

Truly embodied sociology: marrying the social and the biological?

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Abstract

This paper explores the relation between sociology and biology through an examination of issues relating to the sociology of the body, emotion and health. Arguments for a 'biological', and yet social, body are considered before developing a critique of work on the sociology of the biological body. It is argued that there are a number of difficulties with this latter project. Writers working in this area can be seen to have used rather emotional ploys to advance their promotion of a more 'biologised', or 'material-corporeal', account of the body, emotion and health. In addition though these writers eschew reductionist, naturalist, and dualist arguments, they nevertheless draw on studies that have some or all of these characteristics. Finally a variety of epistemological and methodological difficulties inherent in physiological analysis and in 'interviewing' the body are explored. It is concluded that we still remain near the 'starting point' of a sociology of the body that inter-relates biology and sociology.

Introduction

In this paper I wish to examine work on the sociology of the body, particularly where it addresses the 'biological body'. Such work is directly relevant to Ted Benton's proposal for a 're-alignment of the human social sciences with the life-sciences' (Benton, 1991: 25) and Michael Bury's call 'to rethink the relationship between sociology and the biological sciences' (1997: 199). Though sympathetic to such proposals, I seek to highlight the difficulties of their enactment through an assessment of work on the 'material-corporeal' body.

In what follows, I will briefly review arguments supportive of the material-corporeality of the body before examining difficulties in relating sociology to biology through reference to those who have attempted this journey. The paper will particularly focus on work relating the social to psychophysiological and health issues. It will be argued that although adventurers in this area have a 'noble purpose', they have tended to underestimate the differences in perspective between sociological and psychobiological analysis. Such differ-

ences can also be observed amongst those broadly concerned to embed human beings within their natural environment, such as Peter Dickens' (2000) work on social Darwinism. In order to move beyond current limitations, the paper will explore the difficulties inherent in 'interviewing' the 'biological body'.

Beyond the ethereal and the elusive: towards the material corporeal

A number of writers have criticised the tendency in work on the sociology of the body to see the body as infinitely plastic, whereby it largely appears as a "made up body" linked to a "made up self" (Bury, 1995: 44). Though such writers may acknowledge that the body is socially constructed and is *partly* made and re-made through discourse, they also argue that there are limits to this process. Thus Shilling notes that 'the body may be surrounded and perceived through discourse, but is *irreducible* to discourse' (1993: 81). For these writers, the problem with work on the sociology of the body is that a social constructionist emphasis has rendered a biological and corporeal sense of the body 'theoretically elusive' (Kelly and Field, 1994: 34) with the consequence that it has 'a rather "ethereal" existence' (Williams, 1996: 41). Williams further argues that medical sociologists have perpetuated the rift between the social and the life sciences through their 'tendency to relegate the body to biology' (1996: 41; cf., Bury, 1997: 199). Instead Williams argues that 'sociology should be fundamentally embodied' (Williams, 1996: 42). This desire to 'truly embody' sociology will be referred to as the project of a nascent *material-corporeal sociology*.¹

This project is of relevance to wider ontological and epistemological debate if only because, for some, 'nature' is seen to occupy a pivotal position in adjudicating between realist and constructionist argument (eg, Bury, 1986; Murphy, 1994; Soper, 1995; Dickens, 1996), as well as a means to underwrite human rights (Turner and Rojek, 2001: 120; cf., Barbalet, 1998: 128–42; Hacking, 1999).² I have addressed related issues in some detail elsewhere (see Newton, 2003). For the present, I wish to focus on the project of material-corporeal sociology and explore its specific aims and assumptions.

There are a range of arguments that support this project, such as those that (1) simply point to the embodiment of social life, (2) highlight 'body scripts', and (3) emphasise the social nature of body scripts. Shilling (1993) provides an example of the first in drawing on Elias's (1991) illustrations of the embodiment of human communication, witnessed in the latter's attention to the anatomy of the human smile. Except in a long-term evolutionary sense, the smile remains an *extra-discursive* aspect of our biological body yet *central* to social discourse.³ The hundreds of human facial muscles provide a complexity and subtlety that is unique to human interaction. As Stephen Mennell notes, in comparison to humans 'even the apes have relatively rigid, immobile

faces' (1989: 205). Such facial muscle complexity is largely pre-discursive yet continuously informs our social interaction.

Other illustrations of the 'independent' biological body point to what one might call 'body scripts', or 'texts' of the body, such as those surrounding birth, maturation and death. On the one hand, social construction is clearly highly significant to these life events through the way in which we interpret them. Yet on the other hand they are extra-discursive to the extent that we can't talk our way out of them.⁴ As Soper notes, 'if the body is viewed as entirely the historical effect of cultural powers, then no plausible explanation can be given of why it is that all human bodies are subject to processes of growth, reproduction, illness and mortality' (1995: 133). In sum, physical maturation represents a 'script' of our 'biological' bodies which cannot just be re-written by discourse (cf., Turner and Rojek, 2001). Yet at the same time it is *deeply social* since maturation defines life course 'stages' which still remain highly significant in differentiating childhood, adolescence, employed adulthood, retired adulthood etc. (even if the timing of these divisions has become more 'blurred').

One further illustration of the social significance of the biological body comes from considering the complexities of the way in which body scripts interact with the social world. For instance, a remarkable gender balance is maintained between the sexes in human reproduction wherein close to equal numbers of female and male children are born: other things being equal, slightly more boys than girls are born (an androcentrically defined 'sex ratio' of 105, or five per cent more boys than girls; Heer, 1975; Goodkind, 1999). All those 'private' fertilisations of ova by sperm somehow add up to some incredibly balanced 'public' global arithmetic, *even though* this collective social accounting is dependent on the interaction between 'open' heterosexual mating and the 'open' material-corporeal (the seemingly 'chance' conception of an ova by an XX or XY chromosome). In sum, biological bodies have 'conversations' that are not only independent of the wishes and discourse of individuals, but also produce remarkable collective social arithmetic at a global level. If one were just reliant on human discourse, only a dictatorial control of the sex of unborn children could produce such *balanced* arithmetic, and yet it happens 'naturally' through a kind of collective but extra-discursive body. At the same time it is once again a thoroughly social process since it determines the gender balance of society.⁵

Together the above examples reinforce the argument that sociologists should attend to the material-corporeality of the body since they suggest that corporeality can be *simultaneously extra-discursive and deeply implicated in the social fabric*. They also suggest that sociologists should make more strenuous efforts to cross the 'Great Divide' between society and nature since they imply that to ignore the biology of the body is to circumscribe our understanding of the social.

Crossing the great divide

As argued above, the interaction between the body and the social begs the question of why sociology should adopt a closure that largely ignores the corporeality of bodies. This line of argument has informed Benton's (1991, 1992) call to close the gap between the life and social sciences, as well as the work of sociologists of the body and emotion such as Shilling, Freund and Williams. Yet though I have sympathy with their concerns, I also feel that there are particular difficulties in exploring the material-corporeality of the body. It is one thing to note that the biological and life sciences are contested terrains, and that within this 'family' of knowledge there are 'branches' which allow for the possibility of 'an extension . . . to include psychological and social processes and mechanisms' (Benton, 1991: 20). Yet it is another thing to actually make this 'extension' and develop approaches that enable a successful 'cross-over' to be achieved. As Shilling noted in 1993, 'as yet, there are no *fully developed perspectives* on the body which seek to combine the biological and social sciences in the manner suggested by Benton' (Shilling, 1993: 106, added emphasis). In what follows, I shall try to show why it has since been difficult to formulate such a 'fully developed perspective'. I will focus on the relation between our experience of the social world and our physiological 'processing' of that experience. In terms of the relation between the biological and the social sciences, this area represents a particularly interesting subject since, in looking at the interrelation between the social and physiological biology, we are truly crossing the 'Great Divide' and exploring a material-corporeal body. In order to introduce this area, I shall firstly consider a writer who has been particularly influential within it, namely Peter Freund.

