Modernity and Cultural Decline

A Biobehavioral Perspective

Matthew Alexandar Sarraf
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"*Modernity and Cultural Decline* is a breathtaking scientific analysis of the rise—and now the decline—of Western civilization. The authors' use of bio-genetics is unique and profound. Spengler and Toynbee would have been interested. We also should be interested—and forewarned."

—Seymour Itzkoff, *Professor Emeritus of Education, Smith College, USA*

"The authors advance a bold thesis to explain the decline of the West … in terms of evolutionary processes. They discuss cutting-edge evolutionary theories of human sociality … The authors explain the 'social epistasis amplification model' and the role of spiteful mutations. … The book puts human nature, genes and evolution back into historiography and sociology, from where those concepts have been largely expelled since the mid-twentieth century. The final chapter advances … cosmological reasoning by providing a far-futures vision of the possible course of human space-colonization … This is the real thing, sharp minds … offering testable hypotheses based on quantitative models. As I read *Modernity and Cultural Decline* it occurred to me that … many university departments deserve to be … restocked with genuine scientists."

—Frank Salter, *Former Researcher of the Max Planck Society, Germany*

"A profoundly important book. The authors have that rarest of combinations: vision and courage. This, combined with a vast technical knowledge, makes for a potent force. To tackle the evolutionary-genetic basis for the problems of Western civilization, in light of industrial technology, seems obvious, and yet they are the first to do so. And even if their highly pessimistic conclusion pans out, there is still much value in understanding our road to collapse. One can only hope that society finds the will to engage with these vital and consequential ideas."

—David Skrbina, Senior Lecturer, *University of Michigan, Dearborn, USA*

"*Modernity and Cultural Decline* is a supremely bold, thoroughgoing biological account of often unacknowledged double-edged or negative impacts of modernity … [such as] rising psychopathology, nihilistic outlook and social incohesion. The actual plusses and minuses of life in the modern era are teased out in a profound chapter clearing away the political and philosophical lenses through which commonly modernity is viewed. Socio-cultural phenomena—the puzzle of the demographic transition as well as industrialization—no less than psychology and morphology are here shown to be highly amenable to study in terms of genetics and evolution…

In unusual depth of argumentation with voluminous evidence, there is no flinching at the great complexity of the data, which is treated forensically. Criticism in particular is dealt with comprehensively.

The gauntlet is thrown down with … near exhaustive detail, providing food for thought, irrespective of how near the mark the authors—or in agreement the reader—may be. This is the sort of science book of which we need more: highly innovative and expansive to the point of seeming blue-sky-thinking that nevertheless is grounded."

—Steve Moxon, Independent Researcher,
Author of Sex Difference Explained *(2016)*

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M.A.S.: To the memory of my grandparents

M.A.W.o.M.: To the memory of Professor Henry Cosad Harpending

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CHAPTER 1

Introduction

Threats to the Future

The essential message of this book is that Western populations are in decline, by which we mean that they are changing in a number of significant ways that are reasonably considered to be undesirable. Although this deterioration is manifest most clearly at the sociocultural level, we argue that its ultimate basis is in human biological evolution. Modern Western people have been losing a number of important traits, including intelligence and what might be called "existential vigor," understood as an individual's robust psychological commitment to his culture-bound way of life. This is apparent across a host of indicators of mental and physical health, intellectual productivity and ability, social cohesion, and perceived meaning in life. As they seem to comprise the foundation of advanced civilizations, the loss of these traits may prove catastrophic in the long run. The deepening of social isolation (declines in family formation alongside high rates of family dissolution; solitary living; preference for short- over long-term relationships), profane and narcissistic culture (secularization and rejection of all forms of transcendence, especially those encouraging sacrifice for anything other than individual hedonistic gain[1]), and ideological/sub-cultural fragmentation

[1] Some have argued that recent Western history, sometimes meaning modernity (which can denote different time periods, but in this context most often means the period from industrialization on) and sometimes the contemporary period more narrowly, has not been an "age of disenchantment," but rather that in this era, transcendent meaning has been sustained through or is being revived by "New Age" and other forms of basically paganistic

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(political strife; opposition to widely shared standards of behavior) all indicate societal degradation. None of these problems is likely to be corrected in the foreseeable future. They are all *sequelae* of an anti-civilizational evolutionary path on which industrialization and postindustrialization (collectively, "modernization") have set all Western societies. We contend that the highest form of civilization is a complex, adaptive response to harsh and rare ecological and environmental challenges. When non- and anti-civilizational traits and corresponding behaviors are biologically permitted, that is, not selected against or even selected for, civilization is, in an important sense, no longer adaptive, and thus its basis starts to erode. It is cruelly ironic that since industrialization, civilized life has undermined itself by altering selection pressures such that they promote this outcome.

The current work aims to provide an *evolutionary-behavioral theory of social development*, which is intended to explain the historical ascendance of Western civilization, as well as, and more importantly, its recent decline and evidently grim future prospects. A key component of this latter part of our analysis is an explication of the distinctive psycho-existential idiosyncrasies of modernized Western peoples, particularly *nihilism*, the sense that life—whether it is one's own or that of all humans or even of all animal organisms—has no point, and various *mental health* problems, especially depression, anxiety, and schizophrenia. This book is primarily a work of social science, which may seem strange given the breadth of topics that it covers and especially its biological emphasis. But we understand the relevant topics as broadly as possible, such that a wide set of variables pertaining to the condition of groups, societies, and civilizations requires our attention. One cannot devise an adequate theory of the current state of, or historical changes in, for example, the mental health of a population without considering biological and macro-sociological factors. Further, scientists are only just beginning to understand the dynamical interplay of these factors, including the "social" quality of the genome itself and its ramifications for broad trends in mental health. Nonetheless, our theoretical approach competes with a regnant paradigm that seeks to explain all group-level human behavioral variation purely in terms of "environmental" phenomena; this "environmentalist" alternative is often accompanied by an explicit or implicit

and/or occult thought (see, e.g. Josephson-Storm, 2017; Partridge, 2004/2005; Teichrib, 2018). While this view may not be entirely inaccurate, we will later discuss empirical data indicating that it is exaggerated: if one understands "disenchantment" simply as loss or relative lack of perceived existential purpose, then it does seem that disenchantment characterizes modern history.

hostility toward any explanation of human behavioral[2] (as well as social, cultural, etc.) variation that invokes biology. The theoretical and empirical poverty, indeed hopelessness, of this paradigm has been made overwhelmingly clear through research in the fields of psychometrics, sociobiology, human behavioral ecology, behavior genetics (including molecular genetic research), evolutionary psychology, and related disciplines. Alas, such work is little known in the behavioral sciences as a whole, and so we devote a chapter (Chap. 2) to apprising readers of relevant findings in these fields and critiquing the paradigm that would have us ignore them.

Our evolutionary-behavioral theory of social development builds upon and unifies a substantial body of research on the historical, biological, and psychological dynamics of Western civilization, in which two of the current authors have participated. Woodley and Figueredo (2013) and Woodley of Menie, Figueredo, Sarraf, Hertler, Fernandes, and Peñaherrera-Aguirre (2017) have provided substantial evidence indicating that Britannic populations reached their peak of general cognitive ability and intellectual productivity around the middle of the nineteenth century, roughly contemporaneous with the end of the British industrial revolution. A precipitous and ongoing decline in both of these domains followed. One successful hypothesis, propounded by Woodley and Figueredo (2013) and recapitulated by Woodley of Menie, Figueredo, et al. (2017), and tested by the latter, maintains that the harsh and variable environments and ecologies of Early Modern Europe—due primarily to low but fluctuating temperatures and resultantly brutal winters that constituted a "Little Ice Age" in this period—shifted the balance of selection pressures on Western populations strongly to the *group level*, placing them primarily under *group selection*,[3] and that both these group-level and the remaining *individual-level* selective pressures favored high levels of general intelligence in these populations. Selection shifted in this way because resource scarcity in this

[2] Unless otherwise indicated, we intend "behavioral" to be inclusive not only of observable behavior but also of psychological properties, although we will occasionally use the term "psychobehavioral" to refer to that same general category.

[3] Group selection typically entails that groups of organisms compete with one another to survive and reproduce, as opposed to individual selection, which often entails that individuals compete with one another to survive and reproduce (although there are many factors that exist independently of competition that contribute to differential fitness between groups and between individuals). These are not mutually exclusive processes, but the balance of selective pressure at any given time may be closer to the group or individual level. The topic of the "levels of selection" (e.g. selection at the group level or individual level) is discussed in more detail in Chap. 2.

difficult environmental and ecological context provided a fitness advantage to those populations that acted *as* groups to enhance their share of resources via inter-group conflict (war). General intelligence was selectively favored insofar as it increased the ability of individuals and groups to meet the many novel challenges that they faced in these trying conditions. Additionally, Woodley of Menie, Figueredo, et al. (2017) found that use of altruistic words sampled from Charles Darwin's 1871 *The Descent of Man* reached a peak among Britannics in this group-selected phase, suggesting that group selection promoted altruistic dispositions that facilitated social cohesion and allowed Western populations to act as coordinated wholes in war. Other studies suggest that these same selective patterns applied historically to the Japanese (see Fernandes, Zerbe, Peñaherrera-Aguirre, & Figueredo, 2021). As modernization took root and advanced, the use of altruistic words fell along with intellectual achievement and general intelligence. The decline appears to have continued.

With a similar eye to evolutionary changes among Western populations over time, Woodley of Menie, Sarraf, Pestow, and Fernandes (2017) advanced a new theory, the *social epistasis amplification model* (SEAM), to account for apparent fitness-depressing behaviors and traits in Western populations following industrialization—for example, sub-replacement fertility and the apparent rising prevalences of personality and other mental disorders. This model posits that relaxation of negative selection, that is, selection against deleterious mutations, in Western populations via profound reductions of sources of morbidity and mortality (mainly through industrialization and subsequent macro-sociological processes) has had and continues to have adverse effects beyond genetic damage accruing to carriers of deleterious mutations. Evidence was presented that via social epistasis, that is, inter-organismal genomic transactions, the effects of harmful mutations can be amplified to non-carrier humans and the broader group behavioral ecology, especially if those affected by deleterious mutations have high social status and thus roles in creating, shaping, and maintaining norms of behavior.

Here we argue that patterns of social epistasis and selection regimes are interactive, with civilizational behavior depending crucially on a fragile configuration of the two. A critical premise in connecting these phenomena is that the costs of defeat in war are *severe*: losing populations face potentially substantial reductions of fitness.[4] It is thus essential that those

[4] One could argue that with the shift from tribal to more complex human societies, the nature of warfare changed greatly, such that extinction of populations through inter-group conflict became very rare. Thus, the fitness costs of inter-group conflict may have been markedly attenu-

populations under group selection and competing with other groups via warfare be attuned to and able to thwart all major threats to the integrity of their groups, both *without* and *within*. Based on the work of Woodley of Menie, Sarraf, et al. (2017), we term social epistasis that issues from deleterious mutations, and that has in all likelihood universally negative effects on group and individual fitness, *negative social epistasis*, and argue that it has the potential to substantially undermine the fitness of groups it afflicts. It is known that those Western populations that were likely under group selection exercised rigorous cultural controls, and thus had little tolerance for aberrant behaviors on the part of their members (on Medieval Europe, see Epstein, 2009; Moore, 2007). Those who deviated sharply from established norms of psychology and behavior were apt to be selected against, socially (e.g. via ostracism) and sexually. These forms of selection against non-normative persons may reflect adaptations of group-selected populations, for example, elevated monitoring of threats to the group's behavioral ecology, which may have had the effect of triggering control of those individuals at risk of generating negative social epistasis before they could inflict population-level harm.[5] Stringent cultural controls would have had the effect of not only generally promoting those behaviors beneficial to the group's fitness but also of making salient those with genetic predispositions at odds with the behavioral requirements of the group. For instance, participation in and compliance with the demanding rituals and standards of conduct that were part and parcel of traditional Christian life may have been very difficult for those outside a range of relevant genotypic

ated. Nonetheless, there is evidence that selection pressures related to inter-group conflict in the Modern Era were quite strong, having had the effect of inducing large changes in population levels of at least one psychological trait over the course of about a century (Woodley of Menie, Figueredo, et al., 2017). If relevant inter-group conflict in the Modern Era had been associated with weak group-level selective pressure, and so with small fitness losses for populations that were unsuccessful in such conflict, one would not expect group-level selective pressure to have induced large changes in population levels of phenotypic traits in the course of just ~100 years from that Era—but germane data suggest that such selective pressure did have such effects in the case of at least one phenotypic trait (Woodley of Menie, Figueredo, et al., 2017).

[5] We may conjecture that the broader competitive ecology of Little Ice Age Europe would have promoted progressively more effective social monitoring of this sort, in that competing groups would have effected a positive feedback loop of selection for general intelligence among themselves (through warfare, as indicated above), with each group being placed under selection for higher levels of this trait, at least in proportion to the advantage a more intelligent group(s) had over them by virtue of superior intelligence; with growing average general intelligence of any group, there would have been a more efficient and effective execution of all social processes with the function of maintaining or improving group integrity, and the same sort of positive selective feedback loop would likely have applied to all other traits that could so benefit group integrity, including monitoring for negative social epistasis.

variation, facilitating social and sexual selection against them.[6] The resultant efforts to control non-normative anthropological types would have had the effect of limiting genetic diversity. This in turn would have promoted concern among individuals for the genetically discriminable broader groups to which they belonged, insofar as fitness payoffs to investment in such groups increase as a function of intra-group genetic homogeneity (assuming that competition with sufficiently genetically dissimilar groups occurs; Salter & Harpending, 2013); further, the more exactly a population reflects the genetic and hence behavioral natures of any given group member, the stronger adherence to and identification with group norms may be, which could serve to fortify the group against internal and external hazards via the promotion of, for example, social monitoring behaviors.

