees, access to the countryside, and urban design and architecture that incorporates more of the atmosphere of outdoor open space are all good for our health and wellbeing. (Coyne, 2013)

If these prescriptions seem rather ordinary, the form of reasoning (ie from brain-imaging study of urban space to policy proposals on the urban land-scape) is rather less so. Others have used what we know about the relation-ship between demographics and psychiatric illness to generate predictive maps: *PsyMaptic*, an epidemiological prediction tool, supported by the Wellcome Trust and the NHS, uses socio-demographic and socio-environmental factors to pre-dict episodes of first-episode psychosis in specific districts. 'Until now,' the cre-ators point out, 'healthcare policy makers, commissioners and planners have not had access to accurate information regarding the level of new cases of psy-chotic disorder expected in different regions of England & Wales' (PsyMaptic, n.d.).

Of course, these interventions are very different from one another, and are not part of any single project for 'governing the *Neuropolis'*. Yet it is clear that what we call the *Neuropolis* is not a mere intellectual construction; it is also an inter-ventionist imagination of the future city – of its shape and its demographics, its services and its parklands, its problems and its priorities – based on a commit-ment to managing the relationship between the city, the person and the brain. In itself, this marks an important transition point: if, a century ago, intellectu-als argued that cures for the ills inherent in urban existence required a focus on pathological urban immigrants, the prescription today is much more likely to be about the presence of green spaces, and the density of particular areas, rates of poverty and welfare dependency, the preponderance of loneliness, and so on.[3] Research on the urban brain, that is to say, does not simply attempt to know and manage the incidence of mental disorder in the city; it is also part of a broad, heterogeneous trend of thought that is bringing cities into existence as neural phenomena, and not only spatial ones. The *Neuropolis* contains within it the as-piration to create a *good* city, understood here as a city that fosters healthy neu-rological functioning in its citizens, and thereby a space that fosters individual and collective flourishing. The neurobiological life of the urban citizen has be-come a problem to be resolved, and an opportunity to be optimized, through city policy.

And yet the rise of the *Neuropolis* is not only of interest because of this revised image of the biological citizen that it embodies. It is also interesting because, precisely through this move that links the neurobiological to the spatial and the governmental – that renders the spatial neurobiological in terms of a precon-scious cognitive map structuring an experience that might yet be modified – it offers the possibility of a relation with the social sciences that goes beyond ge-nealogy or critique. In the final section of this paper, we offer a more generous and imaginative reading from sociology of this neurobiological turn. This is not because we think a biopolitical reading is inaccurate (it is not), but rather because we think, to paraphrase Didier Fassin (2009) that another biopolitics is possible – that there is perhaps yet an *affirmative* sociology to be recovered from these recent interventions, especially as they ask us to think, even if only in one very specific way, about how exactly we want to conceptualize, measure and shape a good urban life.

The biopolitics of urban utopia

In an essay on how we are to think 'the good city', Ash Amin asks us to 'look at the contradictions and possibilities of our times as the material of a politics of well-being and emancipation that is neither totalising nor teleological' (2006: 1010). Noting the accelerating processes of urbanization in many countries, Amin wonders if we cannot think the contemporary city as 'the *topos* of … [a] more pragmatic interpretation of the good life' (2006: 1011). If cities are still too often 'polluted, unhealthy, tiring, overwhelming, confusing [and] alienating', still the '"being-togetherness" of life in urban space has to be recognised, demanding attendance to the politics of living together' (2006: 1011–1012). For Amin, a pragmatic politics of urban utopia calls attention to mundane realignments already underway in many cities; he focuses on the possibilities that lie within the commons of the city and its civic sociality, including the 'technological unconscious' of its infrastructure, to help us imagine – both for the global 'north' and 'south' – much richer assemblages of participation, solidarity, enchantment and dissent.

