Science as Culture
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/csac20

Myths of Modern American Sleep: Naturalizing Primordial Sleep, Blaming Technological Distractions, and Pathologizing Children

Matthew J. Wolf-Meyer[a]
[a] Anthropology, University of California, Santa Cruz, CA, USA
Published online: 19 Aug 2014.

To cite this article: Matthew J. Wolf-Meyer (2014): Myths of Modern American Sleep: Naturalizing Primordial Sleep, Blaming Technological Distractions, and Pathologizing Children, Science as Culture, DOI: 10.1080/09505431.2014.945411

To link to this article: http://dx.doi.org/10.1080/09505431.2014.945411

Science as Culture, 2014
http://dx.doi.org/10.1080/09505431.2014.945411

Myths of Modern American Sleep: Naturalizing Primordial Sleep, Blaming Technological Distractions, and Pathologizing Children

MATTHEW J. WOLF-MEYER

Anthropology, University of California, Santa Cruz, CA, USA

ABSTRACT *Across different kinds of modern influences on human sleep—from communication and media technologies, to medical interventions and chemicals used to modify sleep and wakefulness, to the organization of social life—some are seen as interfering with human nature. Others, like many institutions, are accepted as natural. This is apparent in the example of school start times, which are widely assumed to be based on an agrarian past. Unlike modern media technologies, school start times are often implicitly accepted as based in nature, and help constitute a sense of a historical primordial natural state in which humans lived in harmony with nature. The presumed naturalness of institutional times stands in opposition to modern media technologies and laboratory-derived chemicals, which are often criticized for being disruptive to our human natures and as having negative impacts on our sleep patterns. In some cases, technology may be serving as a distraction, interfering with a child's sleep, but technology also provides an easy object of criticism, for physicians, scientists, and parents. In doing so, normative social expectations and the institutions that frame them escape criticism in the face of blaming the disorderly behavior of individuals.*

KEY WORDS: myth, technology, medicalization, pharmaceuticals, media

Introduction: The Nature of Modern Sleep

In 1998 the Center for Applied Research and Educational Improvement (CAREI) at the University of Minnesota, paired with the Minnesota Regional Sleep

Correspondence Address: Matthew J. Wolf-Meyer, Anthropology, University of California, 361 Social Sciences 1, 1156 High Street, Santa Cruz, CA 95064, USA. Email: mwolfmey@ucsc.edu

Disorder Center, recommended, quite simply and with a wealth of evidence, that American public schools alter their start times to approximately an hour later in the morning (CAREI, 1998a, 1998b). The data presented showed that students had marked improvement in their standardized test scores and their grades earned, as well as fewer incidents of bad behavior and reduced symptoms typically associated with attention deficit disorder and attention deficit hyperactivity disorder. In addition, students, faculty, and administrators generally agreed that student temperament had improved and that the school environment had greatly cheered. The CAREI study came on the heels of 20 years of medical science that had argued that puberty-aged students have a greater sleep requirement than younger students—around 10 hours each night—and that their biological clock makes it difficult to sleep prior to 11 pm, effectively precluding them from sleeping more than six hours on school nights. What results from this biological situation when paired with traditional school start times is an escalating 'sleep debt', a state of chronic sleep deprivation.

Despite this evidence, outside of Minnesota very few school districts have altered their school start times, often relying on an assumption that an agrarian tradition of early waking is being upheld through a dedication to early school start times. One school district superintendent has been quoted as saying 'The scientific evidence hasn't been compelling enough. There's still something that doesn't click for me' (quoted in Martin, 1999). She went on to explain that school board members were happy with student scores on standardized tests and 'many acceptances at prestigious colleges'. In a district where parents voted against altering school start times, one 15-year-old girl was moved to ask, 'Why is it that people around here don't like kids?' (Martin, 1999). Sleep is often understood in the USA—and especially in educational settings—as a behavioral issue and as subject to the individual will of students rather than a biological matter, i.e. if a student is tardy due to waking late or sleeping during class, it is due to the student's choice to behave badly, and not the increased sleep requirements of adolescents and the social arrangement of school start times. In the USA, sleep is understood to be intractably natural and yet subject to individual decisions, which makes winning such school start time victories incredibly difficult. Individual choice, for many Americans, can overcome natural desires, meaning that, in the case of school start times, students just have to choose to go to bed earlier. These understandings of sleep influence public policy, medical practice, the subjective experience of health, and the micro-politics of family and work life, and provide a window to understanding the contested realm of human nature in American life, particularly as it relates to cultural assumptions and ideas about technology and social organization.

These research findings about adolescent sleep were central to the practice of medicine at the Midwest Sleep Disorder Center (MSDC), where clinicians often counseled adolescents and their parents about the difficulties of sleeping enough with contemporary school demands. During a visit to the MSDC in July 2006,

one of the senior pediatricians, Dr MacTaggert, stopped me after the weekly staff meeting to hand me an article she had printed out from *The Australian* (McLean, 2006).[1] The article summarized the work of Jan Van den Bulck (Eggermont and Van den Bulck, 2006), who, since the early 2000s, has conducted survey-based studies of teen sleep behaviors, specifically as they are impacted by television, video games, and cell phones.[2] My previous conversations with Dr MacTaggert had focused largely on school-aged children and the need for more detailed research on their sleep patterns; she handed me the article without comment, no doubt hopeful I would find Van den Bulck's findings to be of interest—or controversial.

Van den Bulck's research draws upon a minor tradition of identifying pediatric health concerns with the presence of television (Owens *et al*., 1999), but broadens this concern by also including video games, computers, the Internet, and cell phones as negatively impacting the health of children. This research depends upon accepting these forms of distraction as something new, and thereby qualitatively different from the means that children have distracted themselves with previously—such as radio, reading, storytelling, and play—as if the technological encroachment upon sleep is something novel in the early twenty-first century. Only in Van den Bulck's most recent work has the presence of books been taken into account, and only to make claims in support of bedtime reading as a sleep aid (Eggermont and Van den Bulck, 2006).

Like Van den Bulck, sleep experts, parents and teachers often identify technological distractions as particularly pernicious for disrupting children's sleep, even rising to the level of a moral problem: namely, that children distract themselves with technology, which seduces them away from their natural instincts towards sleep and interferes with their social obligations. Starting from those popular assumptions, I am interested in asking: why some kinds of technology are seen as contrary to human nature? How do technologies and individual behaviors become the object of criticism and thereby obscure the actual causes of bad behavior? For example, why are school start times exempt from criticism, but telecommunication devices ripe for attacks from parents, administrators, doctors, and scientists? How does the problem of children distracting themselves through technology usage pathologize individual behavior while reinforcing the rhythms of modern society, which often depend upon assumptions about what human nature is and what sleep should look like? And what assumptions about human nature and its relationship to evolution and the environment structure these ideas about technology, biology, and individual choice?