The foregoing potentially suggests a biological explanation of purposive, that is, non-nihilistic, lifeways and moral/ethical systems that were likely common prior to industrialization (see Chap. 3). These lifeways and systems turned on sharp, unequivocal distinctions between normative (e.g. "good" and "bad") and deontic (e.g. "right" and "wrong") facts, properties, and categories. "Moral ambiguity," while a familiar concept in the secure and comfortable modern world, was likely somewhat alien to premodern Christians (or at least less familiar than it is to modernized people). This might be true partly because uncertainty, doubt, or lack of conviction about the right and the good would have potentially compromised the social monitoring necessary to maintain the genetic and behavioral ecological architecture of groups.[7] Not only this but also such

[6] Something similar seems to happen with the modern Amish, whose austere way of life annually brings non-trivial fractions of Amish youth to abandon their communities for the modern world when the opportunity to do so is presented to them (Harpending & Cochran, 2015; this opportunity comes about in an established adolescent rite of passage known as *Rumspringa*, which has endured in the Amish world possibly because it is an adaption for controlling patterns of social epistasis); the high levels of social stability and well-being and low levels of mental illness (Seligman, 1990) that the Amish enjoy may have something to do with this "boiling off" of incompatible members of their communities (Harpending & Cochran, 2015 also discuss the role of such "boiling off" in the evolution of distinctively Amish traits).

[7] Gerhard Meisenberg (personal communication) suggests another possible driver of the more severe moral orientations of older Western populations: less developed abstract cognition, limiting the possible complexity and nuance of moral reasoning (see also Oesterdiekhoff, 2012, 2016, and along similar lines Meisenberg, Rindermann, Patel, & Woodley, 2012). Nonetheless, gains in certain dimensions of abstract reasoning through modernization (the Flynn effect, about which more later) have co-occurred with the increasing mutational dam-

moral-existential weakness of resolve would hardly have helped the morale of a group frequently contending with the trials of war. We can therefore see how group selection might have favored certain patterns of social epistasis and particular cultures, and indeed how these cultural constructs would have cemented those social epistatic patterns.[8]

But because group selection in these Western populations depended on such harsh and unstable environmental and ecological contexts, it and the socio-behavioral and biological conditions it promoted were sure to be undone given the diminishment of that harshness and instability. Such relaxation did in fact occur, brought on first by climatological warming and subsequently by industrialization (Woodley of Menie, Figueredo, et al., 2017), a process that significantly improved the material wealth of Westerners, thereby profoundly attenuating morbidity and mortality among them, which enabled world-historically unprecedented population growth. Insofar as milder climates and industrialization reduced the need for inter-group conflict by making resources more abundant, one might predict that they have decreased (or even reversed the pattern of) fitness benefits associated with robustness or hardiness and general intelligence at the group and individual levels. It is a likely fact that the milder an environment/ecology is, the more accommodating of genotypic diversity in a species it will be, for it will require fewer specific adaptations on the part of organisms to avoid death or reproductive failure. Moreover, there will be little reason for members of a group to execute rigorous sociomonitoring of their fellows to detect and eliminate or at least suppress the influence of non-normative types because in the absence of inter-group conflict, damage to a group's integrity poses little risk to the survival of the group as a whole or that of constituent members, at least in the short run. Additionally, when groups and individuals are faced with few urgent and novel challenges, general intelligence loses its evolutionary premium.[9] Individuals in these pacified

age described above. This leaves open the possibility that modernized moralities reflect much preoccupation with "moral ambiguity" because of distortions of the psychological processes underlying "nuanced" moral cognition, stemming ultimately from deleterious mutations.

[8] We will later argue that it is probably a mistake to think of social epistasis and culture as distinct phenomena. If social epistasis is, as we will maintain, a major epigenetic determinant of the patterns of (at least) psychobehavioral development that populations exhibit, then it likely influences the constituents of culture (e.g. political orientations, moral beliefs, and life goals).

[9] Though narrow, specialized cognitive skills suited to the generation of wealth in mild ecologies and environments do become valuable; the Flynn effect, or the observed rise in IQ scores in modernizing and modernized populations of about three points per decade, is largely or exclusively promoted by the enhancement of such skills (Woodley of Menie, Figueredo, et al., 2017).

conditions are best served by pursuing the enhancement of their own social status rather than expending time and bioenergetic resources on sociomonitoring that is unlikely to benefit their fitness. Indeed, the rise of tolerance as a moral-political virtue and the many movements vociferously espousing it may be best understood as efforts of individuals, especially those who would be targets of suppression in more demanding environmental/ecological conditions, to thwart the execution of those group-selected adaptations that would threaten their fitness (or their acquisition of utility or welfare, which in modernized environments appears to be what individuals directly seek instead of fitness, perhaps because welfare ancestrally served as a reliable proxy for opportunities to enhance fitness).

Liberalism in political philosophy and theory, and most fully concretely realized in the governments of the Western world, is close to the apotheosis of this moral tendency. For its defining feature, across the left- and right-wing variants of liberalism, is *neutrality* with respect to "comprehensive visions of the good," or complete conceptions of how life ought to be lived (Simpson, 2015, p. ix). Whereas premodern societies readily opposed those unable or unwilling to live in accord with the group's collective vision for human existence, liberal regimes will, at least in principle, only apply coercive force to ensure that all may live out their *own* conceptions of the good life in peace (meaning that just those who attempt to force their visions of the good life on others or who otherwise interfere with or harm others in particular, narrow senses of those terms are the targets of liberalism's coercion) (Simpson, 2015). Liberal regimes, then, interfere with the lives of "private" citizens only if the latter's activities pose a threat to pacified, "free" life. Conversely, it was essential to the survival of premodern or *illiberal* societies that their members exhibited certain virtues (e.g. honor, courage, heroism, fidelity, and wisdom) without which those societies could not have withstood the rigors of inter-group conflict.

This ideological shift of emphasis from the group to the individual level is observable not only in the realms of politics and morality. For instance, it has become fashionable to maintain, at least in some intellectual circles (especially those associated with a distinctive orientation to so-called Continental philosophy), that truth is irreducibly plural, stance-dependent, indeterminate, or, in more extreme cases, non-existent. Whatever their differences, all of these views have a tendency to promote the rejection of any firm and universally binding normative claims in matters of aesthetics, behavior, morality, or even science—though strangely virtually all proponents of views of this sort are decidedly on the left side of the political

spectrum. Some thinkers even celebrate this ambiguity about the truth, believing that it puts a check on "totalizing" worldviews that threaten to exact various abuses on the vulnerable.[10] These intellectuals correctly intuit that illiberal societies, promoting one or at least one fundamental comprehensive vision of the good life, will tend to favor a limited set of human types and will do what is necessary to increase the prevalence of those types in the group and decrease that of non-normative individuals. For the purpose of illustration, one might consider the contrast between, on the one hand, Catholic natural law theory (influential in medieval Western Europe), which holds that the very facts of nature entail that the same character traits and behaviors are objectively virtuous, or vicious, for all persons, and that these facts are knowable by way of a universally applicable logic, and, on the other, the now *de rigeuer* morality of the modern West, which posits that each person should seek a life of maximum satisfaction or fulfillment and should not interfere with (or should even facilitate) others' achievement of the same end (see Rubin, 2015).

As already indicated, it appears to be very probable that what might be called permissive selective regimes, of which liberalism,[11] postmaterialist individualism, truth relativism, and so on are both causes and effects, will produce more internally, genetically variegated human populations. On the face of things, this might not seem like a serious problem. But the more genetically diverse a population is, the less feasible will be any kind of truly shared way of life among its constituents, for members of the group will become more dissimilar with respect to the behaviors, ideals, values, and so on that they are biologically predisposed to perform and accept. In light of Eisner's (2003) research on the decline of human violence in the West over centuries, liberal governments have perhaps secured or at least allow broad compliance among their citizenries with principles

[10] Gerhard Meisenberg (personal communication) observes one rarely appreciated weakness of this strategy, which is that not all worldviews welcome to the liberal table clearly encourage commitment to the sorts of prosocial norms that would allow stable consensuses to be reached in pluralistic societies where normative truth is a contested matter. It is possible that ideologies with more aggressive and antisocial proponents may be advantaged in efforts at liberal consensus building such that they ultimately supplant liberalism with their preferred illiberal view(s).

[11] As we discuss in greater detail later, we use this term in the European sense, which represents the original understanding of liberalism. On this definition, indicated above, liberalism is the political view that governments ought not to impose on the governed any particular vision of the good, the right way to live, or however one might prefer to characterize such comprehensive normative ideals (see, e.g. Simpson, 2015).

of tolerance and non-harming.[12] At the same time, however, liberalism seems to go with ever more embittered divisions of ideology and *Weltanschauung*, even if it is not in the genetic and cultural nature of liberal peoples for these conflicts to frequently boil over into violence, and even if in the broad view of human historical and inter-population cultural variation, these divisions are rather trivial, with the rancor that attends them indicating something akin to the "narcissism of small differences." The adverse effects of population fragmentation under liberalism, or, more broadly, modernity, are subtle but damaging nevertheless. They are made manifest in the virtual disappearance of individuals' ability to communally share a way of life in the fullest sense, which some could argue involves spending all or nearly all of one's life around those who have the same relevant background and religion, and basic conception of human excellence and morality, etc., as oneself. Modern people can find those with whom they are alike in terms of personality and interests, but these alone are thinner bases for interpersonal ties. Matters are made worse by the fact that the prevailing self-oriented ethics of modernity, which emphasizes the importance of "authenticity," for example, actively encourages precise consciousness of personal idiosyncrasies and the calibration of one's life to fit them (see Rubin, 2015). This may encourage resentment toward traditional social norms, which, in part, serve to homogenize individuals' behavior around ideals. Joined with growing genetic diversity, this tendency threatens to steadily unravel the social networks foundational to civilization itself.

It must be kept in mind that this problem concerns not just genetic diversity per se but also a significant source of it. That source, as one may infer from earlier paragraphs, is deleterious mutation accumulation, permitted by the extreme reductions of morbidity and mortality characteristic of industrial and "postindustrial" modernity already discussed. The upshot of this is that not only are populations, at least in the West, becoming more genetically differentiated and thus likely less prone to social cohesion, but that many of the novel anthropological types that have emerged in this process are, at least in part, the products of mutational damage. Behaviors resultant from such damage, as already noted, are likely to be antagonistic to fitness regardless of ecological or environmen-

[12] Though this may have less to do with the cultural effects of liberalism on ontogenetic behavioral development than with the genetic pacification that preceded and likely partially enabled liberalism's broad purchase on the West (or it might be that contributions from environmental and genetic factors have been quite comparable; Frost & Harpending, 2015).

tal context (Woodley of Menie, Sarraf, et al., 2017). Consequently, carriers of such mutations risk undermining group integrity because their behaviors simply degrade individual and group fitness, and not merely due to their genetic difference from others. The severe rise of average levels of narcissism, which a number of psychologists, most notably Jean Twenge (2013), have found in multiple data sets may be a case in point. Although mild forms of personality disorders can offer fitness advantages (and thus in such cases probably are not reasonably classified as disorders), in more serious cases they are appropriately described as disabling. Without a doubt, high levels and prevalence of narcissism will curtail the development of group- and other-regarding virtues. Indeed, and as already noted, Woodley of Menie, Figueredo, et al. (2017) demonstrated that the use of altruistic words was highest in Britannic populations when they were most strongly under group selection, with a pronounced decline in usage frequency following the historical shift toward individual selection. This is in keeping with earlier work finding that the "cultural salience of moral character and virtue" fell sharply in the United States in the course of the twentieth century—reflected in changing relative usage frequencies of germane words in English-language textual corpuses—and relating this to the ascent of narcissism (Kesebir & Kesebir, 2012; Greenfield, 2013; note that per Woodley of Menie, Figueredo, et al.'s [2017] analysis, the effects of the collapse of group selection became clearly detectable around the turn of the twentieth century).

The upward trend in narcissism is of apiece with what appears to be a broad degradation of mental health and sociality in the Western world. A more extensive review is taken up later. For the sake of overview, one may consider the suggestion that counseling psychologist Morgan Brooks makes: that personality disorders have grown so common that it is questionable whether they should be "exclud[ed] … as disorder[s], or … accept[ed as] normal behavior[s] now" (Montes, 2013). Perhaps relatedly, there are indications that Americans have fewer strong interpersonal ties on average than they did three to four decades ago—though the matter is controversial (Brashears & Brashears, 2015)—and that Americans and Europeans experience chronic loneliness at rates far higher than in the recent past: John Cacioppo, a psychologist specializing in loneliness, maintains that in the 1970s and 1980s, some 11–20% of Americans reported chronic loneliness, whereas surveys conducted in the 2010s found that the rate had risen to around 40–45% (longitudinal as opposed to cross-sectional studies conducted recently in the United States and

Europe found rates around 26%; Entis, 2016). More concerning are the growing fractions of persons who have never married or had children at advanced ages (40s and 50s) across the Western world in the twentieth and twenty-first centuries.[13] It is possible that as people grow more personality disordered and generally mentally unwell, they are less suited for lasting social relationships, or to enjoy relationships and meaningfully connect with others through them, and thus are less invested in them.[14] So far, this is to consider just the possible adverse effects of personality disorders, and thus not even to mention the pronounced increases of depressive and anxious psychological distress (Twenge, 2013) and chronic and degenerative physical diseases[15] afflicting Western populations, which are doubtless impediments to healthy social life (see Chaps. 5 and 7).

This overview of the conditions of modernity is selective and incomplete. Much of this book is concerned with filling in the details and justifying our assessment of the facts. But while the picture thus far constructed is partial, it clearly suggests a pessimistic view. The main concern, drawn

[13] These patterns are given to fluctuation. High marriagelessness and childlessness were observed in parts of the West in the early twentieth century, for instance (Rowland, 2007; Sobotka, 2017), though in the past appear to have been related to social crises, such as significant interstate wars, which have become far less common over time in the West (Mann, 2018). It may be that in Western Europe, marriage began to wane at some point during or at the end of the Middle Ages; the Anglosphere, where high marriage rates remained the norm for much longer (Therborn, 2004), may have started to succumb to the same tendency in the second half of the twentieth century.