For Shilling, Freund's work can be seen as providing one means of developing 'a bridge between naturalistic and social constructionist views of the body' (Shilling, 1993: 106). Equally, for Williams and Bendelow, Freund points the way toward a "'socialised" . . . biology rather than a reductionist sociobiology' (Williams and Bendelow, 1998: 144). Freund himself argues that 'sociology . . . cannot afford to regard human physiology as irrelevant or duck its relevance by artificially "bracketing" such issues' (1988: 856). He develops his case by conjoining a traditional sociological concern with power relations to a concern with emotion *and* the physiology of emotion. Freund (1990) argues that our experience of emotion is linked to class, gender, age and ethnicity, because the latter affect our social status and our ability to invoke tacit 'status shields' (Hochschild, 1983). Freund, like Hochschild, emphasises the psychological cost of emotional labour in terms of its 'stress' on the individual.⁶ But unlike Hochschild, Freund explores the interrelations between power, emotional stress, and our physiology, in order to produce a 'sociopsychosomatic' politics of health (Freund, 1990: 471). He suggests that the experience of emotional labour has psychophysiological accompaniments which, if protracted, are likely to lead to 'adverse somatic changes' (1990: 466) and ill health.

Though Freund's work represents a very interesting departure, it is nevertheless illustrative of a limitation that is common to the work of Benton, Shilling, Freund and Williams. All these writers appear aware of the danger of the simple appropriation of positivist psychological and biological research in exploring emotion and health (eg, Shilling, 1993; Williams, 2001). Yet paradoxically they *all* also invoke arguments which are partly reliant on questionable psychobiological discourse. There are a number of consequences that follow from this reliance. They will be explored below through focusing upon the relationship between emotions, 'stress' and ill health. I will argue that there has been, (1) insufficient questioning of supposed links between the social and the body, such as that between emotions and 'stress' and ill health, (2) too easy an acceptance of arguments that derive from research grounded in naturalistic and desocialised contexts, and (3) insufficient interrogation of existing psychosocial concepts, such as that of 'stress'. Not all of the above writers exhibit all of these tendencies to the same degree, but nevertheless there is a good deal of commonality in their overall approach.

Emotions, stress and (ill) health

Most of those arguing for a material-corporeal sociology tend to accept the tenet that there is a link between emotions, stress and ill health. For instance, Williams argues that 'the emotionally expressive body translates broader psychosocial and material conditions of existence, including conflict situations, into the recalcitrant language of *disease and disorder*' (1998: 131, added emphasis). Benton also notes the significance of "'stress" in the aetiology of many chronic and life-threatening physical illnesses' (1991: 5), while Shilling (1993: 115–24) draws on a range of work (though especially that of Freund) in examining the supposed relationship between stress, emotion and ill health.

Freund, Benton, Williams and Shilling all also point to the links between *power relations*, emotion and health, thereby furthering Freund's call for a 'sociopsychosomatic' politics of health (see above). For instance, Benton emphasises the interaction of 'stress, anxiety and isolation' and power relations such as 'pertinent aspects of the class system' (1991: 6). Similarly Williams, and Williams and Bendelow, argue that emotions have a 'central role in linking the health and illness of the . . . agent with wider structures of power and domination, civilisation and control in society' (Williams, 1998: 131; Williams and Bendelow, 1998: 144). Finally, Shilling (1993) draws on Freund and Hochschild in support of such a relationship. In posing such an interrelation between power relations, emotion and health, the argument of Freund, Williams and Shilling might be seen as having some resonance with those who advance the centrality of social structure to our emotional experience, such as Barbalet (1998). Yet unlike Barbalet, they argue for a fundamentally *embodied* understanding of the relationship between power, emotion and

health. In addition they refrain from any mechanistic relation between power relations and health since such a relation is likely to be situated within the 'embodied history' (Bourdieu, 1990: 56) which people learn within a particular habitus (Elias, 1991, 2000). In other words, neither Benton, Freund, Williams or Shilling suggest that emotion or health can be mechanistically 'read off' from presumptions about social structure. That said, they all assume that it is those 'lower down the hierarchy' who are likely to suffer more anguishing emotions and therefore corresponding ill health.

In reviewing this 'sociopsychosomatics' of Freund, Benton, Williams and Shilling, a key question is whether psychosocial issues do seriously influence our health, since this assumption is central to their argument. To explore this issue, it is worth dwelling on the field of psychological stress since it represents the field of inquiry in which the vast majority of work linking the psychosocial and the biological body has been undertaken. Within this discourse, the assumption of a stress \leftrightarrow health link has been a continuing feature since the inception of stress studies. Early work on stress was strongly naturalistic in orientation, as illustrated in the work of Walter Cannon and Hans Selye (Pollock, 1988; Newton, 1995b; Viner, 1999). Subsequent work promoting the health link was particularly associated with psychophysiological work drawing on Selye, most notably the Swedish analyses of Lenart Levi and Marianne Frankenhaeuser. These researchers studied the relationship between psychological stress, catecholamine output (eg, adrenalin, noradrenalin) and illness indicators (Newton, 1995b). Levi and Frankenhaeuser had difficulty in establishing this relationship with Levi, for example, acknowledging that 'the causation of disease by such [psychosocial] stimuli is not proven' (1974: 73). Researchers associated with the Swedish school, such as Robert Karasek and Bertil Gardell continued to pursue this hypothesis, though with less than conclusive success (eg, Karasek *et al.*, 1987). Subsequent research has observed correlations between stress and psychophysiological measures opposite to that which might be expected (Baum and Greenberg, 1997; and see below). For example Fletcher and Jones (1993) found that stress was associated with lower rather than higher blood pressure. Other attempts to reliably establish a stress-health relationship have continued to be problematic. Briner and Reynolds summarise the very heavy layer of doubt which surrounds this central assumption of stress research:

the evidence for the relationship between general stress and health is not particularly strong: Lazarus and Folkman (1984: 205) describe the link between stress and illness as '...still only a premise, albeit widely assumed'; ... Pollock (1988: 391) states that the link is 'unclear and unproven'; Schroeder and Costa (1984: 853) write that '... the link ... has been exaggerated'; and Cohen and Manuck (1995) observe that '... convincing evidence that stress contributes to the pathophysiology of human disease is sparse, and, even where evidence exists, relatively small proportions of variance are explained' (Briner and Reynolds, 1999: 652).

Stress researchers sometimes acknowledge the lack of understanding of their putative stress–health relationship. For instance, one recent review admits that ‘*at the moment*, there are only hints and guesses’ as to the way in which stress may affect the immune system or lead to physical ill health (Evans, Clow and Hucklebridge, 1997: 306, added emphasis). The phrase, ‘at the moment’ is significant. It reflects stress researchers’ continued optimism even though they lack ‘evidence’. That is to say, in spite of the inability of five decades of research to establish clear pathways between stress and illness, most stress researchers still clearly want to believe in it. To do otherwise would be to question the rationale of their project.

The supposition that stress and ‘negative’ emotion lead to physical ill health is of course supported by popular experience, such as that of having a headache or a backache after ‘moments of stress’ or ‘painful emotions’. In such moments, we may be particularly aware that our bodies are like ‘a living memory pad’ (Bourdieu, 1990: 68). However the existence of such temporary psychosomatic experiences does not mean that stress or emotion have any permanent impact on the immune system or that it necessarily ‘leads to’ longer-term physical ill health. Equally while many of us may find our lives ‘very demanding’, this does not mean that such demands will seriously affect our physical (or mental) health.