We are with Amin in his attempt to imagine a pragmatic utopia through and with the contemporary city. But we also want to explore how this might enable us to think a *neurological* politics of urban space. What would it mean to begin thinking a *bio*politics of 'being-together' in urban space? This requires us to recognize that the idea of 'biopolitics' not only points us to a variety of arts for governing populations, but also embodies a normativity about the politics of health. A positive biopolitics of urban space requires us to think normatively about the ways in which the city composes relations among developing brains, sick bodies, internal maps, stressed citizens and toxic spaces. Of course, we know where the sometimes-biological project of liberal democracy has often ended (Rose, 2001: 5). But if we are tentative about pursuing such a biopolitics, and about working through the normative language in which it is couched, still we are in search of a sociology that – as Robyn Wiegman and Elizabeth Wilson recently proposed in another context – 'seeks to encounter normativity on something other than oppositional terms' (2015: 2). Can thinking through the *Neuropolis*, then, begin to winch us across these anxieties, and help us to think about what it means to 'live well' in 'the good city'? Can it direct us towards experimental interventions that actually illuminate the ways that the city presses on, and is impressed by, the cerebral lives of urban citizens?

What is at stake for us, in this *Neuropolitan* vision, is something close to what Tim Choy (2012), in his ethnography of environmental concern in Hong Kong, calls an 'ecological politics.' For Choy, such a politics does not simply describe the struggle between different interests over the terms of environmental debate. Instead, it is a way of thinking and acting that is more thickly embedded in 'questions and comparisons, acts that recast the relations – of nature, culture, politics and more – through which a given animal, plant, health problem, landscape, or question comes to matter epistemically and politically' (2012: 11). Choy uses this concept to pose hard questions about how we might understand – and intervene in – 'ecology' as sociologists. In particular, and against a view of

the environment as the product of particular formations of politics and society, he asks: 'what might we see if we tried not only to read the terms and logics of ecology through sociology, but also to read sociology through ecology?' (2012: 63). Taking this question into, for example, an analysis of urban air, Choy argues that attending to the relationship between social theory and air

> turns Hong Kong into something like a natural object, something nearly elemental. The city's mercantile and military origins become almost atmospheric, a storm depicted by layers of clouds and a sky filled with flashes and roars. (2012: 140)

Paying theoretical attention to the quality – and to the health consequences – of urban air, for Choy, confronts us with 'the moment when wind opens the body to ailments' (2012: 157). Urban bodies, in sickness and in health, are not only interpellated by a sociopolitics of space; they also become

> an intimate location of effects and agencies … air is the substance that bathes and ties the scales of body, region, and globe together…. that subsequently enables personal and political claims to be scaled up, to global environmental politics, and down, to the politics of health. (2012: 157)

Just as Ash Amin helps us to attend to the complex, lived pragmatics of contemporary urban utopias, so does Tim Choy insist that thinking good life in the city *also* requires us to understand how bodies are permeated through atmospheres and environments. He shows us how the ecology of the city is not simply a product of its society or its politics, but is a much more entangled terrain, one in which very different sorts of claims to health, well-being, and justice can come to matter. Such an ecological politics of bodies-through-environments can help us to recast our attention to the ecological effects of brains-in-cities; it can help us, as sociologists, to attend in new ways to the politics of urban mental health; and it invites us to challenge not only the disembodied abstractions of much contemporary neurobiology, but also the decorporealized subjects of much contemporary sociology. It might even help us to see and map these relations, and potentially to intervene on them. This is the promise that we are trying to enclose within the term, *Neuropolis*.

   We are tempted here to invert well-known accounts of 'biological citizenship' and 'biocitizenship' (Rose and Novas, 2007; Petryna, 2002). To again paraphrase Didier Fassin, we might try to turn these accounts – from analyses of the rules of the game to instructions on how best to intervene in the game itself (2009: 52). These analyses remind us that to demand recognition as a citizen – to make the claims entailed *by* that recognition – has long required some account of the relations between a body and its environment. The point is that an ecological politics of the *Neuropolis* would not merely draw our attention to an under-explored historical territory, where the traces of social life have always been visible in their impressions on the nervous system. It would also attempt to render the intuition that urban living marks us in body and soul more concretely – using it to parse questions of anxiety, fragility and stress as they become legible in the urban brain. Crucially, it would invite affiliation with an experimental and clinical literature

that is currently trying to think through the biologically lived, developmentally potent stress of urban life. If urban citizenship can indeed be instantiated neurobiologically, then neuroscientific measures might help us to clarify what we might hope for in 'living well' in the contemporary city – not through a focus on disembodied and abstracted brains, but by reconceptualizing the politics of the city in terms of strategies for intervening in spaces both inside and outside the skull. In addition to long-standing demands for justice at the socio-economic margins of our cities, what would happen if we were called to new forms of attention, accountability and action, through specifically *Neuropolitan* claims to urban mutuality and solidarity?