[14] Strikingly, the problem may be serious enough to have lowered the average annual frequency that American adults have sexual intercourse (1989–2014), which is surprising given the sexualization of Western culture and the associated liberalization of attitudes about sex (Alexander, Inglehart, & Welzel, 2016; Attwood, 2009; Inglehart, 1977; Inglehart & Welzel, 2005). But as it happens, a central cause of this decline has been "[a]n increasing number of individuals without a steady or marital partner" (Twenge, Sherman, & Wells, 2017; see also Collins, 2004), which is something that, ironically enough, sexual liberalization has if anything facilitated insofar as it promotes non-monogamous sexual behavior.

One might suppose that the number of people living without a marital or steady partner is an effect of an aging population with a concomitant increase in the percentage of widowed persons. However, the decline in sexual frequency is robust to a control for age and marital status (Twenge et al., 2017).

[15] Widerquist and McCall (2017) offer striking evidence of how badly human physical health has deteriorated in at least this respect (i.e. the prevalence of chronic and degenerative diseases) in noting that, even when differences in longevity between the populations are statistically controlled, women in hunter-gatherer societies tend to develop breast cancer at the extremely low rate of one in 800; among modern women of the United States, the rate is about 100 times higher.

from the data so far presented or indicated, is that peoples of the West are losing their genetic and behavioral integrity. Via group selection, Western populations became able to contend with particular threats to their survival, in that group selection substantially enhanced the degree to which they had certain traits: general intelligence, (intra-group) altruism, and groupishness. But, following the waning of inter-group conflict, the fitness benefits of these traits have reduced, even becoming costly to fitness in some cases (such as that of general intelligence).

One aspect of the genetic and epigenetic pacification resulting from reduced environmental harshness and involvement in war that some consider lamentable is its tendency to leave people with few great challenges to surmount—this, again, is the reason it does not favor the aforementioned group-selected traits. Pacified groups do seem to need efficient workers, or "human resources" as they are sometimes called, suited to reliably perform a small number of tasks demanding little creativity of thought, only narrowly focused skills. There must be some who can arrange these "resources" in useful networks of production, but they are few and, with falling general intelligence, one might predict, rarer all the time. These networks generate the wealth that sustains the peaceful existential conditions on which the networks depend. Indeed, it has been argued that economic and financial processes are the major factors that organize social relations in the pacified world (see Westbrook, 2004). Older illiberal forms of collective life centrally prioritized *comprehensive* visions of the good that, *because* comprehensive, fostered *exclusion* of whatever might endanger realization of those visions (Simpson, 2015). Conversely, modern liberal social life is more akin to a technology through which any person might satisfy his desires, as long as the satisfaction of those desires is sufficiently narrow and benign to avoid interference with others' pursuits. It is this enabling of each person to fulfill *distinct* visions of how to live that becomes primary, making the economic emphasis of liberal social organization predictable. But this necessarily limits, in certain ways, the scope and the grandeur of the liberal project: it is never more than the *mere* peaceful satisfaction of individual desires that is aimed at. For this reason, it does not, and cannot, involve an imposition of values that might unsettle happiness for the sake of a population's glory, dignity, or spiritual health. But it could be argued that those acting on such values overwhelmingly contribute to the record of history and myth, and therefore capture human interest, whereas those blandly striving after personal utility are forgotten.

This is perhaps why modern Western people are so often cast as internally flattened and evacuated, bereft of virtue, intelligence, or meaning. In terms of social status, they might be best served by this condition, as long as they maintain sufficient motivation to engage with the transactional matrix that defines their everyday world. But a whole way of life promoting little other than the banal pleasures offered by the market, and whatever quirks of identity and viewpoint that the ethic of universal inclusivity permits, is not unreasonably thought to trap us in a nihilistic malaise. A legacy of group selection may still have some of us wanting a society structured around our deepest substantive convictions, one made for the moral and biological flourishing of its people. But this desire is frustrated when the only collective goals of a population are peace and comfort, and especially when it is thought that the moral, existential, and ideological separateness of individuals are essential to their realization. Such an impoverished understanding of social life may leave us alienated, with the fruits of high culture and their bases decaying, and with awareness of this decay condemned for its "exclusionary" potential. It would seem that we have reached the point where pacification is the *bane* of civilization.[16]

Outline

This book proceeds as follows. In Chap. 2, we argue for the superiority of biobehavioral models of human behavior and behavioral variation relative to their purely sociocultural/environmental competitors. It will be shown that opposition to models of the former type emanates largely from scientific ignorance, political motivations, and implicit (but critical) assumptions about the effects of genes and environments on human behavior. Chief among these is the tacit belief that sociocultural or more broadly "environmental" factors are presumptively more determinative of variation in human behavioral outcomes than are biological ones. In light of what is known about the behavior of other animals, and the absence of evidence for relevant human exceptionalism, this presumption is unjustified. We also introduce the central biological concepts for our thesis: general intelligence (and its evolution) and life history, as well as the levels of selection.

[16] As a general rule, periods of peace have preceded times of civilizational decline the world over, and those times of peace themselves typically have followed eras of remarkable cultural development contemporaneous with much inter-group conflict. This is apparent in the history surrounding the *Pax Romana*, as well as the Warring States Period in China and the long run of violent conflicts between ancient Greek city states (see, e.g. Murray, 2003).

In Chaps. 3 and 4, we turn to human history with a biobehavioral perspective, specifically medieval and modern Europe. We observe that although many social scientists and theorists maintain that premodern forms of Western social life were more communitarian and enriched by purposiveness[17] than modern ones, little in the way of evidence is typically presented for this view. Further, among historians, this notion is not at all uncontroversial. We endeavor to show that in spite of the doubts of certain academics, at least some premodern Western societies were much more strongly communal and animated by collective purpose than their modernized counterparts. Our focus in the first section of Chap. 3 is on medieval Western European societies, which particular historians have argued were no less individualistic and divided over values and visions of the good than our own. But such an understanding seems unable to make sense of the untold numbers of altruistic sacrifices made on the part of medieval Europeans to defend Christendom against encroaching Islam. This is the primary reason that the accounts of those historians who present a communitarian picture of the Western Middle Ages are found more plausible than the alternatives. We interpret this group-oriented character of medieval Western populations in an evolutionary light.

These chapters further attempt to explain how the "break" with the premodern condition—that is, the onset and progression of industrial modernity or "modernization"—came about. We address the economic and social changes of Western societies and their genetic foundations, as well as the cultural *sequelae* of these developments. We hope to demonstrate that this sociocultural and economic evolution is best explained in terms of the adaptive challenges that Western groups have faced over time, resulting in slowing life history speeds and, prior to industrialization, higher levels of general intelligence.

Despite the profound enhancement of (components of) human well-being that modernization has produced, there are serious problems associated with the modern condition, which may be quantitatively (but perhaps not qualitatively) unique in the broader context of human history. Salient among the problems are *nihilism* and psychopathology, which seem to share phenomenology at the individual level and to be statistically associated at the group level. The kind of nihilism most relevant to our thesis is not an explicit philosophical idea or theory—though

[17] "Purposive" should be understood as an antonym of "nihilistic."

commitment to philosophical nihilism might be related to the sort that most interests us—but a psycho-existential condition. It seems to frequently occur in certain mental health disorders, depression and schizophrenia, for example, but appears independently of them as well. In a state of nihilism, one feels detached from the world and lacks strong commitment to or even interest in commitment to most or all things thought to be of central importance to human life (or lacks this commitment and/or interest altogether)—relationships, religions, ideologies, communities, and so on. This absence of commitment leads to nihilists' characteristic feeling that life is pointless. An analysis of relevant ideas of perhaps the major theorists of nihilism, Friedrich Nietzsche, Martin Heidegger, and Carl Schmitt, reveals that they all identified a condition that they believed to be peculiarly modern and characterized by existential estrangement and feelings of meaninglessness, which they identified as or associated with nihilism. Empirical data indicate that their suspicions were correct. In Chap. 4, the largely modern phenomena of "permanent revolutionaries" and disaffected intellectuals, and the associated emergence of totalitarian "political religions" in the twentieth century, are interpreted as related in part to modernized societies' inability to provide their members with enduring collective bases of existential purpose.

Chapter 5 critiques efforts to defend excessively optimistic views of modernity, focusing in particular on one especially prominent and recent endeavor along these lines from psychologist Steven Pinker—his book *Enlightenment Now*. This defense of modernity is shown to suffer from a number of weaknesses, which render it highly unconvincing. Most importantly, it has no serious answer to key criticisms of the modern condition from those on the political right and ignores, (baselessly) denies, or trivializes every serious problem that modernized humanity faces.

Chapter 6 investigates the distal sources of modernity's pathological aspects. We examine the possibility that deleterious mutations—that is, those that tend to impair genetic quality and therefore, or for some other reason, depress fitness and/or wellness—have accumulated in modernized populations, which could have a role in the loss of mental health and the nihilization and broader cultural decline of these groups. This accumulation of deleterious mutations may have resulted from the attenuation of sources of morbidity and mortality through industrialization and its *sequelae*. Many have thought that selection through morbidity and mortality has had the effect throughout humanity's evolutionary history of removing deleterious genetic variants from populations; thus, relaxing this

selection possibly would have allowed these mutations to accumulate. Certain evidence indicates that selection against these variants has indeed relaxed and that they have resultantly become more frequent in Western populations (at least). Nevertheless, some maintain that this relaxation has not in fact occurred, or that evidence for its occurrence is inadequate, and so arguments for this possibility are critically evaluated in this chapter.

Chapter 7 builds on findings consistent with the accumulation of deleterious mutations with the *social epistasis amplification model* (SEAM), which posits that the fitness costs of deleterious mutations are not limited to the organisms that carry them. This is possible in light of the existence of interorganismal genomic interactions, that is, social epistasis, whereby the genome of an organism (or the genomes of organisms) can influence another organism's (or more than one organism's) gene expression. If social epistasis occurs in humans, and evidence suggests that it does (Domingue et al., 2018), it is not unreasonably expected that mutations can social-epistatically alter patterns of gene expression in pathological ways, and therefore that the fitness costs of these mutations can be potentially massively *amplified*. In human populations, this process may manifest itself in the form of rapid collapses of both group and individual fitness and the institutions and behaviors that support them. We use a statistical model to test the predictions of the SEAM, and results are found to strongly support these predictions. We discuss the implications of the SEAM for the history of humankind, and examine in particular the role of social epistasis in determining group fitness in inter-group conflict, the (likely) resultant evolution of behavioral modules that have the purpose of controlling patterns of social epistasis, and the psychological character of groups subjected to long-term mutational social epistasis decay. We also argue that environmental determinist alternatives to the SEAM cannot explain the phenomena for which it accounts.

Chapter 8, which draws on the insights of psychologist Raymond B. Cattell and his system of "Beyondism," is a critique of eugenics and transhumanist philosophies. It also addresses dysgenic[18] concerns, which include the accumulation of deleterious mutations but also selection favoring socially undesirable outcomes, such as low levels of general intelligence.

[18] The term "dysgenic" denotes selection for traits generally thought to be socially undesirable, and selection against traits generally thought to be socially desirable; it is usually employed in discussions of selection for lower levels of human intelligence.

Eugenics is of course subject to any number of moral concerns, but equally it is far from clear that it would not exacerbate the troubles it seeks to resolve. It is highly doubtful that humans, especially given their current limitations, could devise an artificial selection regime able to promote the subtle and complex array of desirable traits most auspicious for traditional civilization. Transhumanism presents even graver dangers, possibly defacing all of humankind in an irrevocable way insofar as it may exaggerate some of the pathological human qualities that modernity has engendered. Absent the guidance of what has typically been called virtue (i.e. group-selected moral values and behavioral dispositions), the effects of transhuman "augmentation" could be severely negative. We are left with the unpalatable conclusion that modernity threatens us with either anti-civilizational regression or, should it avoid this, continued technological development inaugurating a "transhuman" future that is more dehumanized than superhuman.

Chapter 8 then concludes the work on a pessimistic note regarding the prospects of human life in particular and, more generally, intelligent life in the universe. Early chapters detail how civilization emerges from a complex set of interrelated factors: slowing life history speed, increasing general intelligence, and intensifying between-group competition. The standard outcomes of these synergistic processes are dense populations that exhibit significant social stratification, diverse cooperative microniches (as manifested in division of labor), prosocial and peaceful in-group and out-group orientations (i.e. pacification), and remarkable innovativeness and economic productivity. Populations with these characteristics may be described as having realized a high level of modernization. But the SEAM entails a dark side to the dynamic through which such groups are evolved. As populations become more productive, innovative, and prosocial, they relax morbidity and mortality; this increases population density, which allows for further niche diversification and thus economic development, but also raises the frequencies of deleterious mutations in the gene pool. Therefore, social-epistatic transactions, via rising population density, become more numerous in tandem with harmful mutations, and so the opportunities for negative social epistasis amplification expand rapidly.

Crucially, social epistasis control modules and in-group prosociality run the risk of corruption via the action of spiteful mutations, that is, mutations that undermine the fitness of those that carry them and those with which the carriers enter into social-epistatic transaction; while initially promoting group fitness, the functions of such adaptive behavioral architecture

may be redirected by mutations in pathological ways—for example, when in-group altruism becomes pathological altruism, and social epistasis control modules then fail to target the carriers of deleterious mutations.[19] The upshot is that group fitness collapse by way of negative social epistasis amplification may be an irreversible process insofar as it destroys the very factors that might undermine it. The implications are especially ominous if, as could be predicted, *convergent evolution* holds across the universe, meaning that all forms of highly intelligent life will manifest or have manifested the defining behavioral traits of humankind. It may then be biologically unavoidable that wherever intelligent life develops to a certain level of sophistication, it entropically degrades to a simpler state rapidly. If true, this theory would resolve the *Fermi paradox* or *Fermi-Hart paradox*, that is, the lack of evidence that extraterrestrial civilizations exist despite considerations indicating that many should. Human populations that were able to endogenously industrialize have sustained a "modernized" condition for only about a century and a half at most, yet are already showing multiple clear signs of entropic decay. If this is typical of intelligent life in the universe more broadly, countless extraterrestrial civilizations may have come and gone in the blink of a cosmological eye, perhaps never (notwithstanding a small number of possible exceptions) managing to develop much beyond the level of the contemporary Western world prior to breakdown and eventual extinction through unmanageable hazards (e.g. asteroid strikes). This suggests a *biocosmic pessimism* about the evolution of life and implies that progress is, in an ultimate sense, an illusion.