Given this uncertainty in the relation between emotion, stress and health, the problem with those furthering a material-corporeal sociology is that they tend to present a rather partial reading of current research, marshalling it largely in one direction – that of emotion and stress ‘leading to’ ‘maladaptive’ psychophysiological activity and thereby to ‘disease and disorder’. For instance, Williams (1998) has corralled a range of research evidence to support the link between emotion, stress, inequality and health. Yet his presentation appears somewhat one-sided, ignoring the qualifications and contrary evidence within the literature he cites. For example, like Freund (1998), Williams notes research by Karasek and his colleagues (Karasek and Theorell, 1990; Alfredsson *et al.*, 1982) suggesting a relation between lack of control over one’s working conditions, stress and ‘adverse health consequences’ (Williams, 1998: 129). Yet neither Williams (1998) nor Freund (1998) note the extent to which subsequent research in this field has questioned the validity of Karasek’s (1979) ‘control hypothesis’. As a number of writers have noted, there are difficulties with Karasek’s job control concept (‘job decision latitude’), inadequacies in his and his colleagues’ research designs, and failures to replicate their findings (eg, Spector, 1987; Ganster and Fusilier, 1989; Warr, 1990; Carayon, 1993; Wall *et al.*, 1996; De Jonge *et al.*, 1996).⁷ Williams also does not cite the qualifications made by Karasek and his colleagues. For instance, in a large random sample of 8,700 members of a Swedish white collar labour federation, Karasek, Gardell and Lindell acknowledge that ‘we failed to find a clear linkage between particular stressors and particular physical illnesses’ (1987: 187). Similarly Williams (1998) devotes some attention to the evidence of a relation between stressful life events (SLEs) and ill health, yet

ignores the tradition of work questioning the validity of SLE methodology (eg, Kasl, 1983; Schroeder and Costa, 1984). Equally, as noted above, Benton links stress, anxiety, social class and ill health, but does not interrogate research in this area (see Benton, 1991: 5–6).

In a manner reminiscent of psychological stress researchers, ‘material corporeal sociologists’ appear to want to believe that a complex of emotion, stress and social inequality cause ill health, and their discourse is very largely framed within this assumption. Just as psychological stress researchers want to believe that stress causes ill health even though ‘at the moment, there are only hints and guesses’ (Evans, Clow and Hucklebridge, 1997: 306), so do ‘material-corporeal sociologists’ of emotion want to assume emotion, stress, power relations and health are interrelated even though ‘*it is not yet conclusive*’ (Shilling, 1993: 116, added emphasis) and ‘*the precise links require further specification*’ (Williams, 1998: 134, added emphasis). However it is not just that the links require further specification, but that one must firstly doubt the salience that one can attach to them in the first place. For example, it seems premature to state that ‘socio-economic factors affect health primarily through *psychosocial rather than material pathways*’ (Williams, 1998: 133, added emphasis; cf., Williams, 2001: 71) when, (1) this argument is premised upon research arguments which have been criticised and contested (such as that of Karasek *et al.*), and (2) there remains considerable evidence for the contrary argument. As Peter Carroll and his colleagues argue (Carroll, Davey Smith and Bennett, 1996), ‘material pathways’ appear far more significant than psychosocial influences, as reflected in the health related differences associated with variation in income, housing, educational opportunity, diet etc., between social classes. In consequence, they suggest that ‘the most compelling intervention strategies . . . are unlikely to be psychological’ (Carroll, Davey Smith and Bennett, 1996: 34). Furthermore, as Bruce Link and Jo Phelan note, there remains the danger that the emphasis on the psychosocial ‘increases at the expense of more fundamental social conditions’ with the consequence that ‘medical sociologists may unwittingly contribute to the emphasis on individual factors’ (1995: 84). Though this is not Williams’ intention, an unfounded overemphasis upon the psychosocial carries the risk of individualisation, particularly when it is made at the expense of downplaying material influences upon health such as those associated with housing, income, diet etc.

In sum, it could be argued that writers such as Freund, Williams, Benton and Shilling have used rather emotional rhetoric in a somewhat unreflexive promotion of their argument. As with stress researchers, the possibility of serious ill health is employed as an emotional referent to underline the significance of the biological and the need to enter the psychophysiological terrain. Traditional sociological concerns then ‘raise the emotional heat’ still further by placing the discussion of stress, emotion and ill health within the context of power relations and social stratification. Emotional ploys can thus be seen to frame their promotion of emotion, power and health.

A biological sociology?

There are other problems with the presentation of those currently furthering the project of a material-corporeal sociology. These arise from the contradictions between the supportive work they cite, and their desires toward ‘fundamentally re-thinking the “biological” in non-reductionist terms’ (Williams, 1998: 134; c.f., Benton, 1991; Williams, 2001), or to being ‘careful in appropriating analytic concepts and discourse’ (Freund, 1990: 471). Such desires reflect a concern to establish a kind of ‘biological sociology’ that is clearly differentiated from the reductionism of sociobiology (Shilling, 1993). Given such desires and cautions, it is surprising how this non-reductionist biological sociology is constructed. For instance, it seems strange that there is some reliance on animal studies in order to explain human health. Both Freund (1988: 854–5; 1990: 464; 1998: 277) and Williams (1998: 129; 2001: 71) cite work on primates such as baboons (eg, Sapolsky, 1982, 1992). Yet reference to animal studies incites a reductionistic account of human health and appropriates rather inappropriate analytic concepts – features which appear to contradict Freund and Williams expressed concerns. Furthermore some material-corporeal sociologists cite positivist and naturalistic research in support of their arguments. For example, Freund supports his argument through reference to positivist neurophysiological work (eg, Freund, 1990). Similarly the work by Karasek that Williams (1998) and Freund (1998) cite in support of stress–health links (see above) is grounded in a methodological approach characteristic of positivist traditions of stress research (Handy, 1995).⁸

The difficulties consequent upon such argument can be further explored by considering Freund’s reference to the so-called ‘fight or flight’ response (Freund, 1990; Freund and McGuire, 1991). Though this entails something of a detour, it is worth exploring the fight/flight concept since it is illustrative of the problems encountered within current material-corporeal sociology. The fight/flight concept refers to the argument that human beings have evolved a particular physiological response pattern to danger or threat. It suggests that a pattern of heightened physiological arousal evolved in such situations in order to enable us to ‘fight’ or ‘flee’ ancient threats (such as that stereotypically associated with the ‘marauding mammoth’). It is further surmised that this response pattern is inappropriate to dealing with the stresses of contemporary society since we cannot necessarily fight or flee, say, work stressors.

As with a number of stress researchers, Freund makes a large theoretical jump in assuming that our supposed contemporary inability to ‘satisfy’ the fight/flight instinct has potentially pathological consequences. Citing Leder (1984), he argues that the fight/flight response represents a source of stress which may lead to ‘gastritis, high blood pressure, perhaps a heart attack’ (Leder, 1984: 39, quoted in Freund, 1990: 462). There are two problems however with such argument: firstly it is reliant on the questionable assumption of stress–health links, and secondly the fight/flight concept incorporates much of the reductive naturalism found in the writer who is generally cred-

ited with its invention, namely Walter Cannon (Newton, 1995b). *Contra* Benton, Cannon's work *cannot* be said to reflect a desire to 'think holistically about living organisms' (Benton, 1991: 17), since his arguments are based on a naturalistic, reductionistic and desocialised account which explains human behaviour chiefly in terms of instincts. For Cannon, the fight/flight response represented an instinctual reaction to threatening environmental stimuli. According to Cannon, the 'emotion of fear is associated with the *instinct* for flight, and the emotion of anger or rage with the *instinct* for fighting or attack' (1914: 264, added emphasis). Stress researchers have long used this argument in order to explain stress as the outcome of a mismatch between our present day psychology and 'outmoded' 'Stone Age' biological instincts, such as the fight/flight instinct. Arroba and James provide a typical example of this argument: 'Modern offices and factories may be very different from the environments our ancestors inhabited, but *our bodies are still programmed to cope with primitive and dangerous places*' (1987: 6, added emphasis; cf., Benson, 1979: 143).