Conclusion: for *Neuropolitanism*

In this paper we have tried to avoid the twin lures of monotonous critique and excitable enthusiasm. Instead, we have tried to pick our way across some of the conceptual, scientific and political complexity in which the 'urban brain' is taking shape. This neurobiological work is still at a relatively early stage, and it does not easily lend itself to any kind of firm diagnosis. Still we are trying, to borrow a term from Donna Haraway (2010), to 'stay with the trouble' of the urban brain. Our aim is to attend to the complexity and the ambiguity; to refuse the invitation to be either excited or appalled; to sidestep the inviting, but totally misleading, division of history – namely: on the one hand, a reductive bio-determinist past and, on the other, an open bio-curious future. We want to point to some important and suggestive continuities, as well as to the potentially progressive political possibilities, that might yet lie within a contemporary neuropolitics of urban experience.

We find much to agree with in Maurizio Meloni's diagnosis of recent epistemological shifts in the biosciences – in evolutionary theory, molecular epigenetics, neuroplasticity and elsewhere, as well as his suggestion that these should mark the beginning of 'a sociological-cum-biological research program' (2014: 743; cf. Rose, 2013). But we suggest that the history of relations between biological and social explanations is more complex – and more hopeful – than he allows. We do not, in fact, need to place our hopes in some epistemological revolution, or in the biosocial future it will usher in. Contemporary hopes and enthusiasms should not be allowed to ignore more positive (albeit often fugitive) transactions in the long history of biosocial exchange. We want to avoid consigning figures as diverse as Louis Wirth, John Calhoun and Stanley Milgram to a forgotten past, just as we are reluctant to embrace molecular epigenetics or neuroplasticity as – at last! – the royal road to a brighter future. The past is more complicated, the present more ambiguous, and the future more uncertain, than any of this allows. We are profoundly concerned with the contemporary, with the neuropathologies of the stressed city worker in her harassed passage, the isolated ageing city dweller in her high-rise apartment – and so many other figures on the contemporary urban scene. But we also want to keep our eyes on the domineering rat amazons of Washington DC in the 1970s; on the neurosyphilis patients

lurking around the vice resorts of Chicago in the 1930s; on Georg Simmel's blasé cosmopolitans, on Edmund White's needy town-dwellers – and, even beyond these, to a whole panoply of neuropsychiatric and epidemiological work on the psychogenic effects of city life, extending well back into the nineteenth century, and to a much wider, non-Euro-American territory than we have been able to elucidate here. The *Neuropolis* is old, and winding. It's easy to get lost there. To think about good life in such a space means not only grappling with history, but also coming to terms with a complex simultaneity of past and present – of the ideas, people and inclinations, that persist, in the shadows, across them.

Acknowledgements

Notes

1 Indeed this term is in the title of the monograph to which this is intended as a contribution.
2 For examples, two authors of this paper (Rose, Fitzgerald), are part of a large, interdisciplinary and international team, working to mix survey measures and ethnographic data, in order to explore the role of urban stress in mental health, as it relates to migrant experience in contemporary Shanghai. See http://www.esrc.ac.uk/news-events-and-publications/news/news-items/exploring-urban-china-esrc-nsfc-research-collaborations/
3 'Immigration,' notably, has persisted as a point of intervention, but the focus has shifted away from pathological heredity of these newcomers, and more to the ways in which immigration indexes broader social problems.