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[19] Throughout human history, it might be that the effects of social epistasis control modules have been the major source of *social* selective pressure controlling deleterious mutation accumulation. One may hope that through genetic engineering, humanity will develop a more benign way to control this problem, which would target mutations themselves rather than their carriers. But the problem is that we have not evolved instincts to target deleterious mutant genes apart from their carriers, which has pessimistic implications for the success of such endeavors.

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CHAPTER 2

Defending Biobehavioral Science

The Failure of Environmentalism

In the Western world at least, it is no exaggeration to say that those academic disciplines concerned with human behavior, even if only obliquely, are in the grip of strong normative biases. More specifically, these fields tend to exhibit biases consistent with a tilt toward individualizing psychological moral foundations[1] among their practitioners. Those with these moral foundations tend to associate with political ideologies on the "left." (We do not prefer to frame this matter in politically divisive ways, but much of the literature on normative biases in academic research does refer to the sources of these biases in political terms, and, in places, we are forced to follow their approach. Moreover, since political orientation can reasonably serve as a proxy measure for individuals' moral foundations [Haidt, 2012], and because good data explicitly concerning the distribution of moral foundations in populations are quite limited, while such data on political orientations are abundant, referring to the literature on population distributions of political orientations lets us better ascertain the state of certain normative biases in the academic fields that are of interest to us than we otherwise could.)

[1] Following the work of Haidt (2012), Gladden and Cleator (2018) describe concerns for fairness—which, in light of Haidt's moral foundations questionnaires, seems largely to reduce to egalitarianism—and harm avoidance, which captures moral inclinations to compassionate or humane behavior, as indicating a latent *individualizing* moral foundation.

M. A. Sarraf et al., *Modernity and Cultural Decline*,
https://doi.org/10.1007/978-3-030-32984-6_2

Duarte et al. (2015) report that "58–66% of social science professors in the United States identify as liberals, while only 5–8% identify as conservatives"; similarly, "52–77% of humanities professors identify as liberals, while only 4–8% identify as conservatives" (p. 3). (As noted in the Introduction, in European contexts "liberalism" typically refers to the view that government should be neutral with respect to visions of the good, whereas in the North American context, in which Duarte et al. [2015] operate, "liberalism" refers to a brand of social democratic politics; unless otherwise noted, the current authors employ the term and its cognates in the former sense.) A study of the political ideologies of Canadian professors found that 33.3% are broadly leftist while a mere 5.2% are broadly rightist (compared to 24.4% of adults in the Canadian population with at least a B.A. degree who identify as broadly rightist), with involvement in teaching humanities courses and opposition to religion being noteworthy predictors of leftism (Nakhaie & Brym, 2011). There is also evidence of left-wing bias in British academia (Carl, 2017), and given that the political and cultural characters of Western Europe overall are more to the left than, say, those of the United States (Pew Research Center, 2012), one expects that substantial leftist academic bias in Western Europe is not limited to Britain.

Attending just to the figures for the United States given above, it should be noted that in framing the matter in terms of a "liberal" (social democrat)/conservative dichotomy, the numbers likely understate the extent of relevant political/moral homogeneity in the American social science and humanities fields. That is because one struggles to find a mainstream American, and even Western, political party or view that is not, in world-historical perspective, on the left or individualizing in character. Many, probably most, of the American academics who identify as "conservatives" or "moderates" at least nominally share with those identifying as leftists important normative and empirical commitments (Salyer, 2018)—for instance, belief in the moral and biological equality of all human groups, or even persons, across time and space, and support for a liberal as opposed to a perfectionist form of government[2]; again, within the context

[2] Note that mainstream American Republicans and "right" libertarians would qualify as leftists in this view.

In the footnoted sentence, "perfectionism" refers to any political view that lacks neutrality with respect to visions of the good, and so would have governments promote the realization of some such vision. But it should be appreciated that the philosophical territory here is more complex than the liberalism/perfectionism dichotomy that we have indicated suggests. For example, some have argued for political views that could be classified as "perfectionist liberal"

of moral foundations theory, we take this to mean that in the modern Western world, the vast majority of academics identifying as on the political left *or* right (or in the center) can reasonably be described as having moral psychologies tilted in an individualizing direction, considered in world-historical context.

But one could argue that it does not follow from the mere fact that individuals with particular political (and/or moral) orientations predominate in certain academic disciplines that the research and scholarship done in those disciplines tend to be biased in ways consistent with those orientations. Nonetheless, evidence for the existence of such bias is apparent in the fact that whenever academics of any notoriety do question or reject beliefs that seem central to individualizing moralities, they are often met with aggressive opposition from fellow academics, administrators, and even students, who, in turn, rarely experience significant disapproval from those with meaningful social influence (Carl & Woodley of Menie, 2019; Nyborg, 2003, 2011; Woodley of Menie, Dutton, et al., 2018; for details on philosophers' often hostile attacks on moral inegalitarians, see Steinhoff, 2015). If those defending, or offering evidence that could support, sufficiently "countercultural" ideas (i.e. those ideas that could be considered to have undesirable implications from the perspective of those with individualizing moralities) in academia strongly tend to experience such serious negative consequences for doing so, at least in the event that they or their work achieves substantial attention, it seems likely that academics will try to avoid those consequences; so one would expect that academics in fields with meaningful bearing on moral and political issues will typically make efforts to ensure that their work does not offend dominant moral and political views, and thus those views will shape the outputs of those fields. (Germane to this point, Carl & Woodley of Menie, 2019, in a study of controversies in the area of intelligence research, observe that "equalitarian [that is, egalitarian] tendencies are more common in individuals on the political left, and it is that political faction from which all the most hostile criticisms of intelligence research have originated" [p. 5]; as one would expect, it is much more challenging to find cases of academics suffering

(e.g. Raz, 1986), and thus the two orientations may not be strictly incompatible. In contrast to us, Reiff (2007) identifies American neoconservatives as representing a kind of perfectionism and distinguishes "hard" from "soft perfectionists," with the former rejecting more of the presuppositions that he takes to define liberalism than the latter, which include neutrality but also, for example, what he calls "toleration"—but the details of these distinctions and precise philosophical concepts are not within the scope of the current work.

serious adverse effects on career or reputation, e.g. job loss, for promoting ideas that fit easily with individualizing moralities, such as the idea that environmental factors entirely determine variation in human intelligence.) Interestingly, and consistent with these observations, it appears that the usage frequencies of a composite of terms associated with individualizing moral foundations (care + harm + fairness + reciprocity) increased, while the usage frequencies of another composite associated with the opposite "binding" moral foundations (loyalty + betrayal + purity + sanctity + degradation + authority + respect) decreased from AD 1900 to 2000 (see Fig. 2.1); these data are taken from Google Ngram Viewer, and indicate changes in the patterns of natural language use, in Anglophone textual corpuses in the case of our analysis, which reasonably are taken to reflect underlying cultural evolution (Michel et al., 2011; trends in Google Ngram Viewer reflect more than changes in academic texts, but of course cultural trends in academia and the broader world are not isolated from one another). There is a high-magnitude (i.e. effect size between 0.5 and 1; Cohen, 1988) and statistically significant negative correlation between

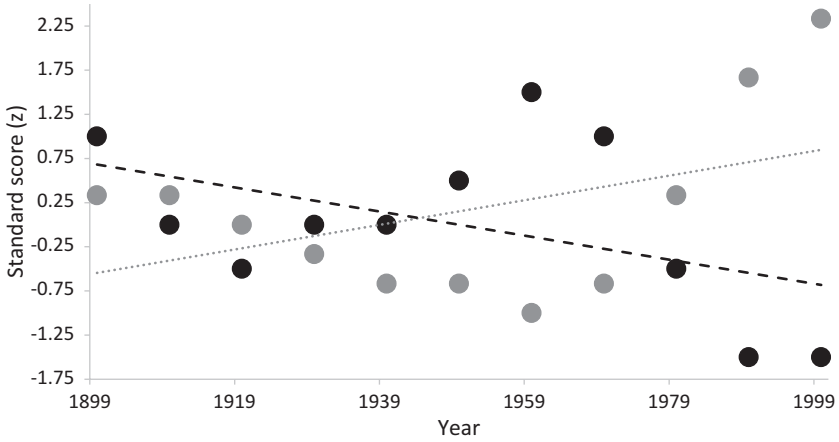

Fig. 2.1 The black dots track the usage frequencies of terms associated with "binding" moral foundations, whereas the gray dots track the usage frequencies of terms associated with "individualizing" moral foundations using Google Ngram Viewer data. The correlation (r) between the two trends is −0.828 ($p<0.05$; $N = 10$)

the trends time ($r = -0.828$, $p<0.05$, $N = 10$ decades), evidencing their divergence over this century-long time period.

What is more, these individualizing commitments are so uncontroversial that in the writings of academics they are typically presented as if they were incontrovertibly true. That is to say that most Western academics seem to believe that moral and biological equality, applying over both time and space, are on such solid ground that no case needs to be made in their favor—or that if such a case is to be made, it need do little other than offer individualizing affirmations to the effect that alternative views are so obviously wrong as to barely merit consideration. For instance, legal scholar Edward Rubin (2015), in a recent book devoted to explaining changes in the moral culture of the Western world, notes that "[b]etween the years [AD] 0 and 1000, the privatization process meant that systems of social control became increasingly more violent … [Later years] reveal an opposite trend … but that is the result of culture, not biology" (p. 332, n. 74). No evidence or argument whatsoever is provided in support of the final claim—for Rubin, it is seemingly axiomatic that temporal changes in the behavior of human populations can only be due to cultural (and maybe more generally, environmental) factors. Perhaps Rubin would allow that certain behavioral changes and differences of human populations are due, at least in part, to biological changes and differences. But it is unclear what motivated his assertion that only "cultur[al], not biolog[ical]" factors reduced the prevalence of human violence over the given period of time other than a mere assumption favoring cultural determinist models of behavioral explanation and against such models that invoke biology.[3]

A further example is in the scholarship of the celebrated historian Ian Morris. In his book *Why the West Rules—For Now*, he offers the following in presenting his approach to explaining human population-level behavioral differences: "[B]iology and sociology explain most of the shape of

[3] It might seem odd that Rubin is inclined to cursorily reject biological hypotheses about human behavioral change, as he elsewhere notes, partly in light of biological considerations, that "equality is not self-evident at all" (2015, p. 181). Importantly, however, he limits this acknowledgment to inter-*individual* inequality (and to the fact that men and women play different roles in reproduction), which some high on individualizing moral foundations will admit exists (though not infrequently with the insistence that the important differences stem from environmental and not biological factors; nothing in Rubin's account rules out his acceptance of such a view, and his rather explicit individualizing morality makes it likely that he does accept it).

history … but these biological and sociological laws are constants, applying everywhere, in all times and all places. They, by definition, tell us about humanity as a whole, not about why people in one place have fared so differently from those in another. To explain that … we need … geography" (Morris, 2010, p. 29). Morris claims to recognize that a case for biological egalitarianism needs to be made. However, the one that he propounds barely transcends recapitulating the geographical determinism of Jared Diamond—the thrust of which is encapsulated in the passage from Morris (2010) provided above—and tarring opposing views with politically charged invective, the latter move signaling an assumption of the truth of biological egalitarianism from the outset, insofar as it suggests an immediate refusal to treat the matter at issue as truly open to dispute.

As advocates of geographical determinism, Morris and Diamond lose sight of a basic tenet of evolutionary science,[4] namely that distinct environments and ecologies select for different hereditary traits (something that Charles Darwin grasped even though he lacked understanding of the material basis of heredity, i.e. genetics). And with geographical variation, there is of course variation of ecologies and environments. Morris (2010), for instance, contends that "[n]ature … is just not fair" since "[a]griculture appeared in the Hilly Flanks thousands of years before anywhere else … because geography gave [the people there] a head start"; the point here is that such differences of geographical fortune can, at least in principle, explain all inter-population human behavioral variation without any need to invoke biological evolutionary factors (p. 117).

Even setting aside geographical variation, it must be recognized that a human population heavily relying on agriculture for thousands of years will be subjected to different selective pressures than other human populations in distinct subsistence paradigms (as others have noted, e.g. Rushton, 1999) because of the unique challenges associated with agricultural life. Such selective pressures surely conferred to agricultural populations genetic endowments in behaviors that partly determine success in agriculture, and therefore affect the odds of survival and reproduction for agriculturalists, which non-agricultural populations would not have had (in light of the basic principles of evolutionary theory that we just indicated). That these genetic endowments can be ultimately ascribed to the mere

[4] For those who need it, a brief exposition of modern evolutionary theory is provided at the beginning of the second part of this chapter.

luck of agricultural populations' historical environmental and ecological conditions does not make them any less real. By the same token, modern humans' high intelligence relative to all other known organisms depends on the fact that their ancestors happened to encounter certain environmental and ecological conditions. That does not somehow render this cognitive endowment non-biological today.