This idea of 'Stone Age' bodies suffering in the modern-day office is very popular, even though it totally overlooks the social and technological complexity of, say, Stone Age society (Sahlins, 1972; Pollock, 1988). Within such discourse, stress is portrayed as the result of our 'natural', but outmoded, animal instincts. In sum, such arguments present a *crude dualism* that reduces the 'problem' of present day social complexity to the outmoded biological body, as supposedly witnessed in the anachronistic fight/flight instinct. The biological reductionism of such discourse makes it far closer to sociobiological argument than to that which one might expect in a putative non-reductionistic 'biological sociology' (see above).

Freund and McGuire effectively reproduce such dualism through their argument that 'modern conditions do not always make the adaptive response of *fleeing or fighting* a practical one' because of 'the rules of "civilized" behavior' (1991: 83, added emphasis).⁹ Such citation of the fight/flight instinct is not however an isolated enrolment of reductive and dualistic research amongst those arguing for a more material-corporeal sociology. For instance, both Freund and Shilling draw on the work of Frankenhaeuser and her colleagues in order to support links between, work, stress and ill health 'indicators' (Freund, 1988: 852; Shilling, 1993: 123). Yet Frankenhaeuser's work is situated within the same dualistic tradition as those who draw on Cannon. For example, echoing the naturalism of Canon's fight/flight instinct, Frankenhaeuser argues that ill health arises because 'bodily responses may . . . be totally inappropriate for coping with the pressures of life today [due to] the mismatch between our *old* biology and the demands of the *new* sociotechnical world . . .' (Frankenhaeuser, 1989: 748, added emphasis). Once again, the essential dualistic argument is that the fault lies with our outmoded biological body rather than being an inherent component of a socially and technically complex world. It seems that there has been a strange schism between our social and our 'natural' development whereby our tired old bodies have

not 'kept up'. Stress and maladaptive emotions would be rendered harmless if we could just have some 'new model' body.

This crude dualism still remains pervasive even amongst the few approaches to stress that have developed more contextualised accounts. For instance, as noted above, Williams (1998) particularly cites the studies of Karasek and his colleagues. Their work has the advantage of appearing more contextualised through its elaboration of the Scandinavian studies of stress researchers such as Gardell and Gustavsen. However their theorising still inherits the reductive dualism associated with earlier Scandinavian writers such as Levi and Frankenhaeuser. For example, they argue that the problems of 'controlling' 'stressors' are 'of course aggravated by the fact that our work stresses now are *not* related to the need for rapid fight/flight physical reactions *for which we are physiologically adapted*' (Karasek and Theorell, 1990: 86, added emphasis). Once again, the problem appears to be that our 'physiological adaption' is outdated, appropriate for such pre-modern 'fight/flight' needs as avoiding marauding mammoths, but not to modern 'work stresses' where our biology only provides 'aggravation'. The basic assumption is *still* that of a crude dualism that *reduces* the social ills of stress and poor health to our outmoded biology.

On the one hand, advocates of a material-corporeal sociology have the goal of countering the 'dominance of constructionism' (Freund, 1990: 454) and ensuring that sociology is '*fundamentally embodied*' (Williams, 1996: 42, original emphasis). Yet on the other, they are sensibly wary of 'appropriating analytic concepts and discourse' (Freund, 1990: 471), or else they have considerable constructionist sympathies (eg, Shilling, 1993). It therefore appears surprising that such writers should marshal naturalistic or dualistic research, such as that associated with the supposed fight/flight instinct. As noted above, one answer to this conundrum is that they aim to counter strong constructionism by invoking strong evidence of not just our psychophysiological lives, but the deleterious health consequences of such psychophysiology, and its links with social inequality. Yet there remain strange omissions and contradictions in the positions that result. For instance, it seems odd that writers in this area may be aware of the narrow terms in which stress discourse is written, and more generally attentive to the social construction of health and medicine, *but do not appear to feel that such cognisance implies a need to question the whole stress/emotion ↔ health relationship*. For example, Freund and McGuire (1991) and Freund (1998) are attentive to the construction of stress, health and medicine and its apoliticism, scientism and decontextualisation. Yet they do not seriously question whether stress leads to ill health *even though this supposed relationship is the means through which stress and health discourse gains much of its rationale and legitimisation*. The problem may be that, like health psychologists, to question this 'central plank' would be to doubt the rationale of their own sociopsychosomatics of health. In sum, though clearly resistant to positivism and naturalism, the desire of Freund, Williams, and Shilling to cross the divide between the social and the biologi-

cal has, understandably, lead them to marshal existing psychophysiological research in support of their argument. The problem remains however that this research tends to rely on the kind of positivist, naturalist or dualist argument from which, elsewhere, they appear keen to distance themselves.

It is also important to note that a similar reliance on positivist assumption can be found among other writers exploring the relationship between human beings and their natural environment. For example, Peter Dickens presents an uncritical reproduction of the central tenets of stress discourse in his attempt to develop ‘an alternative kind of “social Darwinism”’ (2000: 97). Dickens argues that ‘recent work shows that continued exposure to stressful circumstances can severely affect the body’s immune system’ (2000: 108). Like Freund, Benton and Williams, he links the deleterious effects of stress to social inequality arguing that ‘lack of social power is a key reason for the link between inequality and bad health in Western societies’ (Dickens, 2000: 108). Yet in developing this thesis, Dickens (2000: 108) calls on exactly the same positivist stress discourse as Freund, Benton, Williams and Shilling, through reference to early ‘key’ writers such as Hans Selye (Viner, 1999) as well as later researchers schooled within the same psychophysiological tradition as Selye, such as William Lovallo (eg, 1997). In addition, Dickens presents an unquestioning précis of the dualist fight/flight response, noting that ‘humans, like most other animals, have evolved powerful responses’ of ‘preparing themselves to stay and resist or to flee and capitulate’ when ‘confronted by a physical, mental or emotional threat’ (2000: 108). Such evocation of the fight/flight response is hardly surprising given that it forms a key part of the psychophysiological discourse upon which Dickens bases his argument (eg, see Lovallo, 1997: 61–8). In sum, an acceptance of stress orthodoxy is not unique to sociologists of the body but instead would appear to permeate the argument of other writers concerned with the relation between the ‘social’ and the ‘natural’. But as I have argued elsewhere (Newton, 1995a), the language of stress discourse remains that of the ‘closed individual’, *homo clausus* in Elias’s (1970) terms, as reflected in the dualism, individualism, ahistoricism, apoliticism etc of its conceptualisation.

Such observations beg the question of how we can move beyond the limitations of current psychophysiological discourse and create a sociology that can traverse the traditional schisms between sociology and the life sciences without recourse to dualism and reductionism (Benton, 1991). Before we can further such a project however, we need to consider how we can ‘socially know’ the biological body. To put this another way, the question remains as to how we can ‘interview’ the body.