In this article, I examine ways of thinking about the naturalness of sleep and how it has been reshaped by technology and the organization of modern life. I first attend to debates around school-aged children and how technology is seen as providing new and detrimental distractions as discussed by scientists and activists in American media. I then turn to popular books that are concerned with restoring a sense of natural harmony to contemporary social life, scientist

Martin Moore-Ede's *The Twenty-Four-Hour Society* (1993) and public intellectual Jeremy Rifkin's *Time Wars* (1987).[3] Although both are now two decades old, they are paradigmatic in their framing of the debates around sleep, human nature, and the effects of advanced capitalism, globalization, and technology. I turn afterward to my research with disordered sleepers, who show how sleep is often managed by Americans in subtle and profound ways. I conclude by returning to my questions about technology, social organization, human nature, and cultural expectations of sleep.

In both the case of scientists discussing children's sleep and popular representations of human nature at odds with society, I suggest that an interest in defining the *primordial* nature of human sleep is fundamentally important. American intellectuals and lay people imagine that there is a natural, pristine form of human biology that exists prior to society, culture, and technology, and that returning to a harmonious balance between individual physiological desires and social orders is both possible and evidence of the naturalness of the spatiotemporal ordering of modern social life. These conceptions of nature, however, are based more in myth than in historical reality. Like many Americans, my research participants found normal or ideal sleep elusive, and most struggled with disorders that they treated with chemical supplements. These disorderly sleepers stand on the other side of the technological fence, requiring industrially produced chemicals to produce something like normal sleep. Taken together, these cases expose the place of technology in the control of human biology, how biology is mediated by sociotechnical environments, and how Americans tend to live in denial of this mediation.

Analytic Perspective: Human Nature as Moral Foundation for Evaluating Technology

Primordialism is a kind of discourse that instantiates ideological assumptions of nature in necessary opposition to technology and modernity; that is, a human nature is posited to exist outside of social influences, and this primordial nature is one characterized by its balance with our physiological needs. As such, these assumptions about human nature provide the basis for medicalization (Conrad, 2007). A normative nature is posited, against which any variation is seen as a pathology in need of treatment; variations can be physiological or behavioral, and treated by physicians (Armstrong, 2002) or psychiatrists (Rose, 1990). Primordialism defines the natural while obscuring the social; in this sense, it is an extreme form of naturalization. In so being, discourses of primordialism make the human natures they construct into foundations for everyday action, including medical and behavioral management and control, and aim intervention at restoring individuals—and sometimes societies—to the pre-modern nature that primordialism suggests as real.

It is useful in this context to consider Roland Barthes' elaboration of 'myths' in the twentieth century (2013 [1957]). For Barthes, advances in technology,

including mass media, industrial production, and the global distribution of goods, bring the past and the present into conflict, particularly related to ideas about nature, society, and individual and collective histories. Individuals come to accept myths not because of their veracity, but almost in spite of them: the myths promulgated in the twentieth century about our connections with nature are seductive because they tell a story that is appealing, despite being clearly false. Consider Barthes' discussion of wooden toys for children, but marketed to adults: wooden toys recall a simpler time in which humans were more in touch with the natural world and not surrounded by so many manufactured, plastic goods. The simplicity that wooden toys capture is the simplicity that adults wish their own childhood had had. Their purchase of wooden toys for their children helps continue the myth of childhood being simple and associated with nature, despite wooden toys being industrially manufactured, advertised through mass media, and purchased through market transactions. Moreover, these wooden toys become a token of an imagined past, as children grow into adulthood; the toy conveys a message, but the message is based in myth, not reality. Myths are pervasive, and a fundamental component of modern life; as such, myths of a naturalized primordial state structure how Americans think about sleep and its relationships with technology, as well as many other assumptions about nature and human life.

Social theorists have long been concerned with the relationships between nature and technology, often implying that the divide between humans and the worlds that they inhabit results in nature always being mediated by technologies, whether it is demarcated spaces for human–nature interactions, as in the case of parks, or our nightly sleep, mediated by mattresses, comforters, pillows, pharmaceuticals, alarm clocks, white noise makers, and so on. This view of human interactions with nature as being based in our technological mediations of the world is usefully formulated by Bernard Stiegler (1994). Technology, for Stiegler, is the basis of social being, and suggests that every interaction with other humans, our natural environments, or other sociotechnical features of our lives is invariably mediated by the technologies we have produced; it is not that technology is new and that humans are newly divorced from nature, but rather that technology's role in our lives has intensified over the last 200 years. This has been especially apparent in feminist approaches to nature, including scholars across the social sciences and humanities.[4] Central to this literature is the conceit that what was once a natural part of human life has become supplemented with a technological means that replaces and then obscures the natural course.

One might consider how daily alertness has become naturalized, and how this has depended upon a long history of caffeine and sugar intake throughout work and school days (Mintz, 1985); this consolidation of daytime alertness has, in turn, depended upon the consolidation of nighttime sleep, replacing biphasic nightly sleep—in two or more periods—with an aspirational norm of eight uninterrupted hours (Ekirch, 2001; Wolf-Meyer, 2013). This new form of sleep and wakefulness

provides the basis for contemporary medical practice, as individuals who cannot sleep through the night seek insomnia-alleviating medications. In doing so, disordered sleepers and physicians ignore the assumptions and practices that support daytime alertness, acting on the nature produced by the technologies that consolidate sleep, rather than the social organizations that produce modern sleep—that is, they act on a manufactured human nature rather than the institutional times that produce that human nature. This process can also lead towards the false attribution of causation, identifying individuals and their behaviors as the root cause of disorder and attributing their actions with moral value, rather than the structural forces that compel particular forms of action and decision-making.

These moral discourses often depend upon an appeal to a pre-historical natural state, an understanding that the world as it is has been divorced from the world as it should be.[5] This extends primordialism from being applied to individuals to being applied to society more generally. When coupled with economic obligations, moral discourses that take social life and individual behavior as their objects produce normative ideals of everyday life, providing legitimacy for the normative formations of social life and casting those who fail to meet these normative ideals as disabled, disordered, or pathological (Canguilhem, 1991 [1966]; Davis, 1995). This, in turn, can lead to the medicalization of individuals, seeing in their bad behavior the basis for medical or psychiatric intervention. The order of society can often be assumed as based in nature (Martin, 1992 [1987]; Yanagisako and Delaney, 1994), while the behaviors of individuals become associated with pathologies or aberrant decision-making—such as adolescents who stay up too late playing video games or communicating with friends through social media.