The very fact that Morris uncritically recites Diamond's geographical determinism thesis when it has faced rather severe critique, which should at least be addressed (see, e.g. Clark, 2007; Cochran & Harpending, 2009; Figueredo, 2009; Rushton, 1999), intimates an assumption of biological egalitarianism out of hand. It is telling that Morris (2010) even includes Cochran and Harpending's book *The 10,000 Year Explosion* (2009) in the "Further Reading" section of the very same work in which he extols Diamond's geographical determinism; but he does not discuss the critique of Diamond that Cochran and Harpending present. Morris even goes so far as to assert, absent any citation of supporting evidence, that "[o]ur dispersals out of Africa in the last sixty thousand years wiped the slate clean of *all* the genetic differences [among human populations] that had emerged over the previous half million years" (Morris, 2010; emphasis added). This claim is entirely inconsistent with evidence from Cochran and Harpending (2009), who document a number of such differences distinguishing modern human populations. In more recent years, many population and behavior geneticists, evolutionary psychologists, physical anthropologists, behavioral ecologists, and the like have offered further evidence of socially significant genetic differences among human populations, as well as evidence of evolutionary-genetic changes within certain populations over just the past few thousand years (some predicted by Cochran & Harpending, 2009), which the unique environmental circumstances of those populations likely caused, probably leading to genetic divergence from other populations (see Kirkegaard et al., 2019; Lasker, Pesta, Fuerst, & Kirkegaard, 2019; Piffer, 2019; Winegard, Winegard, & Boutwell, 2017; Woodley of Menie, Younuskunju, Balan, & Piffer, 2017). Despite these and other shortcomings in Morris' book, the current authors failed to find any high-profile academic who has taken him to task for them. Rather, *Why the West Rules—For Now* has won more or less universal acclaim. It would appear that tendentious research is permissible among the academic establishment so long as its imperfections align with individualizing pieties.

One could think that Morris and Rubin are exceptions to a more balanced academic consensus on the role of biology in human behavioral variation. But more systematic evidence is available, suggesting that they are firmly within the mainstream. Geher and Gambacorta (2010) and Horowitz, Yaworsky, and Kickham (2014) both examined academics' views about the relation of biology to human behavior, though the latter only probed the beliefs of sociologists. The former study, based on data from 268 adults, reached a number of striking conclusions: leftism (or "political liberalism," as the authors call it) is associated with the belief that human sex differences are environmental rather than genetic in origin; academic employment, especially in the departments of sociology and women's studies, is also associated with belief in the foregoing environmentalist[5] view; finally, employment as an academic is associated with the belief that "behavioral differences between *roosters and hens*" (emphasis added) are functions of environmental rather than biological factors (Geher & Gambacorta, 2010, p. 32). The latter study, based on a survey of 155 "sociological theorists," found, echoing the former, that "liberal-minded," that is, likely individualizing, sociologists are more opposed to "evolutionary biological" ideas than those probably higher on the opposite cluster of psychological moral foundations, that is, those high on Haidt's "binding" orientations that stress loyalty, authority, and purity or sanctity (i.e. a tendency toward disapproval of activities traditionally considered disgusting) (Horowitz et al., 2014).

Particularly striking is the fact that of the 151 sociologists who responded to a question about their general "attitude toward applying evolutionary biological ideas to human social behavior and organization," only 13.2% selected the response indicating that they "embrace" such ideas, whereas 62.9% selected responses indicating skepticism or hostility toward them (Horowitz et al., 2014, p. 495). It must be stressed that resistance to such biological ideas may leave one unable to accept, without logical inconsistency, even the evolutionary origins of humanity itself, insofar as there seem to be very limited options for coherently reconciling denial of the relevance of evolutionary biology to human behavior with the belief that the human species emerged through evolutionary processes.

[5] We will use the term "environmentalism" more broadly to refer to the belief that human behavioral variation is primarily or entirely determined by non-genetic environmental variation.

Perhaps the clearest evidence of distinctively individualizing tendency among sociologists is in their response pattern to a question concerning a prototypical politically sensitive matter, namely the origin of human behavioral sex differences, compared to other questions. Whereas 81.2% of surveyed sociologists were willing to recognize the plausibility or high plausibility of the idea, discussed in more detail later in this chapter, that genetic differences for "intellectual potential" exist among individuals (though nearly a fifth were either uncertain about this or thought it unlikely or very unlikely), only 42.8% were approving of the claim that certain average differences in social and cognitive skills between men and women have a biological basis (Horowitz et al., 2014, p. 497). Unsurprisingly, Horowitz's team found that political radicalism, that is, a kind of ideology that probably attracts those very high on individualizing moral foundations, and feminism significantly negatively predicted sociologists' approval of evolutionary or more broadly biological accounts of human behavior. Since inequality between individuals is less offensive to those with strong individualizing sensibilities, in light of their political preferences, than inequality between the sexes or other groups, it is unsurprising that sociologists were particularly hostile to biological explanations of sex differences.

* * *

Hopefully it is now clear that, at least in the West, individualizing bias is generally and strongly present in those academic disciplines concerned with human behavior. Further, there is evidence (albeit less robust) that this bias is associated with opposition to genetic explanations of human behavioral variation, especially between-group variation. We refer to these biological explanations collectively as "hereditarianism."[6] Of course and although we have already made clear that we reject it, anti-hereditarianism, whatever the motivations for maintaining it, may encompass true empirical beliefs, even if, for example, Morris and Diamond have argued poorly for it. In other words, anti-hereditarianism may be true in part or whole—

[6] To be sure, "hereditarianism" is concerned with scientific explanations made in reference to heritable factors, specifically genetic ones. There are various non-genetic biological approaches to explaining human traits and trait variation, but the genetic approaches in particular seem to be unwelcome among those on the political left (see Furnham, Johnson & Rawles, 1985) and proponents of environmental explanations (environmentalists), and thus our focus is on hereditarianism.

the mere fact that arguments made on its behalf are often weak, and are probably often morally/politically motivated, does not exclude this possibility. Reasons to challenge political/moral biases in academia would not be very strong if the only beliefs that they favor rejection of are false anyway.[7] And what appears to be bias could in fact be principled moral and political rejection of a paradigm that sound empirical inquiry has (seemingly) authoritatively discredited, especially if acceptance of that paradigm carries certain dangers.

Anti-hereditarians often seem to think that their approach exhibits just this sort of scientific integrity. For instance, paleontologist Stephen Jay Gould and population geneticist Richard Lewontin, though both committed Marxists,[8] inveighed relentlessly against evolutionary psychology, behavior genetics, and psychometrics for allegedly scientific reasons.[9] Indeed, Gould stridently criticized hereditarians for their "a priori prejudice," which, he contended, was the cause of the supposedly manifold errors in their research (1996, p. 59). By contrast, then, it would seem that Gould believed his work to be at least better and less biased than the hereditarian research he attacked as poor science. Yet, his own output

[7] Although note that it is generally accepted that sound scientific practice treats all empirical beliefs as, in principle, defeasible. This is needed to avoid dogmatic commitment to theories and beliefs that may impede further advancement of science. There is, then, always some reason to criticize moral and political biases that *compromise* scientific research. But it is necessary to find evidence that such biases have had a corrupting effect before concluding that some particular bias is problematic. It seems certain that no researcher is entirely free of extra-scientific biases, and we are not exceptions. The point is that the mere presence of biases on the part of a researcher, which, as just indicated, are seemingly ubiquitous, does not constitute sufficient basis to dismiss their scientific work (so in the above in this chapter, for example, we have endeavored to draw associations between apparent biases and verifiable scientific errors or other problems). For the zealous anti-hereditarian Stephen Jay Gould, this evidently was not the case: so long as he could even *speculate* that a scientist, such as Samuel George Morton, was operating under unconscious biases, Gould felt entitled to claim that that scientist's work really was distorted by bias, provided, apparently, that the scientist offered results that Gould found morally disagreeable (see Lewis et al., 2011; Ruse, 1989; Sesardic, 2005, pp. 39–40). Even worse, and as will be discussed in the main text, it appears that Gould entered distortions into his own re-analysis of Morton's work to offer evidence of faulty research where none in fact existed.

[8] One can debate whether Karl Marx was or was not a hereditarian of some sort. But this is not very relevant. In practice, Marxism has been an overwhelmingly anti-hereditarian ideology.

[9] Though Lewontin was at times quite open about the fact that his "scientific" work was a means of pushing a political agenda (see Wright, 1998).

clearly expresses strong moral and political biases—revealed, for instance, where he makes apparent that his most famous critique of hereditarianism, the ostensibly scientific *The Mismeasure of Man*,[10] is in no small part a moralistic protest against various forms of European "supremacy" (e.g. Gould, 1996, p. 144) and their harmful alleged consequences (p. 263; see also Ruse, 1989).

More importantly, a number of the attacks that Gould leveled against hereditarian scientists in this work were subsequently shown to be nothing more than defamatory and possibly willfully deceitful misrepresentations, which seemingly originated in his own just mentioned biases. The most prominent such case is Gould's allegation that physician Samuel George Morton was led to produce inaccurate data on human skull size differences consistent with his alleged racial prejudices. It has since been shown that Morton's measurements were sound (Mitchell, 2018) and that, if

[10] Nonetheless, Gould tirelessly attempted to refute criticisms of his work, an effort facilitated by the characteristic slipperiness of his writing, namely his tendency to explicitly state that he does or does not do or believe some particular thing, but make apparent that the opposite is true at another point in the same work. Alcock (1998) provides an example of this trick of Gould's: "In *The Diet*, after having caricatured persons studying the mating tactics of men and women as genetic determinists, [Gould] writes, 'Perhaps I have caricatured this position, but I don't think so, having read so many articles of support. In fact, I don't even think that the basic argument is wrong.' But Gould then goes on to explain that the basic argument *is* wrong because it supposedly cannot cope with the reality that human behavior is influenced by cultural factors" (p. 325; emphasis in original). This tactic allowed Gould to conveniently respond to critiques of his work by denying that he did what his critics accurately claimed he had done, citing as proof the false characterizations of his own writings peppered in them: "These apparent concessions … enable Gould to deflect criticism by pointing piously to his rare, against-the-grain comments when confronted by someone who is responding to the basic negative nature of his attacks. Thus, when Maynard Smith … attempted to rebut 'Gould's curiously ill-tempered review of Helena Cronin's *The Ant and the Peacock*' … Gould replied by pointing to a benign sentence in an otherwise hostile review" (Alcock, 1998, p. 325).

The same tactic is evident in the work of Gould's colleagues and fellow Marxists Richard Lewontin, Steven Rose, and Leon Kamin. In this trio's infamous anti-hereditarian book *Not in Our Genes*, it is argued that science is never free of political bias. In so arguing, Lewontin et al. (1984) seem to preempt charges that their far-left orientation to science is just as politically biased as they allege hereditarianism to be (just in the opposite direction); and yet, in the book as a whole, they go ahead with ferocious attacks on hereditarians for their supposedly politically warped research. Thus, Lewontin et al. (1984) expected readers to accept both that political bias in science is ubiquitous *and* that hereditarian researchers are worthy of unique scorn for doing politically biased scientific work. The hypocrisy is obvious and indicates merely an attempt of Lewontin, Rose, and Kamin to have their cake and eat it too.

anything, *Gould* deliberately manipulated Morton's numbers to create the false impression that the latter was a biased scientist (Lewis et al., 2011). Perhaps more damning, however, is the fact that an anthropology student, John Michael, re-measured a portion of the skulls in Morton's collection and determined that Morton's results were not biased *before* Gould produced the second edition of *The Mismeasure of Man* (Cofnas, 2016, pp. 486–487). Even though Michael sent Gould a copy of the paper reporting his corroboration of Morton's measurements, Gould left his scurrilous claims about Morton's research in *Mismeasure*'s revision (Sesardic, 2005, p. 42, n. 14).

It is an unfortunate truth that a great deal of academic work with an anti-hereditarian bent is uncharitable to its targets (so the phenomenon is in no way limited to Gould's output). Philosophers of science Neven Sesardic (2005) and Nathan Cofnas (2016) have copiously documented not only a welter of errors in the work of Gould (see also Alcock, 1998) and researchers of a similar bent, but also, more troublingly, the tendency of more contemporary academics to uncritically parrot the long-discredited arguments and claims of these scientists.

This tendency is still apparent even in very recent years. Endocrinologist Barbara Demeneix's *Toxic Cocktail* (2017) is a case in point. Demeneix offers an explanation of the rising prevalence of a number of behavioral and psychological problems in developed countries, for example, increasing rates of autism, in purely environmental terms. More specifically, she blames toxins and pollutants of various kinds for this growing psychobehavioral damage. Other researchers, however, have presented strong empirical evidence and/or theoretical considerations indicating that some of these changes are due, at least in part, from genetic factors (e.g. D'Onofrio et al., 2014; Kong et al., 2017; Liu, Zerubavel, & Bearman, 2010; Lynch, 2016; Woodley of Menie, Figueredo, et al., 2017).

Demeneix is aware of at least some of this research but chooses to dismiss it on the basis that it "smacks strongly of biological determinism and genetic determinism or the overriding influence of genes compared to that of the environment. Many authors have written excellent critiques of biological determinism, including Richard Lewontin, Steven Rose, and Leon Kamin" (2017, p. 87). This is not a sensible counter to hereditarianism for a number of reasons. In the first place, the only "critique" of "biological determinism and genetic determinism" (an apparent pleonasm) that Demeneix cites was over three decades old at the time of her book's publication. That critique, the openly Marxist *Not in*

Our Genes (1984), has been met with more or less universal rejection from the relevant scientists who have considered it (for an especially cutting review of this book, see Dawkins, 1985), and so it is odd that Demeneix treats it as an uncontroversial basis on which to reject biological or, more narrowly, genetic theories of recent human behavioral change. One critic (Wright, 1998) has even gone so far as to characterize *Not in Our Genes* as a work of "slander" (Wright, 1998, p. 199), further contending that it offers nothing but familiar arguments that already had been (e.g. Jensen, 1982) and continued to be "refut[ed]," though without any acknowledgment by anti-hereditarians (Wright, 1998, p. 198; see also Sesardic, 2005; Sarraf & Woodley of Menie, 2021; Woodley of Menie & Sarraf, 2021). Indeed, the terms "genetic determinism" and "biological determinism," which not just Demeneix but also Lewontin, Rose, and Kamin employ, are mere terms of abuse that only reflect ignorance of hereditarian research (see Sarraf & Woodley of Menie, 2021) since "there is literally no one who ever subscribed to genetic determinism," that is, "the doctrine that an organism's phenotype is determined by genotype alone"[11] (Sesardic, 2005, p. 14).