Moving from the social to the biological body

A central problem for the project of material-corporeal sociology is that there is no easy way to ‘know’ the biological body, or know how it relates to the

social. To put this another way, any non-reductionistic and contextualised corporeal sociology must still contend with the fact that it is very difficult to interrogate the body, and this places constraints on material-corporeal sociology projects such as the study of emotion, power and health. For contrary to the continuing desires of many biologists, physiologists, and psychologists, the social cannot easily be reduced to the biological (Benton, 1991). As Andrew Sayer puts it:

Our thoughts and actions presuppose certain chemical transformations in our brains but are not reducible to them; in answering someone's question we are responding to the question not their brain chemistry (1997: 479)

Individual brain cells don't think, even though collectively they provide the biology through which thought may emerge. Yet the traditional 'biological answer' to this conundrum is to 'interpret' the body through physiological indicators. However such indicators are not straightforward to analyse which means that there is no easy way to read the psychosocial from the biological. As Armstrong argues, it is difficult to reliably infer 'the relationship between "internal states" and experience' (Armstrong, 1987: 1217). Citing Pennebaker (1984), Armstrong notes that 'there is increasing evidence that the experience of [medical] "symptoms" is not anything like as highly correlated with internal biochemical state as once believed' (1987: 1217). This is hardly surprising since the same physical or physiological 'response' may accompany varied human experience. For instance an increased heart rate might reflect physical exercise, sexual activity, or strong anxiety. Similarly, measures of stress and strain may reflect physical rather than psychological demands upon the body (Karasek and Theorell, 1990: 63).

These and other difficulties make it as specious to talk of linear relationships between the body and the social as it is to speak of the same within the social. As physiological psychologists such as David Krantz and Jennifer Falconer observe of the cardiovascular 'response' of the body,

adjustments in the energy needs of bodily tissues (eg, during exercise or psychological stress) result in a complex pattern of cardiovascular adjustments involving neural, endocrine, and mechanical patterns. *Changes in any one component of the system necessarily affect other components of the system* (1997: 194, added emphasis)

In other words, any desire to relate the social and the biological must confront the complexity of their interwoven relationship (Schwartz, 1982).¹⁰

This complexity occasions a number of problems for physiological assessment. For instance, amongst the more commonly employed physiological measures are cardiovascular response (such as blood pressure and heart rate), and hormonal response (such as catecholamines and corticosteroids). Andrew Baum and Neil Grunberg note that the latter constitute the 'most commonly

studied neuroendocrines in stress research' (1997: 177), and in consequence represent the area where the vast majority of research linking the psychosocial and the body has been undertaken. Yet assessments of the relationship between hormonal measures and stress can be '*biased*' by a host of 'extraneous variables'. Such extraneous variables include 'factors such as gender, race, weight, age, health status, and consumption of salt, caffeine, nicotine, and so on, as well as exposure to exercise' (Krantz and Falconer, 1997: 200).¹¹

Physiological researchers have developed methods to address such 'sources of error'. In addition, there are 'improved' and less 'invasive' methods of data collection such as the use of saliva rather than urine samples. Yet there remain a variety of questions regarding such research. The classic one is that of the 'validity' of the laboratory setting in which much of this research is undertaken. Not surprisingly, just as in experimental social psychology, the physiological laboratory setting is revealed as a notably social encounter (Orne, 1962). For instance, a variety of research, from Ayman and Goldshine (1940) onwards, has observed that cardiovascular responses measured in the laboratory or clinic can be considerably higher than those taken 'at home', a phenomena referred to as 'white coat hypertension'. For experimental physiologists these are sources of 'observer error'. Yet such 'errors' question the legitimacy of experimental physiological research just as much as they do in experimental psychological research. Just because we are interviewing the body rather than 'task reactions' or 'verbal response' makes little difference to the issue of the validity of the laboratory setting of experimental research. For instance, some research suggests that physiological measures may be 'corrupted' by the anticipation of being involved in a stress experiment (Obrist, 1981). The usual questions about the artificiality of experimental laboratory settings therefore remain.

In addition to the above constraints, there are other questions over how reliably we can interview the body, and thereby relate the social to the biological. For instance, physiological stress researchers such as Baum and Grunberg (1997) are aware of certain difficulties in 'interpretation'. They note that behavioural, psychological and physiological data do not always 'converge', but rather 'decouple'. In particular, measures of the body may indicate that 'it' is 'stressed' even though the individual concerned shows *no* signs of behavioural or psychological stress. Baum and Grunberg's answer to such conflicting data is, in effect, to argue that the *body must be right*. They note that:

if a subject reports no distress but exhibits elevated catecholamines or cortisol, the situation can be explained in several different ways. It could reflect denial as in a participant who denies or represses experienced distress . . . Alternatively, arousal could be due to some other variable, such as experiences immediately prior to assessment, activity level and exercise, diet, drug use, or other extraneous factors. Or, in chronic stress situations, elevated hormone levels could reflect new baseline levels and long-term enhancement of endocrine activity (1997: 188)

In other words, Baum and Grunberg largely assume that it is extraneous variables that disguise the 'truth' of physiological assessments of the body. However such 'decouplings' and 'divergences' can equally well be read as a reflection of the difficulties of interviewing the body. For example, there is rarely likely to be a simple correspondence between biological processes and social ones since both arenas are characterised by complexity, involving the neural, the cardiovascular and the neuroendocrinal, as well as the complexity of social interweaving (Elias, 2000) etc. In sum, when we look at how the social relates to the biological, we are examining the interrelation of very complex processes (Benton, 1991). In this context, the question arises as to *why* one should be able to observe a correlation between such bodily and social processes. Given such complexity, it seems more reasonable to expect that a correlation will *not* be observed, or that the body may appear 'stressed' but the individual not.¹²

This entire enterprise is also continually threatened by the difficulties inherent in the physiological project, particularly the taking of 'basal' or baseline measures. Such measures are intended to provide a reading of an individual's 'resting' state when they are not 'stressed' by social, biological or physical contaminants. An individual's physiological response to experimental 'stressors' can then be compared to her baseline or resting state. Achieving a reliable baseline measure requires that all the extraneous variables noted above are either controlled or within 'normal' levels. At the same time, accurate baseline measures are critical to physiological assessment since otherwise one cannot be sure that a particular reading does represent an 'elevated' level. Yet such accuracy is difficult to obtain. Normalcy is compromised since the nomothetic is elusive: for instance, extraneous variables such as caffeine or nicotine are particular to the individual and therefore difficult to reliably assess and control. Baseline readings of an individual at 6.00am after a night's 'rest' may be abnormal because their caffeine and nicotine levels are abnormally low. Aside from biological contaminants, there is also the difficulty of controlling for social 'stimuli'. Indeed, the search for a physiological space devoid of extraneous social contamination resembles a quest for an *asocial* and *abiological* 'holy grail'. A 'pure' baseline seeks a highly idealised state where social, physical and biological contaminants do not interfere. Given the difficulty (and absurdity) of attaining this state, it is perhaps not surprising that research such as Baum and Grunberg (1997) should encounter the problem of 'decouples' between the physiological and the social/psychological. The question arises as to whether the search for uncontaminated baselines represents a dream of purity that is elusive, if not chimeric.

Highlighting this array of difficulties is not meant to imply that a material-corporeal sociological project is necessarily doomed. Rather my concern is to reinforce arguments about the inherent complexity of the relationship between the biological and the sociological (Benton, 1991; Shilling, 1993; Williams, 2001), and the consequent need to 'tread warily'. At minimum, there is a need to avoid the simple appropriation of psychobiological research

because it has a tendency to deny or sideline the complexities of the social-biological interrelation discussed above. Such research still tends to assume that one can read the social (eg, psychological stress) from the biological (physiological 'indicators') through a linear or reductionistic 'lens' which detracts from the complexity of social and the biological.¹²

Conclusion

The human body can be both extra-discursive and deeply embedded in the social fabric, as witnessed in the human smile, the body scripts of birth, maturation and death, the remarkable 'arithmetic' in the sexual reproduction of gender etc. Such examples underscore the *social* salience of the extra-discursive body, and how any account of the social world remains seriously deficient if it ignores the fact that human beings have *biological* bodies, and that our bodies are centrally implicated in human communication, development, maturation, and reproduction. These are 'big' areas, and in spite of sociological tradition (Turner, 1991), it remains remarkable that the body was for so long treated as a 'passive shell' (Shilling, 1993: 29), almost like a mechanical vehicle upon which human life depended but in which nothing of any sociological significance could be found.