Across the many and varied approaches to sleep in the humanities and social sciences (for a review, see Williams and Wolf-Meyer, 2013), scholars have maintained, often implicitly, that sleep is an exquisitely biological, social, and cultural assemblage and often subject to control and disciplinary efforts: at once sleep is a physiological need, but is also subject to social arrangements and obligations, and shaped by cultural expectations of what is normal and abnormal sleep. This way of thinking about sleep is emblematized in A. Roger Ekirch's *At Day's Close* (2005), in which he presents data regarding the styles of sleep that pre-dated electric light and industrialization. Ekirch argues that prior to industrialization, British people slept in two short periods rather than one long, consolidated period of sleep. This claim has since been corroborated for the American nineteenth century and previous (Wolf-Meyer, 2012), as well as in societies around the globe (Steger and Brunt, 2003), leading to the general conclusion that consolidated sleep is socially constructed and culturally conditioned. Sociologists have held the longest tradition of thinking about sleep (Aubert and White, 1959a, 1959b), and in the present have largely focused on the phenomenological (Williams, 2005), political (Williams, 2011), and social determinants of sleep (Lowson *et al*., 2013; Venn *et al*., 2013), exploring the subjective and disciplinary functions of sleep. Across this varied body of work, scholars have been interested in the

underlying nature of sleep and the ways that contemporary societies interfere with and shape physiological experiences of individuals and whole communities, often with negative effects for some while preserving the privileges of others. The control and organization of sleep are inevitably technological, often relying on industrially produced chemicals, and shaped in response to the ordering of social institutions. In the following, I explore these interactions of technology, social organization, human nature, and myth through American attitudes to sleep.

The Most Distractible among Us: Children, Technology, and Sleep

Betsy Taylor, former director of the Center for a New American Dream, perceives in modern American society an endless series of distractions to be blamed for our divorce from a more natural way of being in the world:

> Kids, like adults, are becoming more isolated due to computers, video games, television, and other supposedly 'interactive' electronic equipment. Interacting with a machine bears little resemblance to the rewards of interacting with other people, and instant messaging cannot replace one-on-one human contact. Machines are changing the experience of childhood itself, supplanting traditional activities such as reading, playing and outdoor exploration. (Taylor, 2003, p. 50)

For Taylor, technologies estrange us from 'other people' and 'human contact'. For many scientists and physicians, the same assumption lay dormant in their experimental designs. 'Queensland child health expert' Dr Michael McDowell was paraphrased in The Australian article handed to be by Dr MacTaggert as claiming that 'the unfiltered content on late night television and the ultra-stimulating nature of computer games in particular could lead to disrupted sleep'. McDowell's recourse to 'unfiltered content' and 'the ultra-stimulating nature' of contemporary media is a barely veiled criticism of technology operating against a mythic nature, with a more peaceful, natural past lurking at its edges. As with Taylor, it is not the inflexible order of modern life that is blamed for poor sleep, but the technological distractions that have become ubiquitous and are perceived as divorcing humans from a more harmonious relationship with nature, in which humans—and children especially—would be better sleepers. However, extant scientific literature on adolescent sleep patterns has labored against cultural expectations of sleep since the 1980s in an effort to demonstrate that it is not necessarily technology that is the root cause of school-aged children's sleep deprivation, but a shifting of circadian rhythms during puberty.

The Science of the Pubescent Sleeper

One of the leading researchers on childhood and adolescent sleep patterns is Mary Carskadon, a former student of William Dement, the father of modern sleep

medicine. Carskadon and Dement developed the Stanford Summer Sleep Camp in the 1970s, which ran for a decade and followed a fluctuating cohort of approximately 50 students from age 10–12 through age 18–20 years to ascertain the shifts in sleep patterns through adolescence and young adulthood. What Carskadon was able to demonstrate with this cohort was that sleep requirements and circadian timing altered during puberty so that most children will wake up later in the morning and feel sleepy later in the night (Carskadon *et al*., 1980, 1981). These results have been succeeded by further studies on children's sleep patterns to the point where they have reached a relatively orthodox position within sleep science (for a review, see Hagenauer *et al*., 2009); they have also migrated out of sleep science, especially in relation to the debates surrounding the changing of school start times for high school-aged students (CAREI, 1998a). Despite the broad purchase this scientific data has had in the USA, it stands opposed to the dominant model of sleep, namely that of sleep as something which can be controlled by individuals without detriment, whether through strict behavioral decisions or chemical means. Science, in this case, fails to be authoritative enough, in part due to the suppositions that lie dormant in its claims. Sleep science, because of its very development in the West and the USA in particular (Kroker, 2007), accepts the behavioral hypothesis of sleep, and ultimately perceives individuals as managing or monitoring the conditions under which they fall asleep.

Like Taylor, Carskadon understands technology not as a benign distraction, but as a causal force to be blamed for the sleep deprivation of children. Her criticism of technology, however, makes recourse to scientific explanations: technology in children's lives suggests that deeper biological functions are being interfered with rather than children simply choosing to be distracted by technologies. In *SleepMatters*, a publication produced by the National Sleep Foundation, an article on electric light and its effect on melatonin secretion—a physiologic function tied to the cuing of sleep onset—sought out Carskadon to make sense of recent findings. The summary of the research cited computer use as at blame for students' poor sleep:

> One contributing factor to daytime fatigue in adolescents might be excessive use of computers, especially late at night when they are still alert . . . .Most sleep experts advise against using a computer for any purpose immediately before bedtime, because a bright computer screen is *believed* to affect the biological rhythms that govern sleep. (emphasis added)[6]

For her part, Carskadon was brought in to lend scientific explanation to this otherwise largely moral discourse against the use of technology at night rooted in 'belief'. Although there is doubt in her claims, her final turn toward the use of computers is a behavioral one, implying that the seductive presence of technology leads to poor 'regulation' of sleep:

> 'The risk of adolescents losing sleep due to computer game playing and Internet use seems high in direct proportion to the activating effects of these activities in combination, of course, with late-night access,' observes Dr. Carskadon. 'Whether melatonin secretory patterns are directly affected by the computer usage and whether phase shifts may result is still an open question. Regardless of effects on melatonin, however, latenight computer use opens another door to poor sleep regulation in teens.'

Where are sleepy students to find allies when even the scientific and medical proponents of later school start times are prone to blame the victims? Buried within the practice of contemporary sleep science are moral assumptions about the self-regulation of normalcy. But as sleep science has evidenced biological explanations for late sleep, cultural expectations have failed to shift in tandem; rather, cultural understandings of sleep have remained concretely mythical in their foundations, and the reality of social life—especially for students—has been accepted as one that depends upon the willful decisions of individuals to sleep or not sleep.