Even when setting aside its most unreasonable theses, it remains true that none of the central arguments of *Not in Our Genes* has fared well in the course of time—for example, that the concept of general intelligence is illegitimate and that "[s]trong performance on IQ tests is simply a reflection of a certain kind of family environment" (Lewontin, Rose, & Kamin, 1984, p. 94). By point of fact, all efforts to undermine the theory of general intelligence, that is, that the validity of intelligence tests is primarily a function of the degree to which they tap a single mental factor (general intelligence or *g*), have failed—it is a simple fact that one statistical psychometric factor accounts for much of the variance in and most of the validity of IQ test scores, consistent with the predictions of *g* theorists (Bouchard, 2014; Ganzach & Patel, 2018; Jensen, 1998; Johnson, te Nijenhuis, & Bouchard, 2008). There is hardly a serious psychometrician left who rejects *g* theory given the strength of such results, and the most extreme alternatives, such as Howard Gardner's theory of multiple intelligences, have lost virtually all support from relevant experts (Waterhouse, 2006).

The most spectacular failure of all is perhaps Lewontin, Rose, and Kamin's (1984) effort to argue that "family environment" is the decisive

[11] Demeneix's understanding of "genetic" or "biological determinism" is perhaps more tempered than this, but Lewontin, Rose, and Kamin's (1984), to which she refers, is not.

determinant of IQ test performance (p. 94). Roughly a century of scientific work on the genetics of intelligence has left little doubt that, by adulthood, family environment explains just about *none* (0%) of the variation in IQ scores (Plomin, 2018), whereas genetic factors explain about 70–85% of the variation (Bouchard, 2004; Plomin & Deary, 2015; *g* potentially has an even higher adult heritability of 86%, according to Panizzon et al., 2014, who modeled it explicitly as a latent factor, reaching 91% when corrected for measurement reliability, according to Woodley, te Nijenhuis, & Murphy, 2014). (The percentage of variation in a phenotype, or some life outcome, in a population for which variation in genetic, and perhaps other heritable, factors accounts is called "heritability.") It is unknown what factor(s) accounts for the residual 20–30% of unexplained variance in IQ test performance, but it may be primarily measurement error and random developmental noise—genetic (and perhaps other biological) error, in other words, with perhaps some contribution of random environmental events (Jensen, 1998; Sarraf & Woodley of Menie, 2021). Recently, work on the heritability of intelligence has ramified into the realm of molecular genetics, meaning that specific genetic variandts, or variants that are "nearby" in the genome to the causal ones, have now been causally implicated in individual-level cognitive and related phenotypic variation in humans (Lee et al., 2018; Sniekers et al., 2017; Trampush et al., 2017; Zabaneh et al., 2017). This is reasonably construed as a deathblow to the "not in our genes" thesis.[12]

[12] Some critics, such as Ken Richardson and Jay Joseph, deny these implications of behavior-genetic research. For a detailed response to arguments of the sort that they offer, see Sarraf and Woodley of Menie (2021). In brief, it is worth noting that these and other critics tend to focus narrowly on problems alleged to pertain specifically to twin studies, problems that they argue inflate heritability estimates. Their complaints are very probably incorrect, however, since the heritability estimates of twin studies have been replicated in non-twin behavior-genetic analyses specifically aimed at determining if the results of twin studies could be validated (e.g. Schwabe, Janss, & van den Berg, 2017). Moreover, there is evidence that certain errors that some such critics highlight in twin studies in fact tend to downwardly, not upwardly, bias those studies' heritability estimates (although the degree of this bias is associated with the heritability of the trait; see, e.g., Liu, Molenaar, & Neiderhiser 2018). Some have noted that molecular-genetic studies tend to deliver far lower estimates of trait heritability than classic (non-molecular) behavior-genetic studies, and take this to be evidence of upward bias in those studies of classic design. But this "problem of missing heritability" is unsurprising in light of the fact that these molecular methods are quite new and imperfect—for instance, they are poor at detecting the probably substantial contribution of rare genetic variants to the heritabilities of traits and life outcomes; Kendler et al. (2016), given the results of their non-twin behavior-genetic study, note that they found no evidence that twin

A more complete assessment of the hereditarian and environmentalist paradigms is attempted later in this chapter. But here it is worth asking why there is such limited sophistication in efforts to defend anti-hereditarian (or environmental determinist or environmentalist) views. Too often, opponents of hereditarian science systematically depend on misrepresentation and omission of theory and fact for their arguments to achieve any apparent plausibility. Worse still, and as noted earlier, environmentalists seem unable to abstain from concerted efforts to intimidate and defame their ideological enemies (Carl, 2018, 2019; Carl & Woodley of Menie, 2019; Cofnas, 2016; Davis, 1986; Hunt, 1998; Meisenberg, 2019; Nyborg, 2003, 2011; Scarr, 1987; Sesardic, 2005; Segerstråle, 2000; Walsh, 2014; Woodley of Menie, Dutton, et al., 2018; Wright, 1998). Their resistance to hereditarianism, or even mere isolated findings that are at odds with broadly individualizing moral commitments, is rarely without a great deal of passion. Walsh (2014) recounts the story of anthropologist Charles Leslie, who left an editor post at the academic journal *Social Science and Medicine* in protest "after it published an article documenting the large overrepresentation of Africans and people of African descent among AIDS patients" (p. 6). Leslie issued a statement explaining his motivation for resigning, in which he averred that "[n]on-social scientists generally recognize the fact that the social sciences are mostly ideological … Our claim to be scientific is one of the main academic scandals … By and large, we believe in, and our social science was meant to promote, pluralism and democracy" (quoted in Walsh, 2014, p. 6). For a serious scientist, an admission anything like that offered by Leslie would be an occasion for embarrassment. But Leslie somehow seems to have been proud of the fact that his life ostensibly as a scientist has not been about generating empirical knowledge at all, but instead has been a very refined and opaque[13] form of politicking.[14]

There is not space here to document the countless instances of academic behavior akin to Leslie's, but they are largely united insofar as they are highly emotional and often clearly motivated by individualizing ide-

studies provide upwardly biased heritability estimates, and so conclude that biases in twin studies are not a plausible source of the missing heritability problem.

[13] Leslie certainly does not announce his extreme bias so transparently in each of his scientific publications.

[14] One also has to wonder what value this sort of moralistic refusal to accept certain facts has in the "real world." If some demographic suffers from a higher rate of HIV infection, ignoring this will only prevent the development of policy initiatives that might save lives.

ologies. Evolutionary psychologists who attempt to scientifically explain the phenomenon of rape in humans are libelously portrayed as "silly … narcissistically self-aggrandizing [fantasists] who justify sexual coercion" (quoted in Palmer & Thornhill, 2003); psychometricians investigating the effects of immigration to developed nations on population-level intelligence (e.g. Nyborg, 2012) are wrongfully (see Vernon, 2015) accused of scientific misconduct (it seems that Nyborg's experience in this case was an extension of earlier attacks he faced from Marxist academics; Nyborg, 2011, pp. 250–251); behavior geneticists studying the relative effects of genetic and environmental factors on variation in intelligence are maligned and "threatened and attacked, both verbally and physically" (Scarr, 1987, p. 224); and so on. In recent years, neurobiologist Adam Perkins, who has argued that welfare claimants tend to manifest an "employment-resistant personality profile," had a talk at the London School of Economics canceled in response to pressure from activists (Foster, 2016), and the political scientist Charles Murray was assaulted by protesters at Middlebury College for his supposedly "bigoted" views (Krantz, 2017).

In face of all of this, one has the impression that environmentalists, and those of an individualizing moral bent more broadly, are driven by fear and paranoia in their antagonism of hereditarians. They are, seemingly on the whole, unwilling to tolerate even the conditions in which hereditarianism *could* gain traction in academic or wider Western culture. A hypothesis explored later on in this book posits that this behavior is itself the product of biosocial factors. But for now, it is sufficient to note that these reactions are probably consequences of the fact that political and social ideologies associated with individualizing moral orientations often strongly depend on certain empirical beliefs, and these beliefs in turn have been seriously challenged by many strains of evidence that have been accumulating in the biobehavioral sciences for decades.

Some may be skeptical of the idea that biobehavioral science has political implications at all. But such skepticism is unwarranted. For example, leftism is principally defined by *egalitarianism*; some have even suggested that all forms of leftism take "universal equality" to be the "highest good" (Paul Gottfried quoted in Hawley, 2016, p. 11). But what distinguishes the political-moral left from right is perhaps somewhat more subtle. Leftism seems to overwhelmingly involve, in its various manifestations, commitment to the realization of equality in at least one morally salient domain (typically political, economic, or hedonic) among all persons in a national society, or even among all persons on Earth or among all sentient

creatures; leftists might treat such equality as a feature of the correct moral theory (as when certain utilitarians posit that all persons' pleasure must be regarded as "counting" equally) or might have some vaguer reason for regarding equality of whatever sort(s) as *intrinsically* good or right. To the extent that leftists come down from moral abstractions and take equality in concrete, empirical spheres of life to be realizable, and its realization to be a goal that ought to be urgently pursued, the findings of biobehavioral science threaten their moral-political mission. Certain persons on the left have acknowledged this fact—take, for example, Cordelia Fine's (2017) assessment of the relevance of empirics to the sex-egalitarian objectives of feminists: "Although scientific claims don't tell us how our society ought to be … they can give us strong hints as to how to fulfil those values, and what kind of arrangements are feasible … if the sexes are essentially different, then equality of opportunity will never lead to equality of outcome" (p. 17). Those inclined to politics informed by individualizing moral commitments are of course at liberty to await the day that technology can eradicate genetic human or even animal inequality (an issue to be considered later [see Chap. 8]), so obviously biobehavioral science does not challenge their values *as such*. But in the same way that standard economics has shown socialism[15] to be an impracticable political-economic project, given certain general facts about human limitations (see Gintis, 2018) that do not seem realistically surmountable, biobehavioral science has done much to show that equality for humans, let alone for all animal life, is not achievable in the world as it is.

Unsurprisingly, then, those of individualizing moral psychologies are at pains to deny the relevance of genetic variation to human behavioral variation. They are forced to adopt a *sociological*, *sociocultural*, or (most general of all) *environmentalist paradigm*, according to which, even if biology can explain *universal* features of human behavior, only social, cultural, and/or environmental facts figure in explanations of behavioral differentiation. This skewed perspective has far-reaching and mostly untenable implications. It must deny, for instance, that individual behavioral differences have heritable bases and are targets for (natural, social, and/or sexual[16]) selection, which seems to exclude the possibility of human behavior-genetic evolution in the first place, in addition to the

[15] At least in the context of industrial and "postindustrial" societies.

[16] See Figueredo et al. (2017) for an elucidation of this categorization of forms of biological selection.

possibility that such evolution is ongoing (despite the fact that it manifestly is; Kong et al., 2017), and by extension an evolutionary basis for differences in behavior between humans and other primates (given that modern evolutionary theory assumes that there is heritable phenotypic variability among organisms with consequences for fitness,[17] and that humans and other modern primates descended from archaic hominids). Moreover, it leads anti-hereditarian academics to offer particularly dubious explanations of social phenomena, such that these academics are far more often guilty of the scientific failings that they frequently impute to hereditarians than are hereditarians themselves. An exemplar of this hypocrisy is in anti-hereditarians' frequent complaint that evolutionary psychologists engage in "just-so story" telling in their research, that is, that evolutionary psychologists merely generate hypotheses about the ultimate biological origins of behaviors without ever offering good reasons to accept them or even advance them beyond the level of speculation (*cf* Confer et al., 2010; Figueredo & Berry, 2002; Woodley of Menie & Sarraf, 2021). The current authors are yet to see the "just-so story" criticism directed at anything but evolutionary science, especially evolutionary psychology. Yet the work of anti-hereditarian social scientists and humanists is *rife* with just-so stories that are far more egregious than almost anything one can find in the whole corpus of evolutionary research.

For the sake of illustrating this point, consider the following inventive explanation of the origin of human behavioral sex (though in this case called "gender") differences found in the work of noted feminist philosopher Sally Haslanger (apparently inspired in part by the writing of an even more illustrious feminist academic, Catharine MacKinnon):

> [W]e can usefully model one process by which gender is constructed roughly as follows: The ideal of Woman is an externalization of men's desire (so-called Woman's Nature is what men find desirable); this ideal is projected onto individual females and is regarded as intrinsic and essential to them. Accepting these attributions of Womanhood, individual women then internalize the norms appropriate to the ideal and aim to conform their behavior to them; and, in general, behavior towards women is "justified" by reference to this ideal. This, in turn, *is responsible for significant empirical differences between men and women*. (2012, p. 93; emphasis added)

[17] "Fitness" refers to the replicative success of one's genes; a more elaborate treatment of the concept is offered in the second part of this chapter.

This explanation is highly implausible, and the author provides no serious empirical evidence to support it. First, the existence of sex roles across animal taxa,[18] arising from variation in behavioral and physical traits, is an established fact, one most parsimoniously explained through *sexual selection theory*[19] as opposed to theories invoking "environmental factors or chance" (Janicke, Häderer, Lajeunesse, & Anthes, 2016); there is simply no rational basis on which to expect that humans would be the one sexually reproducing species to which this rule does not apply:

> we find it hard to believe that social role theory, even the "biosocial" version, retains any scientific credibility at all in the twenty-first century. To us, social role theory is a vestigial remnant of human exceptionalism. Given the overwhelming preponderance of comparative evidence for sexually selected sex differences in intraspecific aggression across such a broad diversity of species, it does great violence to the principle of parsimony to invent a special explanation for exactly the same phenomenon in our own species. Surely, such special pleading cannot be considered sound scientific theorizing.[20] (Figueredo, Gladden, & Brumbach, 2009, p. 278)

Haslanger (2012) ignores the voluminous literature on the evolution of behavioral (and other) sex differences, the findings of which do not align with her social constructivist thesis.