The significance of the body for the social underscores the need to formulate lines of inquiry capable of integrating the two. The present paper has been particularly concerned with one such body of work, namely nascent 'material-corporeal' sociology. This project not only attempts such integration but also addresses Benton's (1991) call to break down the division between life and social sciences. Writers such as Shilling, Freund and Williams have clearly been sympathetic to this latter 'cause', and to the argument that there can be no epistemological reason to erect a barrier between the biological and the social. In areas such as the sociology of health, it seems wilful ignorance to side step the interaction between the social, the emotional, and bodily physiology. Equally, a sociology of emotion, or of sport, that ignores the inner working of the body appears one-sided.

In addition to wanting to truly cross the 'Great Divide', Benton, Shilling, Freund and Williams all also appear concerned to counter strong constructionist treatment of the body. They are either openly critical, or questioning of, approaches where 'the body is viewed simply as a "blank screen" or "sign receiving system" ever open to being constructed and reconstructed by external texts or discourses' (Shilling, 1993: 39; c.f., Soper, 1995). At the same time, they are generally wary of a retreat to naturalistic approaches and the reductionism they imply (as witnessed in sociobiology). Instead Shilling points to a 'third way':

Analysing the body as *simultaneously biological and social provides a starting point*, and no more than that, for going beyond the limitations of

naturalistic and social constructionist views of the body, while retaining some of their insights (Shilling, 1993: 106, added emphasis)

I have sympathy with the above argument, particularly its suggestion that we are at the 'starting point'. Yet I have sought to illustrate how there are epistemological and methodological difficulties that bedevil current attempts to move beyond this 'starting point'. For those already on this 'journey', the desire to counter strong constructionism may have led to an insensitivity to constructionist argument. In particular, the material-corporeal project of Freund and Williams appears to lack a reflexivity to their own *emotional* evocation of the supposed links between the social (eg, inequality), the emotional (and its physiology) and ill health. Their discourse contains a strong resemblance to stress discourse through the way it uses emotion and ill health to justify a somewhat pathological reading of the interplay of the social and the biological, while adding the 'killer-blow' of social inequality into the frame. Yet as noted above, there remains considerable debate as to the relationship between stress, emotion and ill health. In addition, much of the psychophysiological research they use to support their argument is rooted in either reductionist, dualist or naturalist argument. As also noted above, an uncritical reproduction of psychophysiological discourse is not unique to sociologists of the body but is also apparent amongst others addressing the sociology of 'nature' such as Dickens (2000).

In sum, it is important to remember that in many ways we do remain 'at the starting point'. Not only can we not rely on existing psycho-physiological research in order to enter the biological terrain, but we also face difficulties in knowing the body and the biological. The complexity of the relation between the body and the social is such that a particular physiological measure cannot necessarily be read as the 'response' to a certain kind of social 'stimuli', such as a 'stressor' or 'maladaptive' emotion. For neither the social nor the biological generally operates in this *singular* fashion. The complexity of both means that we are often likely to be looking at a constellation of issues and processes, as exemplified by the way in which back pain may reflect a complex interweaving of 'evolutionary defect', physical, social and emotional 'demand', and non-linear physiological processes. The perils of the physiological enterprise derive from the difficulties of isolating singular relationships (such as that between stress and hormonal secretion) within a biosocial arena characterised by pervasive complexity.

Discussion within corporeal sociology is of course also surrounded by debate regarding the ontological and epistemological commensurability of the natural and social sciences (Soper, 1995). Though paradigm incommensurability may not entirely apply, it can be hardly be said that such debates are remotely 'settled', or that we have arrived at some 'third way' between critical realism/naturalism and constructionism that can be applied reliably across both the natural and the social arena. In sum, while discussion of this issue is beyond the scope of the present paper, this is not meant to imply that it is

without salience to the arguments considered above. The question still remains as to whether we are on the same ontological and epistemological terrain when moving from the natural to the social (Newton, 2003).

Finally, part of the problem in crossing terrains relates to the institutionalisation of knowledge, and the continued divide in education and training between life, psychological and sociological researchers. It is not entirely surprising that sociologists are insufficiently critical in their citation of psychophysiological work where they lack training in such areas. Consequently, it seems difficult to ignore this issue in any longer-term attempt to erode existing divisions between the life and social sciences. On the one hand, sociologists are often right to think that positivist 'scientists' are somewhat naive empiricists, lacking epistemological sophistication. Yet on the other, if we are to 'truly' cross the great divide between the social and nature, then we need a more sophisticated understanding of psychology and biology. Without that, we can neither deconstruct it, nor reconstruct it.

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Notes

- 1 This term is used in order to (1) distance from the association with sociobiology that reference to biological sociology creates, and (2) indicate a concern beyond the traditional circumference of biology, particularly the continuing tendency of biologists toward reductionism (Benton, 1991). The latter is *not* just a characteristic of sociobiologists. To take just one example, it is ironic that evolutionary biologists such as Ernst Mayr criticise the reductionist tendencies of physics when they are equally reductionist in their treatment of the social (eg, Mayr, 1997).
- 2 The emphasis on the 'real' effects of biological processes (Benton, 1991, 1992; Bury, 1995, 1997; Williams, 1996) raises the epistemological issues of foundationalism vs. anti-foundationalism (Bury, 1986; Turner and Rojek, 2001) and realism vs. constructionism (Soper, 1995). For reasons of space, I can presently do no more than *very briefly* allude to positions taken by those concerned to bring the 'biological body . . . "back in"' (Williams, 1999: 797). Williams (1999) employs the critical realism of Roy Bhaskar, while Benton questions Bhaskar's qualifications of naturalism (Bhaskar, 1989: 39, 167–81) in order to develop a more committed critical naturalism (Benton, 1981, 1993). In contrast to such strong naturalism, others have attempted to square realist and constructionist interpretations of 'nature' by acknowledging the latter, but refusing to deny 'the extra-discursive reality of nature' (Soper, 1995: 8; cf., Shilling, 1993). Though varying in epistemological orientation, the writing of Benton, Williams, Freund and Shilling all share a concern to highlight the continuing inattention to biology, the body and corporeality within sociology, social theory and medical sociology (eg, Shilling, 1997, 1999).
- 3 The human smile illustrates the strongly social nature of human evolution, and the way in which the neo-Darwinian sense of natural selection operates within 'a *social* context' (Benton, 1991: 23).
- 4 Bodies are increasingly plastic (Castells, 1996), and it may be that one day we will truly physiologically transform birth and death, but for the moment, there remains a maturational process which we can modify but *not* eliminate.