Technology might be the cause of sleep loss, but it might equally be the fault of school start times and the inflexible arrangement of students' lives. In the latter scenario, technology only serves as a means to fill time when children are expected to be in bed, and must resort to solitary or mediated group play. Such refrains to a technological cause and a perceived transformation in youth culture allow adults and institutions to justify their disciplining of unruly students without needing to think more deeply about the activities children have available. Such institutional and individual expectations of sleep depend in part upon understanding decisions about sleep as the willful choices of sleepers—or non-sleepers—and rely upon efforts to make sleep a behavioral concern rather than a biological one. Some scientists and activists have lobbied similar criticisms of American society more generally, and make recourse to our primordial nature to conceptualize how immersed we are in a world of technological distraction, relying themselves on the use of a naturalized primordial myths for understanding human behavior and society.

Technology, Globalization, and Sleep

One of the most persistent myths about the physiology of sleep and human social life is that life as it is ordered today is based on natural rhythms, including the scheduling of work, school, and the obligations of family life. A dominant way of conceptualizing this natural order is that of agrarian harmony, where early rising farmers start the day with sunrise, work until sunset, and then retreat home to family life. These primordial agrarian rhythms make sense of a day spent working or schooling, an evening with the family, and a full night's consolidated sleep. The agrarian myth lends legitimacy to dominant views of circadian

rhythms, which, in turn, legitimate treatment of a variety of sleep disorders—primary among them, insomnia. The point of medical intervention in this model is to restore an individual's natural rhythm. What the agrarian myth of everyday life fails to account for is the dip in the homeostatic sleep drive that most humans experience at midday, a cue for a nap; moreover, it assumes that consolidated sleep makes sense and extends the spatiotemporal regimes of everyday American life to some primordial point in humanity's history. The agrarian myth depends on ignoring simple realities of life as it has evolved, and human society throughout recorded history (Worthman and Melby, 2002). There is no reality to the agrarian myth of American everyday life's ordering, but its influences are profound. Because the agrarian myth serves as a means to justify American spatiotemporal formations, it also serves as a barrier to their reorganization. Moving beyond this myth is necessary for rethinking normal sleep and the ordering of society.

In this section, I focus on the thought of two proponents of the agrarian myth. The first is Martin Moore-Ede, a renowned sleep researcher; the second is Jeremy Rifkin, a Leftist political activist and author of numerous popular, post-Marxist texts. Both are relatively minor players in the history of twentieth-century sleep science and medicine, but they are representative examples of how public intellectuals, whether scientists or activists, deploy ideas about nature in thinking through human relationships to sleep and time. While they are not as central to sleep science as Nathaniel Kleitman or William Dement, they are important precisely because they were popular, both publishing books aiming to appeal to a broad, lay audience; their effects may be harder to chart than Kleitman's or Dement's, but it is because of this diffusion of their thought that charting their place in history is vital. Moreover, the deployment of the agrarian myth is more widespread than simply in the work of Rifkin and Moore-Ede—they serve as representatives of particular ways of thinking about human nature, justifying their thought through science. Much like Carskadon, they also provide examples of how even well-researched science can fall into the realm of mythical, primordial thinking.

At the time that he published *The Twenty-Four-Hour Society* (1993), Moore-Ede was already a well-respected sleep researcher, having published the voluminous *The Clocks that Time Us*, with Frank Sulzman and Charles Fuller—a watershed text in establishing the role of circadian rhythms in human physiology (Moore-Ede *et al*., 1984). *The Twenty-Four-Hour Society* is quite different, and intended for the American reading public more generally. Chapters are short, and in inviting language cover such concerns as nighttime lighting, driving regulations for truck drivers, the dangers of having doctors on call for long periods of time, and the nature of human sleep.

Since the 1970s, Rifkin has published books regularly, which generally take as their objects emergent economic, scientific, and technological concerns. Rifkin has published widely—on genetic engineering, on changes in the labor market and global economy, on the beef industry, and on computerization and the

social use of time. Written for a popular audience, *Time Wars* (1987) examines this latter concern: how are computers changing expectations of workers, and how does the intensification of work time shape other aspects of daily life? Rather than fulfilling some utopian promise of freeing Americans from work, Rifkin argues that computers, and what he refers to as 'computime', are having an increasingly negative effect on society.

Rifkin and Moore-Ede are rather alarmist in their concerns: the spatiotemporal rhythms of American society are encroaching on our human nature, they claim, a nature based in agrarianism. These rhythms are also, Rifkin and Moore-Ede conjecture, spreading around the globe, making escape from them impossible. For Moore-Ede, our technological future is inevitable, and it falls upon experts to find ways to mitigate its effects on our health; for Rifkin, another world is possible—one which foregoes the conveniences of computers. For both—and this is ultimately what unites them—there is a primordial human nature, one that exists in harmony with its environment, and which is disrupted by the presence of both social organization and technology. Americans will never be able to return to this mythic agrarian state, but its presence offers a humanistic rationale for the criticism of technology.

The Science of Primordial Sleep

Moore-Ede accepts a primordial state of human sleep, one which has been irrevocably disrupted by industrialization, electric light, and the 'twenty-four-hour society': 'Before the twenty-four-hour society took hold, everyone worked and slept more or less on the same schedule' (1993, p. 204). He also accepts that the introduction of the 24-hour society was a new spatiotemporal formation in the history of humanity, and that, once it was established, could only be negotiated with and not eradicated. Moore-Ede writes of the 'design' of the human animal, a 'design' intended for a hunter–gatherer model of society:

> Our bodies were designed to hunt by day, sleep at night, and never travel more than a few dozen kilometers from sunrise to sunset. Now we work and play at all hours, whisk off by jet to the far side of the globe, make life-or-death decisions, or place orders on foreign stock exchanges in the wee hours of the morning. (1993, p. 6)

Rooting human society in place formulates spatiotemporal orders that are tied to daily patterns of light exposure, but often ignores changes in the amount and timing of daylight. It also ignores that many human societies have developed in extreme conditions, as in the case of northern and southern communities exposed to long periods of light and dark.

Moving beyond geological connections between humans and their environments, Moore-Ede perceives continuity between humans and other animals,

noting that the dominant model of consolidated sleep is not necessarily a pre-given rhythm in nature:

> [M]ost animals actually catnap around the clock rather than adopting the *unusual human habit* of taking all our sleep in a single consolidated episode at night. But we still have vestiges of that age-old pattern of behavior, and with some training we can return to that more primitive state .... Napping is to a large extent a learned behavior, and cultural attitudes and the climate determine behavior. (1993, p. 177, 179, emphasis mine)

But there is confusion between learned behaviors and biological dispositions, as Moore-Ede also argues that the consolidation of sleep may have been of evolutionary benefit to *Homo sapiens*—napping is 'to a large extent' learned:

> Why does the human brain consolidate all sleep and all wakefulness into single blocks? ... Might sustained alertness have enabled the human being to rise above all other species, think great thoughts with sufficient concentration, solve complex problems with sufficient time, complete great tasks with this gift of focused attention? And might consolidated sleep bouts of eight hours have emerged as an effective survival behavior that kept our ancestors out of trouble at night by suppressing human curiosity and the urge to explore at dangerous hours? (1993, p. 23)

Moore-Ede perceives that culture concretizes the social formations of human sleep and activity, but he fails to examine how individuals come to find these arrangements important; instead, he highlights the hegemonic function of spatiotemporal rhythms, consolidated and promulgated by American capitalism.