Second, even if one were to grant that her a-biological theory accurately describes relations between the sexes that held at some point in the very distant human past, its account implies that sexual selection would have favored those women most naturally compatible with, and thus most able to embody, the ideal of "Woman's Nature" (e.g. through greater relative physical femininity and the like). In the absence of countervailing selective pressures, this process of sexual selection would have produced and/or deepened genetically based behavioral (and physical) sex differences in the long run. It would thus be incorrect to think that even the process that Haslanger outlines would not give rise to genetically based differences in behavior between the sexes.

[18] Note that some animals reproduce asexually.

[19] Sexual selection refers to variation in reproductive success (fitness) that occurs as a result of mate choice and competition for mates.

[20] Figueredo, Gladden, and Brumbach's (2009) assessment was applied specifically to the case of sex differences in aggression, but their view is clearly relevant to behavioral sex differences generally.

Third, it makes no sense that a sexually reproducing species would have arbitrary mate preferences. Haslanger seems to think that men's sexual tastes are matters of purely contingent social norms, unrelated to the biology of men or women. But she never convincingly explains why men constructed the "ideal of 'Woman's Nature'" in the first place. Her book gives the impression that the explanation would have something to do with this ideal helping to facilitate the oppression or domination of women by men, but this only moves the problem back a step—why, as Haslanger's own view posits, do men but not women tend to have an interest in socially dominating, and overall success (as a group) in so dominating, the opposite sex, and why are women acquiescent to male efforts at such domination (see Haslanger, 2012, pp. 41, 58–60); why is this general dominance/submission dynamic between the sexes so rarely reversed, especially at the group level, over time and space, and what non-genetic basis could the *ultimate origin* of this dynamic, with its high generalizability across environments, reasonably have?[21]

The standard evolutionary view of mate preferences is that they encourage reproduction with individuals who are likely to produce fit offspring, through the genetic traits and/or resources that they will prospectively bequeath to those offspring (Geary, 2010)—these preferences likely evolved because of this fitness-enhancing function. Mate preferences vary with a number of factors such as phenotypic condition (Cotton, Small, & Pomiankowski, 2006) and sexual relationship types (e.g. whether the relationships are prospectively short or long term—see Figueredo et al., 2017, p. 50—although this distinction is not free of controversy). Nevertheless, universal mate preferences in humans have also been noted, such as for

[21] Moxon (2016) maintains that "[a]ny adherence to a notion that at root is 'social conditioning' is a naive position born of failing to appreciate that there is an infinite regress to biology…. The social constructivist view of the sexes is a self-contradiction … [that] cuts no ice in psychology. The sexes are supposed identical, yet, at the very same time, one sex is held somehow to 'oppress' the other in some foundational way, through the nebulously envisaged structure or dynamics of 'patriarchy' …. No sense can be made of putting these two groundless, non-scientific positions together. It would be impossible for males to somehow conspire putatively to 'oppress' in their 'patriarchy' … and for females not to do likewise if there were no such thing as sex difference" (p. 4; emphasis in original). While one likely could not find a notable feminist academic who would argue that the sexes are "identical," absent qualification, Moxon's argument is quite effective against feminist claims of genetic *behavioral* sameness, more often called equality, between the sexes.

more as opposed to less symmetrical faces and bodies[22] (Geary, 2010, pp. 193, 208; *cf* Graham & Özener, 2016). Features regarded as attractive associate positively with health (Nedelec & Beaver, 2014), suggesting that they indicate relative freedom from deleterious mutations—indeed, evidence supports the idea that humans have evolved dispositions to find these traits attractive because they signal "good genes" that would benefit the fitness of prospective offspring (Geary, 2010, pp. 192, 209–210). Moreover, to the extent that mate preferences vary, this variation is under substantial genetic control (Zietsch, Verweij, & Burri, 2012). All this is to say that human mate preferences are not at all arbitrary or mere "social constructs" and furthermore that it is not sensible to think, in the light of the basic evolutionary theory, that they would be—given that there is variability in all fitness-relevant traits, and that some of this variability is heritable, it is unreasonable to expect that humans' mate choices would be hostage to social and cultural conventions; rather, the sound expectation is that they have reliable heritable tendencies to favor mates who will likely advantage the fitness of their offspring, as their fitness would be seriously jeopardized if they lacked these tendencies. Since Haslanger's theory of the origin of human behavioral sex differences rests on the premise that men's sexual preferences in women are purely socially contingent constructs, it is implausible. It is more reasonable to maintain that the ideal of "Woman's Nature" exists because it corresponds to the most prospectively fitness-enhancing ensemble of female traits. Together with the foregoing considerations provided, this makes clear that Haslanger's "theory" is in fact a mere "just-so story."

With the scientific research immediately above in mind, it should not surprise anyone that general aspects of biological theory sometimes become the critical targets of those oriented to individualizing moral foundations. An example of this that has proven harmful to the academic, and possibly public, understanding of biology is seen in the work of Stephen Jay Gould and Richard Lewontin (1979), specifically their attempt to minimize the role of selection and adaptation in the evolutionary history of life on Earth. Again indicative of Marxist influence, made so explicit in *Not in Our Genes* in the case of Lewontin and elsewhere in the case of Gould (see Ruse, 1989), the hope seemed to be that biological

[22] This is not to imply that individuals never choose other desirable traits in mates *over* symmetry—they do. Rather, the point is that, *all else being equal*, people overwhelmingly tend to prefer more rather than less symmetrical sexual partners.

evolution could be interpreted as an essentially communistic process. Marx himself, at least once, scorned Darwin's selectionist theory of evolution, casting it as a mere ideological artifact of England's capitalistic milieu: "It is noteworthy … how Darwin rediscovers his English society with its division of labor, competition, the opening up of new markets, 'inventions,' and the Malthusian 'struggle for existence,' among the animals and plants" (quoted in Gasman, 2004, p. 110). Gould and Lewontin (1979) appear to capture something of the spirit of this critique in their salvo against adaptationism and selectionism (theories invoking the "struggle for existence"), in keeping with Gould's belief that the "minimiz[ation]" of "alternative [non-selective] evolutionary agents" in biology such as "'random drift,'" that is, random as opposed to selective changes in the frequency of genetic variants in a population, was undesirable (Beatty, 1984, p. 113). To a great extent, their arguments turned on a failure to understand what an adaptation actually is (see Figueredo & Berry, 2002) and a curious lack of awareness of the fact that their anti-adaptationism was merely another species of the "just-so story" that they saw everywhere in selectionist and adaptationist thought (Andrews, Gangestad, & Matthews, 2002; Figueredo & Berry, 2002 coined the term "just not so story" in reference to "[uncritical acceptance] of any alternative explanation as long as it is *not* an adaptationist hypothesis" [p. 517]). Importantly, the history of science indicates that adaptationism has fared far better than its alternatives: "The exaptationist research program [Gould and Lewontin's preferred anti-adaptationism], if there is anything even worthy of the name, has yielded very little new knowledge in comparison [to the adaptationist program] because of its inability to make novel predictions" (Figueredo & Berry, 2002, p. 518; see also Krasnow & Truxaw, 2021 and Woodley of Menie & Sarraf, 2021). Nevertheless, the ideas of Gould and Lewontin seem to have succeeded in sowing plenty of confusion (Alcock, 1998, 2001; Wright, 1998), especially in the social sciences (on Gould specifically, see Carroll, 1995).

All this aside, the fatal problem for the sociocultural/environmental paradigm is its poor explanatory power relative to its biobehavioral counterpart. There are too many regularities of human behavior that the latter can adequately explain, but the former cannot, to avoid the conclusion that the biobehavioral paradigm is superior. One highly persuasive testament to this fact is Clark and Cummins' (2018) study of a very large English pedigree, covering the years 1750 to 2017 (and therefore an enormous amount of social, cultural, and economic change), finding that variation in wealth,

educational, and occupational outcomes is almost entirely genetically determined. This result could hardly be more at odds with sociological views that insist on the overwhelming role of social "structures and processes" in producing socioeconomic status differences (see, e.g. Butler & Watt, 2007; it should be stressed that work offering such environmentalist assertions very rarely even attempts to measure genetic effects and compare their importance to non-genetic ones, preferring to sweep such considerations away as irrelevant with liberal use of, for example, the terms "essentialist" and "determinist"). Beaver and Walsh (2011) cover the poor explanatory performance of environmental/sociocultural theories of crime, noting that even when a statistical model includes variables from more than one environmentalist criminological theory, it will usually explain much less than 30% of the variance in the phenomenon of interest (p. 3); biologically informed approaches to the study of crime, while still relatively new, are already offering more impressive empirical results and more comprehensive and parsimonious theories (e.g. Figueredo et al., 2018). Quite damning findings for environmentalists come from Sariaslan (2015), who analyzes the relationship between neighborhood socioeconomic conditions and violent crime, substance use problems, and mental health problems in unusually large nationally representative samples of the Swedish population; his results indicate that neighborhood socioeconomic conditions likely have no causal effect on any of these outcomes, whereas genetic factors probably do, in complete contradiction to the structural-sociological approach.[23] Furthermore, Sariaslan (2015) found that variable exposure to "family income" among genetic full siblings may have no effect on the probability of participation in violent crime or of developing substance use problems. These findings are consistent with the typical results of behavior-genetic studies, which indicate that family environment has no lasting effect on psychological and behavioral traits (as indicated above in the case of intelligence) (Plomin, 2018).

Behavior geneticists have accumulated a tremendous amount of highly replicable evidence (see Plomin, DeFries, Knopik, & Neiderhiser, 2016)

[23] An environmentalist could object that this result may be contingent on the unusually high standard of living (in world-historical context) that the vast majority of Swedes enjoy. But the fact that Clark and Cummins (2018) found that genetic variation has been overwhelmingly determinative of social outcome variation over more than two and a half centuries in England bodes very poorly for this environmentalist counter, since eighteenth-century England, which Clark and Cummins' data partly cover, had a remarkably bad standard of living by contemporary Western standards (Clark, 2007).

that genetic factors have a very substantial role in generating human psychological and behavioral variation. As noted above, variation in intelligence or IQ, which is robustly related to general success in life (Strenze, 2015), is probably about 70–85% determined by genetic factors in adulthood (Bouchard, 2004; Plomin & Deary, 2015[24]). Environmentalists will in all likelihood have to accept the fact that "environmental factors have a more limited impact on individual differences in success than some theories suggest" (Moreau, Macnamara, & Hambrick, 2019).

[24] Some, such as Turkheimer (2016), deny that behavior genetics has demonstrated much more than that correlations between genetic and phenotypic/life outcome variation exist. The idea is that behavior-genetic research is inadequate to support causal claims about the role of genetic differences in generating phenotypic/life outcome differences. But the force of this argument depends on the highly implausible view that there probably are hidden environmental factors strongly confounding these associations and that may be causally responsible for them (see Sarraf & Woodley of Menie, 2021).

Research on the generalizability of heritability estimates across populations and over time within populations, as well as on gene-environment interactions that might modulate heritability, are relevant here. While more of this research is needed on other phenotypes and life outcomes, it does appear that IQ, and especially general intelligence, hardly varies in its heritability as a function of population, socioeconomic status, or time period (Sarraf & Woodley of Menie, 2021; Woodley of Menie, Sarraf, et al., 2018; Woodley of Menie, Pallesen, & Sarraf, 2018; Toto et al., 2019 found an unusually low heritability of IQ in one population, but this is likely due to the low validity of the IQ test for the population on which it was used—for relevant discussion, see Wicherts, Dolan, Carlson, & van der Maas, 2010). Similarly, the heritability of social status seems minimally variant across populations (Clark, 2014) and, in the case of England, over time (the same was found for other measures of social success as well; Clark & Cummins, 2018). Consistent with these results, studies of gene-environment interactions generally tend either not to find the predicted interactions or to find that they have weak effects, at least in humans (Culverhouse et al., 2018; Dudbridge & Fletcher, 2014; Duncan & Keller, 2011; McGue & Carey, 2017), which does not bode well for hopes of finding large differences in trait and outcome heritability across human populations as a function of environmental variation. Further, there are substantial genetic influences on which environmental factors individuals are exposed to, given, for example, that genetic predispositions influence the environments into which people sort themselves (Kendler & Baker, 2007). Therefore, even when considering traits and outcomes variation in which is under non-trivial environmental control, it may be challenging to alter the distribution of environmental exposures through, for example, policy initiatives.

Nonetheless, certain traits and outcomes of organisms, especially those exhibiting relatively low additivity (which is not true of general intelligence or, in all probability, social status), may be substantially influenced by epigenetic effects stemming from the genomes of other organisms (see Chap. 7). To what degree epigenetic effects of this kind, which we call social-epistatic effects, influence trait/outcome variation within populations as opposed to absolute levels of traits/outcomes of whole populations is currently unclear.

When personality traits are well measured, they can exhibit heritabilities of around 85–90% (Riemann & Kandler, 2010). A general factor of life history speed (a phenomenon given more attention in the following section), subsuming personality, health (mental and physical), insight, planning, and self-control, is probably about 65% heritable (Figueredo et al., 2006). These are all critical human traits, the high heritability of which carries many implications that would be foolish for social scientists to ignore. Indeed, failure to recognize the role of genetic factors in variable behavioral outcomes frequently leads to spurious sociological explanations of important phenomena. For example, the association between exercise and subjective well-being (conceptualized as happiness or satisfaction with life) may not be causal at all, despite the advice and claims of countless doctors, therapists, and social scientists—rather, they may be positively associated only because common genetic factors contribute to both of them (Stubbe, de Moor, Boomsma, & de Geus, 2007). Similarly, genetic as opposed to environmental factors may entirely explain the association between non-heterosexuality and proneness to poor mental health, and not discrimination as sociocultural theorists often suppose (Zietsch, Verweij, Bailey, Wright, & Martin, 2011; but see also Bailey, Ellingson, & Bailey, 2014; Timmins, Rimes, & Rahman, 2018).