References

Abbott, A., (2012), 'Stress and the city: urban decay', *Nature*, 490 (7419): 162–164.
Adli, M., (2011), 'Urban stress and mental health', *LSE Cities*, available at: http://lsecities.net/media/objects/articles/urban-stress-and-mental-health/en-gb/ (accessed 8 January 2015).

Altman, I., (1975), *The Environment and Social Behavior: Privacy, Personal Space, Territory, and Crowding*, Monterey CA: Brooks/Cole.

Amin, A., (2006), 'The good city', *Urban Studies*, 43 (5–6): 1009–1023.

Aspinall, P., Mavros, P., Coyne, R. and Roe, J., (2013), 'The urban brain: analysing outdoor physical activity with mobile EEG', *British Journal of Sports Medicine*, 49 (4): 272–276.

Barad, K., (2003), 'Posthumanist performativity: toward an understanding of how matter comes to matter', *Signs: Journal of Women in Culture and Society*, 28 (3): 801–831.

Calhoun, J. B., (1962), 'Population density and social pathology', *Scientific American*, 206 (2): 139–150.

Calhoun, J. B., (1973), 'From mice to men', *Transactions & Studies of the College of Physicians of Philadelphia*, 41 (2): 92–118.

Choy, T., (2012), *Ecologies of Comparison: An Ethnography of Endangerment in Hong Kong*, Durham, NC: Duke University Press.

Cohen, S. and Lezak, A., (1977), 'Noise and inattentiveness to social cues', *Environment and Behavior*, 9 (4): 559–572.

Coyne, R., (2013), 'The brain in the city: reflections on digital media & culture', available at: http://richardcoyne.com/2013/03/09/the-brain-in-the-city/ (accessed 6 April 2015).

Craik, K. H., (1973), 'Environmental psychology', *Annual Review of Psychology*, 24 (1): 403–422.

Fassin, D., (2009), 'Another politics of life is possible', *Theory, Culture & Society*, 26 (5): 44–60.

Fitzgerald, D., Rose, N., and Singh, I., (2016), 'Revitalizing sociology: urban life and mental illness between history and the present', *British Journal of Sociology*, 67 (1): 138–160.

Frisby, D., (2002), *Georg Simmel*, London: Psychology Press.

Glass, D. C. and Singer, J. E., (1972), *Urban Stress: Experiments on Noise and Social Stressors*, Waltham, MA: Academic Press.

Guterman, S. S., (1969), 'In defense of Wirth's "Urbanism as a Way of Life"', *American Journal of Sociology*, 74 (5): 492–499.

Haraway, D., (2010), 'Staying with the trouble: xenoecologies of home for companions in the contested zones', *Fieldsights – From the Editorial Office, Cultural Anthropology Online*, available at: http://www.culanth.org/fieldsights/289-staying-with-the-trouble-xenoecologies-of-home-for-companions-in-the-contested-zones (accessed 6 April 2015).

Kim, G-W., Jeong, G.-W., Kim, T.-H., Baek, H.-S., Oh, S.-K., Kang, H.-K., Lee, S.-G., Kim, Y. S. and Song, J.-K., (2010), 'Functional neuroanatomy associated with natural and urban scenic views in the human brain: 3.0T functional MR imaging', *Korean Journal of Radiology*, 11 (5): 507–513.

Kim, T.-H., Jeong, G.-W., Baek, H.-S., Kim, G-.W., Sundaram, T., Kang, H.-K., Lee, S.-G., Kim, H.-J. and Song, J.-K., (2010), 'Human brain activation in response to visual stimulation with rural and urban scenery pictures: a functional magnetic resonance imaging study', *Science of the Total Environment*, 408 (12): 2600–2607.

Kinver, M., (2014), 'Global science programme to focus on urban wellbeing', *BBC News*, 9 December, available at: http://www.bbc.co.uk/news/science-environment-30381476 (accessed 6 April 2015).

Lawrence, C., (2009), 'Degeneration under the microscope at the fin se siècle', *Annals of Science*, 66 (4): 455–471.

Lederbogen, F., Kirsch, P., Haddad, L., Streit, F., Tost, H., Schuch, P., Wüst, S., Pruessner, J. C., Rietschel, M., Deuschle, M. and Meyer-Lindenberg, A., (2011), 'City living and urban upbringing affect neural social stress processing in humans', *Nature*, 474 (7352): 498–501.