- 5 This bio-social process also appears to control for the greater mortality of men by tipping the balance so that slightly more boys are born. Moreover the sex ratio may also be interrelated with social issues such as the position of women in society. For instance Mead Cain (1993) suggests that fertility is higher in patriarchal societies since it is likely to deliver more surviving sons in situations where a premium is placed upon them. This occurs because, *ceteris paribus*, five per cent more boys will be born in the first place (Heer, 1975). In this way, what is already a complex social and biological process, namely the sex ratio, may itself be further interrelated with macro-social issues such as patriarchy.
- 6 In consequence, those drawing on Freund need to be aware of critique of Hochschild such as that of Wouters (1989) or Barbalet (1998).
- 7 The specific Karasek studies cited by Williams (1998) can also be subject to critique. For instance, that of Alfredsson *et al.* (1982) is based on the hypothesis that working conditions cause physical illness (specifically, myocardial infarction). Yet their research cannot assess such supposed causation since it is based on research design which analyses association, not causation.
- 8 Though Karasek and his colleagues develop the more contextualised school of Scandinavian stress research (Newton, 1995a), their research employs the same positivist methodologies that still characterise nearly all stress research.
- 9 Though the implicit reference is as much that of Elias as Freud, the dualistic notion of some outmoded, now 'uncivilised', fight/flight instinct is still clearly implied.
- 10 This is illustrated by the common experience of back pain. If I experience back pain, it may be through a complex of bad posture, dealing with physical loads, and work or other 'demands', rather than any one of these. Furthermore, my back pain may have been 'learnt' over a very lengthy period (eg, bad posture since childhood). Back pain may also be seen over the very 'longue durée' as the consequence of a quadruped animal which hasn't quite evolved to become an easily functioning 'upright' biped. The form and intensity of back pain that I experience will be influenced by all of the above *as well as* all the complex interrelations between posture and physiology.
- 11 This is not to deny that physiological measures provide useful medical information as in the case of strong hormonal deficiency. Yet in stress and emotion research, the concern is with establishing whether an individual is showing elevated hormonal levels (beyond their baseline state) rather than a marked deficiency or excess. In this context, the problem is that elevated levels may occur because of the influence of a large array of extraneous variables.
- 12 Though stress researchers do look beyond linear correlation (eg, 'moderation' by individual differences, social support or job control, etc.), most modelling still relies on highly reductionistic accounts of the social and biological processes researched.
- 13 This of course raises the question of how we model complexity (Byrne, 1998). Though it is beyond the scope of the present paper to discuss this issue in depth, there are reasons to be cautious about the use of chaos and complexity theory. Such theorising is (1) still in its infancy in its application to the social sciences, and (2) open to the accusation that it repeats an old mistake in the social sciences, namely the appropriation of inappropriate natural science models.

References

- Alfredsson, L., Karasek, R. and Theorell, T., (1982), Myocardial infarction risk and psychosocial work environment: An analysis of the male Swedish working force. *Social Science and Medicine*, 16: 463–467.
- Armstrong, D., (1987), Theoretical tensions in biopsychosocial medicine. *Social Science and Medicine*, 25 (11): 1213–1218.
- Arroba, T. and James, K., (1987), *Pressure at Work*, London: McGraw-Hill.

- Ayman, P. and Goldshine, A.D., (1940), Blood pressure determinations by patients with essential hypertension: 1 The differences between clinic and home readings before treatment. *American Journal of Medical Science*, 200: 465–474.
- Barbalet, J.M., (1998), *Emotion, Social Theory and Social Structure*, Cambridge: Cambridge University Press.
- Baum, A. and Grunberg, N., (1997), Measurement of stress hormones. In Cohen, S., Kessler, R.C. and Underwood Gordon, L. (eds.), *Measuring Stress: A Guide for Health and Social Scientists*, New York: Oxford, pp. 175–192.
- Benson, H., (1979), Your innate asset for combating stress. In *Harvard Business Review: On Human Relations*, London: Heinemann.
- Benton, T., (1981), Realism and social science: Some comments on Roy Bhaskar's 'The Possibility of Naturalism'. *Radical Philosophy*, No. 27: 13–21.
- Benton, T., (1991), Biology and social science: Why the return of the repressed should be given a (cautious) welcome. *Sociology*, 25 (1): 1–29.
- Benton, T., (1992), Why the welcome needs to be cautious: A reply to Keith Sharp. *Sociology*, 26 (2): 225–232.
- Benton, T., (1993), *Natural Relations: Ecology, Animal Rights and Social Justice*, London: Verso.
- Bhaskar, R., (1989), *The Possibility of Naturalism, 2nd edition*, Hemel Hempstead: Harvester Wheatsheaf.
- Bourdieu, P., (1990), *The Logic of Practice*, Cambridge: Polity.
- Briner, R. and Reynolds, S., (1999), The costs, benefits, and limitations of organizational level stress interventions. *Journal of Organizational Behavior*, 20 (5): 647–664.
- Bury, M.R., (1986), Social constructionism and the development of medical sociology. *Sociology of Health and Illness*, 8: 137–169.
- Bury, M.R., (1995), The body in question. *Medical Sociology News*, 21 (1): 36–48.
- Bury, M.R., (1997), *Health and Illness in a Changing Society*. London: Routledge.
- Byrne, D., (1998), *Complexity Theory and the Social Sciences*. London: Routledge.
- Cain, M.T., (1993), Patriarchal structures and demographic change. In Federici, N., Oppenheim Mason, K. and Sogner S. (eds.), *Women's Position and Demographic Change*, Oxford: Clarendon Press.
- Cannon, W.B., (1914), The interrelations of emotion as suggested by recent physiological researches. *American Journal of Psychology*, 25: 256–282.
- Carayon, P., (1993), A longitudinal test of Karasek's job strain model among office workers. *Work and Stress*, 7 (4): 299–314
- Carroll, D., Davey Smith, G. and Bennett, P., (1996), Some observations on health and socio-economic status. *Journal of Health Psychology*, 1 (1): 23–39.
- Castells, M., (1996), *The Rise of the Network Society*, Oxford: Blackwell.
- Cohen, S. and Manuck, S.B., (1995), Stress, reactivity and disease. *Psychosomatic Medicine*, 57: 423–426.
- De Jonge, J., Janssen, P.P.M. and Van Breukelen, G.J.P., (1996), Testing the demand-control-support model among health care professionals: A structural equation model. *Work and Stress*, 10 (3): 209–224.
- Dickens, P., (1996), *Reconstructing Nature: Alienation, Emancipation and the Division of Labour*, London: Routledge.
- Dickens, P., (2000), *Social Darwinism: Linking Evolutionary Thought to Social Theory*, Buckingham: Open University Press.
- Elias, N., (1970), *What is Sociology*, New York: Columbia University Press.
- Elias, N., (1991), *The Symbol Theory*, London: Sage.
- Elias, N., (2000), *The Civilizing Process, Revised edition*, Oxford: Blackwell.
- Evans, P., Clow, A. and Hucklebridge, F., (1987), Stress and the immune system. *The Psychologist*, 10 (7): 303–307.
- Fletcher, B. and Jones, F., (1993), A refutation of Karasek's demand-discretion model of occupational stress with a range of dependent measures. *Journal of Organizational Behaviour*, 14 (4): 319–331.