Moore-Ede is no anti-capitalist; if anything, he is drawn to the chaotic excitement that global capitalism promises. He generalizes this desire for capitalism's enticements to American society broadly, and from there, internationally. This is how he characterizes the modern sleeper:

> Hustle and bustle, decisions, deals, and opportunities occur continuously, because it is always daytime somewhere in the global village. And those working in that daytime create a demand for instant attention from others who must work by night on the other side of the world. (1993, p. 8)

This production of spatiotemporal disparities—with some sleeping while others work—is recognized by Moore-Ede as being class based, with managers able to maintain a normal schedule, while laborers are forced into less desirable times for work (Krishnamurthy, 2010). This division is potentially a dangerous one, as night workers may be reluctant to contact supervisors in times of crises—for fear of waking their superiors, who are home, cozy in bed.

Fixing Pathological Sleep

The motive to publish *The Twenty-Four-Hour Society* was, in part, an attempt to ease the potential disasters of nightwork. Moore-Ede includes discussions of the Valdez oil spill, the nuclear meltdowns at Three Mile Island and Chernobyl, and the NASA Challenger explosion, all the result of sleep deprivation. Your business too, Moore-Ede implies, could be subject to risk by relying on shift workers—if they fail to be properly controlled. And it is this fear of what the 24-hour society might bring that tempers Moore-Ede's enthusiasm. But it is out of this that he elaborates his hopes for a potentially productive relationship between society and the individual, one where technology provides a new basis for elaborating 'human needs and nature':

> We cannot expect to control these costs [of failures due to fatigue] by retreating from the twenty-four-hour society into the lifestyle of the past. We are too far advanced in our technology and gain too many benefits from its application to our lives. Rather, we need to develop the wisdom to protect *human needs and nature* in the technological world we have created. (1993, p. 78, emphasis mine)

Against the hegemony of the 24-hour society, Moore-Ede argues for individuals to find a balance between their spatiotemporal demands and desires for sleep, a balance that may be encouraged by employers, but most likely is dependent upon individual decision-making; the wrong decision is worthy of individual blame. For Moore-Ede, it is the promise of scientific research and new technologies that might find remedies for the 24-hour society and its maladies. But this technology depends on the inflexibility of human physiology, a foundation that Moore-Ede makes frequent recourse to, and which he often aligns with a primordial past, or 'simpler era'. In the following, Moore-Ede posits an inability to 'adapt' alongside a primordial social formation:

> [The 24-hour society] might be fine if the human body were infinitely adaptable. But our patterns of sleep and wake, of digestion and metabolism, are governed by internal biological clocks, elegantly attuned to the patterns—of dawn and dusk, night and day—of a simpler era. (1993, p. 8)

But that 'simpler era' is a myth.

The Politics of Primordial Sleep

If Moore-Ede accepted the 24-hour society, but sought to mitigate its negative effects, Rifkin wrote *Time Wars* as a manifesto to rally resistance to modern American spatiotemporal demands. Rifkin's argument is based on a conception of humanity as necessarily divorced from the natural world through the alienating

effects of capitalism. For Rifkin, something must be done to realign humans with their primordial nature. Rifkin states his beliefs succinctly: 'Locked in a sea of perpetual technological transition, modern man and woman find themselves increasingly alienated from the ecological choreography of the planet' (1987, p. 21).

Rifkin blames 'computime' for this estrangement from our natural world, an increasing fractionalization of time as a result of the computerization of social life. This rise of computime produces a final separation of humanity from our natural environment: 'The new "computime" represents the final abstraction of time and its complete separation from human experience and the rhythms of nature' (1987, p. 24). This 'computime' is aligned with an intensification of the powers of globalizing capitalism, as communication and coordination possibilities increase with the availability and spread of computer technology. Thus, Rifkin's 'complete separation' is also a falling of humanity into a technologically mediated everyday life, from which escape is difficult but necessary.

For Rifkin, all life on Earth is imbued with a natural rhythm produced by the environment in which it evolved. From this foundation, Rifkin extrapolates to explain the problem of technological development as a predicament that human intelligence and culture have produced:

> [B]elow material surfaces, life is animated and structured by an elaborate set of intricately synchronized rhythms that parallel the frequencies of the larger universe . . . . The idea of biological clocks and circadian, lunar, and circannual entrainment suggests a radical new interpretation of context as more of a rhythmic bond than merely a spatial setting. While all living things can be characterized by the biological rhythms they inherit, *only human beings impose a social sense of time on top of the biological clocks with which we are born*. Since the dawn of Western consciousness, we have lived out our lives in a schizophrenic middle kingdom where biological and physical time clash head-on with our cultural and social time. (1987, p. 53–54, emphasis mine)

What creeps at the edges of Rifkin's conceptions of life and temporal rhythms is the inevitability of natural forces; humanity's ability to produce new, 'social' rhythms belies its inability to manufacture rhythms that actually matter biologically, that can overcome nature. Rifkin's invocation of that which is hidden 'below material surfaces' and the seemingly immaterial forces of 'cultural and social time' expose that his materialism fails to be strong enough to accept that 'cultural and social time' can replace 'biological and physical time'. Some social orders are conditioned by nature, and others are 'artificial', but can there be degrees of estrangement from nature, as Rifkin portrays?

> In agricultural societies, the rhythms of communal life follow closely the rhythms of nature. The rising and setting sun, the cycles and seasons of

> nature, the periodicities of the biological and physical environment all condition the repetitive rhythms of the social order. The modern urban environment creates an entirely different set of *artificially occurring rhythms*. Morning and evening rush hours, assembly line production, shift work schedules, and the like establish a repetitive and highly predictable rhythmic pattern, divorced from the rhythms of the natural world. (1987, p. 70, emphasis mine)

Rifkin acknowledges that both agricultural and modern urban social patterns are 'artificially occurring rhythms', but stipulates that modernity is more estranging. It is ultimately unclear in Rifkin's analysis as to why 'urban' spatiotemporal formations are negative in their effects—beyond simply further alienating humanity from nature, as if some alienation is permissible, but too much is fundamentally objectionable.

Rifkin's goal in *Time Wars* is to argue for the universal value of human time, with the time of the socially and economically disenfranchised being as valued as the elite (1987, p. 227). This revaluation of time, Rifkin assumes, will lead inevitably to a revolution, as the universal value of human time will lay a foundation to refashion a more equitable society. Rifkin's acceptance of primordial and universal constants might seem radical compared to Moore-Ede's willingness to negotiate with social transformations and technological possibilities; rather, both are conservative views of humanity's relationships with nature, technology, and society, imagining that with modernity a rupture from a historical natural order has occurred, and humanity has fallen from grace into a technologically mediated world at odds with our own best interests.