Lipowski, Z. J., (1971), 'Surfeit of attractive information inputs: a hallmark of our environment', *Behavioral Science*, 16 (5): 467–471.

Lynch, K., (1960), *The Image of the City*, Cambridge, MA: Technology Press.

Malzberg, B., (1930), 'Mental disease and "the melting pot"', *Journal of Nervous and Mental Disease*, 72 (4): 379–395.

Meloni, M., (2014), 'Biology without biologism: social theory in a postgenomic age', *Sociology*, 48 (4): 731–746.

Milgram, S., (1970), 'The experience of living in cities', *Science*, 167 (3924): 1461–1468.

Park, R. E. and Burgess, E. W., (1967 [1925]), *The City*, Chicago: University of Chicago Press.

Petryna, A., (2002), *Life Exposed: Biological Citizens after Chernobyl*, Princeton, NJ: Princeton University Press.

Pick, D., (1993), *Faces of Degeneration: A European Disorder, c. 1848–1918*, Cambridge: Cambridge University Press.

PsyMaptic, (n.d.), 'Overview [of PsyMaptic]', available at: http://www.psymaptic.org/about/ (accessed 6 April 2015).

Ramsden, E., (2011), 'From rodent utopia to urban hell: population, pathology, and the crowded rats of NIMH', *Isis*, 102 (4): 659–688.

Rapoport, A., (1978), 'Culture and the subjective effects of stress', *Urban Ecology*, 3 (3): 241–261.

Roelcke, V., (1997), 'Biologizing social facts: an early 20th century debate on Kraepelin's concepts of culture, neurasthenia, and degeneration', *Culture, Medicine and Psychiatry*, 21 (4): 383–403.

Rose, N., (2001), 'The politics of life itself', *Theory, Culture & Society*, 18(6): 1–30.

Rose, N., (2013), 'The human sciences in a biological age', *Theory, Culture & Society*, 30 (1): 3–34.

Rose, N. and Novas, C., (2007), 'Biological citizenship', in A. Ong and S. J. Collier (eds), *Global Assemblages*, 439–463, London: Blackwell.

Schopler, J. and Stockdale, J. E., (1977), 'An interference analysis of crowding', *Environmental Psychology and Nonverbal Behavior*, 1 (2): 81–88.

Schroeder, C. W., (1942), 'Mental disorders in cities', *American Journal of Sociology*, 48 (91): 40–47.

Seeman, M., (1975), 'Alienation studies', *Annual Review of Sociology*, 1: 91–123.

Simmel, G., (1964 [1903]), 'The metropolis and mental life', in G. Simmel, *The Sociology of Georg Simmel*, 409–426, New York: Free Press.

Tsunetsugu, Y. and Miyazaki, Y., (2005), 'Measurement of absolute hemoglobin concentrations of prefrontal region by near-infrared time-resolved spectroscopy: examples of experiments and prospects', *Journal of Physiological Anthropology and Applied Human Science*, 24 (4): 469–472.

Tsunetsugu, Y., Park, B. J., Ishii, H., Hirano, H., Kagawa, T. and Miyazaki, Y., (2007), 'Physiological effects of Shinrin-yoku (taking in the atmosphere of the forest) in an old-growth broadleaf forest in Yamagata Prefecture, Japan', *Journal of Physiological Anthropology*, 26 (2): 135–142.

White, E. W., (1903), 'The Presidential Address, delivered at the Sixty-second Annual Meeting of the Medico-Psychological Association, held in London on July 16th, 1903', *The Journal of Mental Science*, 9: 587–605.

White, W. A., (1903), 'The geographical distribution of insanity in the United States', *Journal of Nervous*, 30 (5): 257–279.

Wiegman, R. and Wilson, E. A., (2015), 'Introduction: Antinormativity's queer conventions', *differences*, 26 (1): 1–25.

Wirth, L., (1938), 'Urbanism as a way of life', *American Journal of Sociology*, 44 (1): 1–24.