- Frankenhaeuser, M., (1989), A biopsychosocial approach to work life stresses. *International Journal of Health Services*, 19: 747–758.
- Freund, P.E.S., (1988), Bringing society into the body. *Theory and Society*, 17: 839–864.
- Freund, P.E.S., (1990), The expressive body: a common ground for the sociology of emotions and health and illness. *Sociology of Health and Illness*, 12 (4): 452–477.
- Freund, P.E.S. and McGuire, M.B., (1991), *Health, Illness and the Social Body: A Critical Sociology*. Englewood Cliffs, New Jersey: Prentice Hall.
- Freund, P.E.S., (1998), Social performances and their discontents: the biopsychosocial aspects of dramaturgical stress. In Bendelow, G. and Williams, S.J. (eds.), *Emotions in Social Life*, London: Routledge, pp. 268–294.
- Ganster, D.C. and Fusilier, M.R., (1989), Control in the workplace. In Cooper, C.L. and Robertson, I. (eds.), *International Review of Industrial and Organizational Psychology*, Chichester: Wiley, pp. 235–280.
- Goodkind, D., (1999), Should prenatal sex selection be restricted? Ethical questions and their implications for research and policy. *Population Studies*, 53: 49–61.
- Hacking, I., (1999), *The Social Construction of What?*, Cambridge, Mass.: Harvard University Press.
- Handy, J., (1995), Rethinking stress: Seeing the collective. In Newton, T.J., with Handy, J. and Fineman, S. (eds.), *'Managing' Stress: Emotion and Power at Work*, London: Sage.
- Heer, D.M., (1975), *Society and Population*, 2nd edition, Englewood Cliffs, New Jersey: Prentice-Hall.
- Hochschild, A.R., (1983), *The Managed Heart: Commercialization and Human Feeling*, Berkeley: University of California Press.
- Johnson, M., (1987), *The Body in the Mind*, Chicago: University of Chicago Press.
- Karasek, R., (1979), Job demands, job decision latitude, and mental strain: implications for job re-design. *Administrative Science Quarterly*, 24: 285–308.
- Karasek, R., Gardell, B. and Lindell, J., (1987), Work and non-work correlates of illness and behaviour in male and female Swedish white-collar workers. *Journal of Occupational Behaviour*, 8: 187–207.
- Karasek, R. and Theorell, T., (1990), *Healthy Work: Stress, Productivity and the Reconstruction of Working Life*, New York: Basic Books.
- Kasl, S.V., (1983), Pursuing the link between stressful life events and disease: A time for reappraisal. In Cooper, C.L. (ed.), *Stress Research: Issues for the Eighties*, Chichester: Wiley.
- Kelly, M.P. and Field, D., (1994), Comments on the rejection of the bio-medical model in sociological discourse. *Medical Sociology News*, 19 (2): 34–37.
- Krantz, D.S. and Falconer, J.J., (1997), Measurement of cardiovascular responses. In Cohen, S., Kessler, R.C. and Underwood Gordon, L. (eds.), *Measuring Stress: A Guide for Health and Social Scientists*, New York: Oxford, pp. 193–212.
- Leder, D., (1984), Medicine and paradigms of embodiment. *The Journal of Medicine and Philosophy*, 9: 29–43.
- Lazarus, R.S. and Folkman, S., (1984), *Stress, Appraisal and Coping*, Springer: New York.
- Levi, L., (1974), Stress, disease and psychosocial stimuli. In McLean, A. (ed.), *Occupational Stress*, Springfield, IL: C.C. Thomas.
- Link, B.G. and Phelan, J.C., (1995), Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior*, 36, (Extra Issue): 80–94.
- Lovallo, W.R., (1997), *Stress and Health: Biological and Psychological Interactions*, Thousand Oaks, Calif.: Sage.
- Mayr, E., (1997), *This is Biology: The Science of the Living World*, Cambridge, Mass.: The Belknap Press of Harvard University Press.
- Mennell, S., (1989), *Norbert Elias: Civilization and the Human Self-Image*, Oxford: Blackwell.
- Murphy, R., (1994), *Rationality and Nature: A Sociological Inquiry into a Changing Relationship*, Boulder, Colorado: Westview Press.

- Newton, T.J., (1995a), Knowing stress: From eugenics to work reform. In Newton, T.J., with Handy, J. and Fineman, S. *'Managing' Stress: Emotion and Power at Work*, London: Sage.
- Newton, T.J., (1995b), Rethorising stress and emotion: Labour process theory, Foucault and Elias. In Newton, T.J., with Handy, J. and Fineman, S. *'Managing' Stress: Emotion and Power at Work*, London: Sage.
- Newton, T.J., (2003), Crossing the Great Divide: Time, Nature and the Social. Forthcoming in *Sociology*, 37.
- Obrist, P.A., (1981), *Cardiovascular Physiology: A Perspective*, New York: Plenum.
- Orne, M.T., (1962), On the social psychology of the psychological experiment: with particular reference to demand characteristics and their implications. *American Psychologist*, 17: 776–783.
- Pennebaker, J.W., (1984), Accuracy of symptom perception. In Baum, A. *et al.*, (eds.), *Handbook of Psychology and Health*, New Jersey: Erlbaum.
- Pollock, K., (1988), On the nature of social stress: production of a modern mythology. *Social Science and Medicine*, 26 (3): 381–392.
- Sahlins, M.D., (1972), *Stone Age Economics*, Chicago: Aldine-Atherton.
- Sapolsky, R.M., (1982), The endocrine stress response and social status in the wild baboon. *Hormones and Behavior*, 1: 279–292.
- Sapolsky, R.M., (1992), Endocrinology alfresco: Psychoendocrine studies of wild baboons. *Recent Progress in Hormone Research*, 48: 437–468.
- Sayer, A., (1997), Essentialism, social constructionism, and beyond. *Sociological Review*, 45 (3): 453–487.
- Schroeder, D.H. and Costa, P.T., (1984), Influence of life event stress on physical illness: Substantive effects or methodological flaws? *Journal of Personality and Social Psychology*, 46: 853–863.
- Schwartz, G.E., (1982), Testing the biopsychosocial model: The ultimate challenge facing behavioral medicine? *Journal of Consulting and Clinical Psychology*, 50 (6): 1040–1053.
- Shilling, C., (1993), *The Body and Social Theory*, London: Sage.
- Shilling, C., (1997), The undersocialised conception of the (embodied) agent in modern sociology. *Sociology*, 31 (4): 737–754.
- Shilling, C., (1999), Towards an embodied understanding of the structure/agency relationship. *British Journal of Sociology*, 50 (4): 543–562
- Soper, K., (1995), *What is Nature? Culture, Politics and the Non-Human*, Oxford: Blackwell
- Spector, P.E., (1987), Interactive effects of perceived control and job stressors on affective reactions and health outcomes for clerical workers. *Work and Stress*, 1 (2): 155–162.
- Turner, B.S., (1991), Recent developments in the theory of the body. In Featherstone, M., Hepworth, M. and Turner, B. (eds.), *The Body: Social Process and Cultural Theory*, London: Sage.
- Turner, B.S. and Rojek, C., (2001), *Society and Culture: Principles of Scarcity and Solidarity*, London: Sage.
- Viner, R., (1999), Putting stress into life: Hans Selye and the making of stress theory. *Social Studies of Science*, 29 (3): 391–410.
- Wall, T.D., Jackson, P.R., Mullarkey, S., and Parker, S.K., (1996), The demands-control model of job strain: A more specific test. *Journal of Occupational and Organizational Psychology*, 69: 153–166.
- Warr, P.B., (1990), Decision latitude, job demands and employee well-being. *Work and Stress*, 4 (4): 285–294.
- Williams, S.J., (1996), The vicissitudes of embodiment across the chronic illness trajectory. *Body and Society*, 2 (2): 23–47.
- Williams, S.J., (1998), 'Capitalising' on emotions? Rethinking the inequalities in health debate. *Sociology*, 32 (1): 121–139.
- Williams, S.J., (1999), Is anybody there? Critical realism, chronic illness, and the disability debate. *Sociology of Health and Illness*, 21 (6): 797–819.

- Williams, S.J. and Bendelow, G., (1998), *The Lived Body: Sociological Themes, Embodied Issues*, London: Routledge.
- Williams, S.J., (2001), *Emotions and Social Theory*, London: Sage.
- Wouters, C., (1989), The sociology of emotions and flight attendants: Hochschild's *Managed Heart*. *Theory, Culture and Society*, 6: 95–123.