Fixing Pathological Societies

The central problem with both Rifkin's and Moore-Ede's conception of human biology is that they rely upon a normative ideal, an idea of human biology as invariable across the species, yet flexible within individuals (Martin, 1994). This flexibility can be used for good or ill—we can adapt to new spatiotemporal arrangements, but some of them might be unhealthy or estrange us from our nature. Moore-Ede recognizes human variations in preferred times of activity, but this is restricted only to modern humans; he fails to include such a set of variations in his understanding of primordial or pre-industrial life. He also fails to address what the evolutionary benefits of such a biological arrangement might be—which might be necessary to support his claim that consolidated sleep is a possible evolutionary benefit. In so doing, Moore-Ede accepts a flexible model of human physiology, albeit one negatively affected by orderings that contradict individual physiological dispositions. Similarly, Rifkin's model of human physiology is flexible: he recognizes that some temporal regimes are less desirable than others, and some take advantage of the disenfranchised, but individuals can cope

with these adverse spatiotemporal demands. Rifkin's concern is greater than individual life—all of human society pays for its demands on the time of workers. What Rifkin accepts as a normative ideal is a universal constant among living species, namely an inevitable attachment to environmental rhythms.

Both Rifkin and Moore-Ede draw the same conclusion: modern life is at odds with a species that has evolved in tune with sunrise and sunset, the seasons, and circannual revolutions. Where Rifkin and Moore-Ede differ is in their emphases on the forces of global capitalism, and whether it might be negotiated with or changed altogether. For Moore-Ede, capitalism's force on society and social arrangements is inevitable, and the human body is left to find ways to cope with the desire for profit and the need for sleep. For Rifkin, capitalism might falter if exposed to the raw power of human life's value. And, now, we live in the world predicted by Moore-Ede, and our means of mitigating the demands on our sleep reside in pharmaceuticals. Rifkin's revolution, despite changes in the economy and capitalist formations, has been deferred. But revolution may not be the point for Rifkin. Instead, as it is for Moore-Ede, a conception of humanity's primordial spatiotemporal sense of order, of sleep and wakefulness, provides a counterpoint to contemporary American everyday life and provides a basis for their criticisms of technology and the broader logics of individual blame.

The Horizons of Primordialism

In this section, I turn to a series of cases of adults who narrate their use of technological and chemical stimulants while in school. Their experiences evidence how their negotiation of the demands of their everyday lives—chemical, institutional, and biological—comes to be understood as a behavioral concern by authorities and threatening to society rather than as simply an intensification of the conditions of sleep that all humans experience. For most disordered sleepers, especially through their youth when they carry undiagnosed problems—or problems that might be interpreted as behavioral—self-medication becomes a necessity as a response to complaints about their bad behavior. With the variety of substances through which caffeine can be consumed—which is not limited to coffee, tea, soda and other soft drinks, chocolate, pills, and gum—most individuals are able to find means to insinuate caffeine into their daily routine as an accepted means for controlling sleepiness.

Andi, in the following interview excerpt, recalls how her sleepiness in school was accepted by those around her as her 'wanting attention'—clearly a behavioral decision. In her youth she had been diagnosed with infectious mononucleosis, which, in hindsight, she perceived as having interfered with an earlier diagnosis of narcolepsy with mild cataplexy.

> I missed a lot of school and I slept through a lot of school. It's kind of funny—I would need a nap right then and there, and I was out of

> commission. A lot of it they said had to do with wanting attention . . . .My mother got me up when I was younger, and I was always able to get to school—as a kid. Also, through college, I would try and avoid morning classes because I had trouble getting to them. I could short myself through the week and catch up on the weekend, but I'm not that young and flexible anymore.

Eventually, Andi took it upon herself to arrange her school days in such a way as to meet her desires for sleep. Andi relied upon what she perceived as a bodily flexibility, an ability to short herself through the week as a response to the institutional demands of school, which would inevitably need to be repaid over the weekend. That American institutions have come to rely upon a perceived flexibility in human biology only reifies the assumption that an inability to remain awake through class is a behavioral decision of individuals and worthy of blame.

Annette, a young woman who had experienced excessive sleepiness since the age of five, similarly faced institutional sanctions while in school, and turned to treating her symptoms with legal stimulants. At the time of her interview, she worked for the US military as a medical administrator, and had become increasingly aware of the role that her sleepiness played in her life throughout the course of boot camp, which she recalls in the following:

> *Were you self-medicating with caffeine?*
>
> Oh, god, yes. What is it, Ephedrine pills? Me and those were best friends. I always had some. I went through about eight or nine Mountain Dews a day. Um, yeah, and it still didn't help, that's what I found hilarious—that I could go to sleep drinking Mountain Dew like it was nothing. Caffeine pills—No Doz—is what got me through boot camp. I always had the shakes, but I thought it was normal. I didn't enjoy the Ephedrine, but I took it when I had to.
>
> I slept during my classes, I always have. I'm lucky enough that I'm fairly intelligent and functioned [well]. There were parent-teacher conferences a lot during high school, because I had teachers complaining about me sleeping in class and my mom would just make a deal with them, like 'If she drops below an A, tell her to wake up. Otherwise just let her sleep.' I slept my way through school; I don't remember much of high school. Every class was nap time. You learn the methods behind it, like sleeping with your eyes open, or ways to position your book [to sleep behind it]—I knew it all.

Annette and her mother both realized that her behavior in the classroom was dictated in part by her biological predisposition towards sleepiness; her mother was willing to intervene on her behalf to ensure that she was able to meet institutional

expectations of being in school, while still abiding by her desire for sleep. Annette's later reliance upon caffeine throughout her adult life—while possibly startling—is not exceptional. The social arrangements of American everyday life leads to the production of chemically influenced subjects, individuals who can only function to the level of others' expectations through reliance upon chemical means, a decision which they are compelled to make for themselves and which is understood as an individual choice rather than a necessity.

This situation of chronically sleep-deprived students and workers who must rely upon chemical stimulants is one that has been produced by expectations of appropriate forms of everyday life in relation to institutional times. However, despite the evidence that the school and work day might be a central cause in this production of a pervasive sleep debt, blame is often placed elsewhere, often in the behavioral decisions of children, adolescents, and employees who, in their socially legitimated powerlessness, make easy victims to accuse for their culpability in their sleep deprivation. To aid parents, administrators, employers, and scientists in their blaming of the victims, modern technologies are often seen as conspiring with school-aged children, and later workers, in their avoidance of sleep, from the presence of television, to the use of computers and video game consoles, to, most recently, text messaging and cell phones. In all cases, this depends upon the construction of a mythical nature of sleep that exists before technology and in which social organization is not to be blamed for the inadequacies of individuals.

Conclusion: The Troubled Nature of Human Sleep

Throughout this article, I have addressed debates about various kinds of influences on human sleep—from communication and media technologies, to social organization, to medical interventions and chemicals used to modify human sleep. Across these different influences, some technologies and forms of social organization are seen as contrary to human nature, as qualitatively different from other technologies and institutional forms that are more discrete in their effects, as in the case of school start times. School start times, unlike modern telecommunications technologies, are often assumed to be based in nature and help constitute a sense of a primordial natural state in which humans lived in harmony with nature.

The naturalness of institutional times stands in opposition to modern telecommunication technologies and laboratory-derived chemicals, which are often criticized for being disruptive to our human natures and for having negative impacts on our sleep patterns. While this may be true, it is equally true that the social arrangement of time can adversely affect sleep, as is demonstrated through the negative effects experienced by adolescents struggling with short allowances for sleep and early school start times. That children are seen as distracting themselves through technology usage results in the pathologization of individual behavior while reinforcing the rhythms of modern society; children are seen as bad actors in their use of technology, rather than recalcitrant school administrators

who refuse to alter school start times, and who often implicitly employ a mythic primordial human nature in defense of their decisions.

Sleep is often explicitly controlled through the use of chemicals. This manipulation reinforces the modifications to sleep that social institutions make. If there is mystery in Rifkin's analysis about why modern life is fundamentally more problematic than agrarian life, it may lie in the intensification of institutional forms of power, which have come to exist beyond the power of individuals to shape, and which shape our everyday lives. This kind of claim—which depends upon constructing a mythical primordial state—falsely attributes some technologies and social forms with greater disruptive potential and worthy of blame. Although we are often drawn to primordial thinking, human bodies are produced through their interactions with their sociotechnical environments (Stiegler, 1994) and our biology is always being shaped, interrupted, and challenged by our being in the world. Children and adults do not *choose* to be distracted by technology or influenced by social organization. Instead, technologies and organizational forms participate in our always mediated relationships with nature (Martin, 1992 [1987]; Lock, 1993). In some cases, technology may be serving as a distraction, interfering with one's desire for sleep; but, technology also provides an easy object of criticism for physicians, scientists, and parents. In doing so, normative social expectations and the institutions that frame them can be upheld in the face of blameworthy, disorderly behavior on the part of individuals.

Discourses of technological distractions broadly circulate in American society through the criticism of social transformations that make what appear to be new demands on individuals, as in Rifkin's and Moore-Ede's writings on globalization and late twentieth-century capitalism. The construction of, or recourse to, the primordial, whether in relation to sleep or any other biological phenomena, carefully ignores how human nature is always mediated by its environment—including both technologies and institutions. That novel technologies continue to be produced and serve as a means to displace the criticism of social organization onto the behaviors of individual users means that no significant social change can occur. Instead, as long as individuals and their choices are seen as the site of intervention and criticism, there will always be a displacement of blame. If we are to truly assess modern sleep in the USA and elsewhere, we must begin by accepting that human nature is always mediated by technology and social organization and that any postulation of how sleep once was is mediated by the myths of a primordial past which never existed. Moreover, if we are to assess how human biology interacts with social organization more generally, we need to understand the ways that primordialism obscures our objects of analysis, whether it is human biology or social influences. The first, necessary step in this direction is accepting the always mediated nature of human biologies; there is no biology without the social, and criticisms of the behaviors of individuals depend upon a robust conception of the interactions between the biological and society, its institutions, technologies, and relations.

Acknowledgements

This work was supported by the National Science Foundation [grant number 0551757].

Notes

[1]The names of Dr MacTaggart and the MSDC are pseudonyms. This paper is based on research conducted at a sleep disorders clinic as well as among sleep-disorder patient support groups. Over 30 months, I attended weekly staff meetings, local support groups, and national professional meetings, as well as spent nights in the clinic observing patients sleep; each of these sites also served as a mechanism to recruit interviewees, including patients, their bedpartners, clinicians, researchers, and support group facilitators. This, in turn, was succeeded by a year of research in the Chicago area, primarily with sleep disability support groups.

[2]Van den Bulck's research is conducted in Belgium (2003, 2004), where there are clearly different cultural presumptions about normal sleep and appropriate sleep times for students; my interest in discussing his work is motivated by the fact that it was a topic of conversation among the sleep researchers and clinicians I conducted fieldwork with, as well as that since it is the only research being conducted along these lines, it will surely lay foundational assumptions for other researchers who pursue this path in the future.

[3]Elsewhere, I focus on the contributions of Nathaniel Kleitman, the father of American sleep science, and his student, physician William Dement, in the twentieth century, particular as their work relates to ideas about normative social uses of time and human sleep (Wolf-Meyer, 2013; see also Chapter 2 in Wolf-Meyer, 2012). I also focus elsewhere on historical figures in sleep medicine and science, particularly Robert Macnish and William Whitty Hall, as they navigate the transition between biphasic and consolidated sleep (Wolf-Meyer, 2011).

[4]Representative examples include the research of Emily Martin on menstruation and menopause (1992 [1987]), Margaret Lock on aging and menopause (1993), Jonathan Kahn on race and medicine (2012), and Keith Wailoo on race and sickle cell disease (2001).

[5]For a wide ranging survey of historical and contemporary understandings of 'nature' and the force it has in the lives of individuals and societies, see Daston and Vidal's collection, *The Moral Authority of Nature* (2004), as well as Daston's Tanner Lectures (2004), "The Morality of Natural Orders: The Power of Medea". Central to Daston and Vidal is not what nature *is* but what nature *means* in specific contexts, and how human action is explained and disciplined as a result of how nature is understood.

[6]*Sleepmatters* 5.4 (Fall 2003), reprinted online at http://www.sleepfoundation.org/site/c.huIXKjM0IxF/b.2422499/k.68BD/School_Daze_Kids_Computers_and_Sleep.htm (accessed 18 May 2007).

References

Armstrong, D. (2002) *A New History of Identity: A Sociology of Medical Knowledge* (New York: Palgrave).

Aubert, V. and White, H. (1959a) Sleep: A sociological interpretation. I, *Acta Sociologica*, 4(2), pp. 46–54.

Aubert, V. and White, H. (1959b) Sleep: A sociological interpretation. II, *Acta Sociologica*, 4(3), pp. 1–16.

Barthes, R. (2013 [1957]) *Mythologies: The Complete Edition* (New York: Hill and Wang).

Canguilhem, G. (1991 [1966]) *The Normal and the Pathological* (New York: Zone Books).

CAREI (1998a) *School Start Time Study: Final Report Summary* (Minneapolis: Center for Applied Research and Educational Improvement).

CAREI (1998b) *School Start Time Study: Technical Report, Volume II: Analysis of Student Survey Data* (Minneapolis: Center for Applied Research and Educational Improvement).

Carskadon, M. A., Harvey, K., Duke, P., Anders, T. F., Litt, I. F. and Dement, W. C. (1980) Pubertal changes in daytime sleepiness, *Sleep*, 2(4), pp. 453–460.

Carskadon, M. A., Harvey, K. and Dement, W. C. (1981) Sleep loss in young adolescents, *Sleep*, 4(3), pp. 299–312.

Conrad, P. (2007) *The Medicalization of Society: On the Transformation of Human Conditions into Treatable Disorders* (Baltimore, MD: Johns Hopkins University Press).

Daston, L. (2004) The morality of natural orders: The power of Medea, in: G. B. Peterson (Ed) *The Tanner Lectures of Human Values*, pp. 373–392 (Salt Lake City, UT: University of Utah Press).

Daston, L. and Vidal, F. (2004) *The Moral Authority of Nature* (Chicago, IL: University of Chicago Press).

Davis, L. (1995) *Enforcing Normalcy: Disability, Deafness, and the Body* (New York: Verso).

Eggermont, S. and Van den Bulck, J. (2006) Nodding off or switching off? The use of popular media as a sleep aid in secondary-school children, *Journal of Paediatrics and Child Health*, 42(7/8), pp. 428–433.

Ekirch, A. R. (2001) Sleep we have lost: Pre-industrial slumber in the British Isles, *The American Historical Review*, 106, pp. 343–386.

Ekirch, A. R. (2005) *At Day's Close: Night in Times Past* (New York: W. W. Norton).

Hagenauer, M. H., Perryman, J. I., Lee, T. M. and Carskadon, M. A. (2009) Adolescent changes in the homeostatic and circadian regulation of sleep, *Developmental Neuroscience*, 31(4), pp. 276–284.

Kahn, J. (2012) *Race in a Bottle: The Story of BiDil and Racialized Medicine in a Post-Genomic Age* (New York: Columbia University Press).

Krishnamurthy, M. (2010) *1–800 Worlds: Embodiment and Experience in the Indian Call Center Economy*, Department of Anthropology (Austin, TX: University of Texas, 243).

Kroker, K. (2007) *The Sleep of Others and the Transformations of Sleep Research* (Toronto: University of Toronto Press).

Lock, M. (1993) *Encounters with Aging: Mythologies of Menopause in Japan and North America* (Berkeley: University of California Press).

Lowson, E., Middleton, B., Arber, S. and Skene, D. J. (2013) Effects of night work on sleep, cortisol and mood of female nurses, their husbands and children, *Sleep and Biological Rhythms*, 11(1), pp. 7–13.

Martin, E. (1992 [1987]) *The Woman in the Body: A Cultural Analysis of Reproduction* (Boston, MA: Beacon Press).

Martin, E. (1994) *Flexible Bodies: Tracking Immunity in American Culture—From the Days of Polio to the Age of AIDS* (Boston, MA: Beacon Press).

Martin, D. (1999) Late to bed, early to rise makes a teen-ager . . . Tired. *New York Times*, New York, ED24.

McLean, T. (2006) Teens rely on TV, games for sleep, *The Australian*, Sydney, Australia, July 26.

Mintz, S. (1985) *Sweetness and Power* (New York: Penguin).

Moore-Ede, M. (1993) *The Twenty-Four-Hour Society: Understanding Human Limits in a World that Never Stops* (Reading, MA: Addison-Wesley Publishing).

Moore-Ede, M., Sulzman, F. and Fuller, C. (1984) *The Clocks That Time Us: Physiology of the Circadian Timing System* (Cambridge, MA: Harvard University Press).

Owens, J., Maxim, R., McGuinn, M. Nobile, C., Msall, M. and Alario, A. (1999) Television-viewing habits and sleep disturbance in school children, *Pediatrics*, 104(3), e27, pp. 1–8.

Rifkin, J. (1987) *Time Wars: The Primary Conflict in Human History* (New York: Simon & Schuster).

Rose, N. (1990) *Governing the Soul: The Shaping of the Private Self* (New York: Routledge).

Steger, B. and Brunt, L. (2003) *Night-time and Sleep in Asia and the West: Exploring the Dark Side of Life* (New York: RoutledgeCurzon).

Stiegler, B. (1994) *Technics and Time, 1: The Fault of Epimetheus* (Stanford, CA: Stanford University Press).

Taylor, B. (2003) Recapturing childhood, in: J. de Graaf (Ed.) *Take Back Your Time: Fighting Overwork and Time Poverty in America*, pp. 46–51 (San Francisco, CA: Berrett-Koehler).

Van den Bulck, J. (2003) Text messaging as a cause of sleep interruption in adolescents, evidence from a cross-sectional study, *Journal of Sleep Research*, 12, p. 263.

Van den Bulck, J. (2004) Television viewing, computer game playing, and internet use and self-reported time to bed and time out of bed in secondary-school children, *Sleep*, 27(1), pp. 101–104.

Venn, S., Meadows, R. and Arber, S. (2013) Gender differences in approaches to self-management of poor sleep in later life, *Social Science & Medicine*, 79(1), pp. 117–123.

Wailoo, K. (2001) *Dying in the City of the Blues: Sickle Cell Anemia and the Politics of Race and Health* (Chapel Hill: University of North Carolina Press).

Williams, S. (2005) *Sleep and Society: Sociological Ventures into the (Un)known* (New York: Routledge).

Williams, S. (2011) *The Politics of Sleep: Governing (Un)consciousness in the Late Modern Age* (New York: Palgrave Macmillan).

Williams, S. and Wolf-Meyer, M. (2013) Longing for sleep: Assessing the place of sleep in the 21st century, in: E. Rhaikel (Ed.) *Somatosphere*. http://somatosphere.net/series/longing-for-sleep (accessed 25 July 2014).

Wolf-Meyer, M. (2011) The nature of sleep, *Comparative Studies in Society and History*, 53(4), pp. 945–970.

Wolf-Meyer, M. (2012) *The Slumbering Masses: Sleep, Medicine, and Modern American Life* (Minneapolis: University of Minnesota Press).

Wolf-Meyer, M. (2013) Where have all our naps gone?, Or Nathaniel Kleitman, the consolidation of sleep, and the historiography of emergence, *Anthropology of Consciousness*, 24(1), pp. 96–116.

Worthman, C. M. and Melby, M. K. (2002) Toward a comparative developmental ecology of human sleep, in: M. A. Carskadon (Ed.) *Adolescent Sleep Patterns: Biological, Social, and Psychological Influences*, pp. 69–117 (New York: Cambridge University Press).

Yanagisako, S. and Delaney, C. (1994) *Naturalizing Power: Essays in Feminist Cultural Analysis* (New York: Routledge).