It should be noted that not only human behavioral variation but also *invariance* can seemingly be well-explained only with biologically informed science. To return to the earlier example of sex differences, it is unclear how a sociocultural or otherwise non-genetic theory could parsimoniously account for: (1) universal cognitive and behavioral human sex differences within different populations (see Ellis, 2018); (2) universal human mate preferences and the genetic associations of preferred traits with other fitness-relevant traits such as physical and mental health (see again Nedelec & Beaver, 2014); and (3) consistent behavioral sex role differences throughout the animal kingdom that align with those found in humans (Janicke et al., 2016). We contend that no purely environmentalist theory can adequately explain these phenomena, whereas evolutionary theories positing the distinct fitness challenges—and consequently different selective pressures—experienced by men and women, the fitness-enhancing function of mate preferences, and the genetic relatedness of all earthly lifeforms can easily accommodate them.

Non-genetic, or more broadly non-biological, perspectives on human behavior can be declared dead with great confidence. While theories of this sort occasionally correctly identify proximate, as opposed to ultimate,

causes of human behavior and its variation, there are no obstacles to integrating such proximate-level theorizing into biobehavioral theories (e.g. Figueredo et al., 2018). There is thus no apparent value in continued pursuit of entirely non-genetic/biological behavioral science, given that there is not a single apparent aspect of human life on which biology does not bear in some way, and also given the manifest deficiencies of this approach. As far as we can tell, non-biological behavioral science continues largely for extra-scientific reasons. Evolutionary theorizing was in fact quite well integrated with behavioral science for some time prior to the twentieth century, when politically motivated egalitarians started to make (ultimately successful) aggressive efforts to oust biological ideas from these disciplines (MacDonald, 1998; Nyborg, 2003, 2011). Evidence of this process is found in the substantial increase in the frequency with which the words intelligence/IQ and certain terms of political abuse are used in the same sentence in Anglophone texts published from 1965 to 2000 (Woodley of Menie, Dutton et al., 2018). In our view, the rising use of moral and political values to distort scientific research is one of the more concerning cultural trends of the past century.

Elements of a Biobehavioral Framework for Understanding Human Societal and Psychological Change

Among the relevantly informed, it is uncontroversial that biological evolution via selection has substantially shaped human behavior; though some argue that, for various reasons, it is not possible to gain insight into the selective pressures that shaped human behavioral evolution (without denying that this evolution occurred), these claims are not sound (Andrews et al., 2002; Woodley of Menie & Sarraf, 2021). The common approach to criticizing evolutionary behavioral science, or biobehavioral science more generally, is *philosophical*; in critiquing evolutionary psychology in particular, critics typically stress the supposed insufficiency of methods at researchers' disposal to reconstruct the conditions that determined human behavioral evolution (e.g. Pigliucci, 2010). But critiques of this sort are entirely blind to the enormous predictive success of human evolutionary behavioral science (see, e.g. Buss, 2005, 2015a, 2015b; Laland, 2017). Science is generally conducted such that the emphasis in theory building is not on ensuring the absolute purity and correctness of theoretical premises prior to empirical work, but rather on conducting appropriate *empiri-*

cal tests of predictions derived from those premises. If a hypothetical model of human behavioral evolution implies certain predictions, and if sound tests of those predictions support the latter, then acceptance of that model is usually (though not necessarily) justified unless an alternative is shown to better account for the relevant data. Critics of evolutionary behavioral science tend to ignore the countless successful predictions of their target, preferring to attack the theoretical level alone; and when radical alternatives to well-established evolutionary models are offered, they are typically weak, even obviously wrong (Machery & Barrett, 2006).

Arguments throughout this book draw extensively on biological and biobehavioral science, especially evolutionary theory, mainly for the purpose of explaining human social and cultural change over time. Having offered the reader a sense of the virtues of a biological perspective on human behavior, and of the explanatory poverty of non-biological alternatives, we presently turn to the task of introducing some of the concepts that are especially crucial for the remainder of the book.

We have so far assumed that readers have a basic familiarity with the concept of evolution by selection. Nonetheless, a statement of the idea "in a nutshell" may be useful for some. Modern evolutionary theory posits that organisms exhibit variation in phenotypic traits—behavioral, physiological, anatomical, and so on—at least in part because organisms vary genetically, that is, with respect to the information governing phenotypic development and maintenance encoded in deoxyribonucleic acid (DNA), a molecule that consists of sequences of four bases: adenine, thymine, guanine, and cytosine. The total genetic material of an organism is called its *genome* (a term sometimes used interchangeably with *genotype*).[25] In the case of humans, the genome (typically) is contained in 23 pairs of chromosomes, which are coiled DNA molecules, the structure of which is supported by histones (a type of protein). Specific sites on chromosomes can be identified, which contain sequences of DNA with particular functions—these sites are called *genetic loci*, and the associated sequences of DNA are called *genes*. Variant DNA sequences at particular genetic loci among organisms in a species are referred to as *alleles* or *genetic variants*. Importantly, genomic variation occurs not only because of allelic variation, but also as a result of variation in chromosomal structure (structural variants) and chromosome count (within a species, the phenomenon of atypical chromosome counts is called aneuploidy; aneuploidy often involves serious medical problems in humans, but the finding of aneu-

[25] Sometimes, the term "genome" is used to refer to the total genetic material of a species.

ploidy in certain cells of the body, such as brain cells, is evidently normal; Rehen et al., 2005).

Phenotypic variability, arising in part from genomic variation, co-occurs with variability in organismal *fitness* partially[26] as a function of the environmental conditions to which organisms are exposed. Fitness typically refers to the relative replicative success of genetic variants, that is, the number of copies of these genetic variants made through organismal reproduction compared to other variants in a population. A phenotypic trait is usually deemed fit, or adaptive, if it increases the relative replicative success of the genetic variants that underlie it. But fitness can be defined more generally at the level of the genotype and the total phenotype of an organism—fitness in these cases is the relative reproductive success associated with a phenotype or genotype, respectively. Fitness can also be defined prospectively—an organism, say, might have high fitness in this sense if it lacks deleterious mutations that impair organic function; in other words, if an organism exhibits high genetic quality or genomic integrity. *Selection* simply is the phenomenon of certain genetic variants, genotypes, or phenotypes (depending on one's focus) having greater relative replicative or reproductive success than others. The pathways of selection (e.g. natural, social, and sexual) and patterns of selection (e.g. directional, disruptive, negative, stabilizing, correlational, and frequency-dependent) are complex—but generally when it is said that, for example, a phenotype is "selected for," this merely means that it is associated with high relative reproductive success, and when it is said to be "selected against," it is associated with low relative reproductive success.

To simplify matters, an organism is deemed fit if its phenotype is associated with relative reproductive success in its population. Such relative reproductive success, or fitness advantages, sustained over time should lead to the genetic variants underlying favored phenotypes to become more common in a population. Given that the process of DNA replication is imperfect, it gives rise to new genetic variants, or mutations, that will either harm or (far less frequently) benefit organismal fitness through their phenotypic effects, and thus tend to become more or less frequent in populations over time. Biological evolution by selection in the modern sense

[26] We say "partially" because phenotypic variability relevant to fitness is clearly affected by non-environmental factors. For instance, an organism that is infertile because of a genetic defect cannot have any personal reproductive fitness, regardless of its environmental circumstances.

therefore can be summarized as heritable phenotypic variation subject to selection and mutation. (In this simple overview, we have said nothing about other processes through which evolutionary change occurs, such as genetic drift, but these are not particularly relevant to the key arguments of this book.)

Key Biological Concepts

The Levels of Selection Debate

The levels of selection debate is a long-standing feature of evolutionary biology (Okasha, 2006), and is of special interest in human sociobiology (the biology of social behavior; Gintis, 2017; Richerson et al., 2016) and biobehavioral science. The dispute holds primarily between those who believe that selection acts exclusively at the individual (organismal) or even genic level (or that, even if selection occurs at higher levels of biological organization, it has had little to no meaningful effect on human and perhaps other animal evolution), and those who believe that selection acts not only at the genic and individual levels but also at the level of groups of organisms[27] (and perhaps even species), simultaneously and potentially in consistent or opposing directions at these different levels. The former camp can be termed individual-selection theorists and the latter multilevel-selection theorists. It should be emphasized that the contending parties in this debate are not in disagreement about the fact that selection is ulti-

[27] Some controversy in the levels of selection debate seems to concern the "groups" to which group selection is relevant. While it is true that, as we have noted above, multilevel selectionists at least sometimes maintain that selection may act even at the species level, it is mostly the reality of selection among or between "groups" that is debated, and what is meant by "groups" here is not always apparent. Generally, the "groups" referred to seem to lie in complexity anywhere between networks of close kin and subspecies (while potentially including the latter), and would therefore include tribes and perhaps nations.

Salter and Harpending (2013) cut through much of this confusion in making clear that for evolutionarily relevant group selection to occur, it must merely be the case that two or more populations exhibit a certain degree of genetic dissimilarity, with such genetically dissimilar populations being the groups of interest. Sufficient inter-group genetic dissimilarity allows individuals to receive substantial inclusive fitness benefits (a concept discussed below) from intra-group cooperation in a context of *competition* with other groups. Competition is facilitated by frequent contact such as when sharing a territory. Salter and Harpending also make clear that there is enough genetic variation among human biogeographic ancestry groups to permit group selection among them.

mately meaningful insofar as it affects gene frequencies (setting aside, for example, certain models of cultural group selection). Rather, the debate concerns the levels of biological complexity at which selection acts to affect gene frequencies. The levels of selection debate is relevant to the current work because the latter posits that group-selection dynamics have played a substantial role in (relatively) recent human behavioral evolution. It is therefore appropriate to make some effort to defend group-selection models of such evolution against what we consider the most important critique that they have received.

As indicated above, the most distinctive and controversial aspect of multilevel-selection theories is that they posit that selection can act on groups of organisms, favoring some of these groups over others, rather than on individual organisms (or genes) alone, favoring certain individuals over others. At least since Darwin's (1871) *The Descent of Man*, the concept of group selection has enjoyed intuitive plausibility as a potential explanation for the evolution of the highly cooperative and prosocial behaviors observed in humans (although Darwin did not use the term "group selection," the concept with which that term is associated is clearly present in *The Descent of Man*). Darwin reasoned that groups composed of individuals able to act for one another's benefit were likely to outcompete and replace groups composed of individuals acting without regard for the interests of other group members. This analysis implies that when groups are in conflict, selection should favor populations the members of which are aggregately advantaged over competitors with respect to levels of positive other-regarding (in-group) behaviors. The paradigmatic other-regarding behavior, or set of behaviors, is altruism: an organism acts altruistically when it enhances the fitness of at least one other organism at the expense of its own (i.e. personal) within-group fitness.

While intuitively plausible, it seems difficult for this group-selection model of the evolution of other-regarding traits to explain how altruism becomes selectively favored within groups, that is, how selection against altruism within groups is not insurmountable. If altruists invest in others at the expense of their own relative fitness, it is prima facie unclear how genes that code for altruistic behaviors ever manage to reach high frequencies within groups. This problem for multilevel-selection theories is still raised in the contemporary literature: "Genes for altruism or cooperation … though helpful for the group, tend to reduce the fitness of individuals that behave [in altruistic and cooperative ways]" (Baum, 2017, p. 406); "altruists will generally fail to reproduce as much as the less altruistic

members of the group that benefit from the presence of self-sacrificing individuals. The effects of differences in the survival and reproductive success of groups must exceed that of differences in the inclusive fitness of individuals within groups [for altruism to be selectively favored]" (Alcock, 2017, p. 388).

A common solution to this problem among multilevel-selection theorists invokes various cultural processes that may have the effect of advantaging the fitness of individuals that behave prosocially, that is, for the benefit of others, relative to those who are less prosocial or are selfish (e.g. Boyd & Richerson, 1992). If groups construct culture such that fitness penalties accrue to those that behave selfishly and fitness benefits accrue to those that behave prosocially, for example, through systems of punishment, reputation, and morality, it seems obvious that genes coding for positive other-regarding behaviors could reach high frequencies in human populations. Unfortunately, theories of this sort are insufficient to explain the evolution of altruism in the standard sense, which, by definition, entails that altruism *harms* the personal fitness of organisms, all else equal (although, as we will argue, such theories might nonetheless play a critical role in explaining the evolution of altruism). Indeed, theories of the kind that Boyd and Richerson (1992) present sometimes indicate, implicitly or explicitly, that altruism, as defined above, simply does not exist, at least in humans. But claims of this sort seem inconsistent with the existence of certain human behaviors, such as a soldier jumping on a grenade to save the lives of his comrades.

Inclusive fitness theory, the favored paradigm in sociobiology among individual-selection theorists, seemingly best explains most cases of altruistic behavior—though multilevel-selection theorists generally do not deny the reality of inclusive fitness dynamics in human evolution (Gintis, 2017). Inclusive fitness theory posits that organisms act to increase the population frequency of copies of genes that they carry; contrary to original formulations of the theory, which depend on an "identity by descent" qualification, it is irrelevant in what organism(s) these copies reside (Hamilton, 1975; those unaware of the foregoing paper often mistakenly equate the concept of inclusive fitness with kin selection, when the former is in fact "more general" [pp. 140–141] than the latter, in the words of Hamilton, since it does not depend on the concept of identity by descent). An organism can sacrifice its own fitness, or individual or personal fitness, to improve the fitness of others carrying copies of its genes, its inclusive fitness, and ultimately yield a fitness payoff equivalent to that of producing

a certain number of offspring through its own reproduction (the offspring equivalent of the inclusive fitness payoff of course depends on the organism's success in boosting the fitness of related others and those others' degree of genetic similarity to the organism).

It should be emphasized that whether and how inclusive fitness theory and multilevel-selection theory are distinct is not always clear, and is in many respects controversial (Gintis, 2017; Hamilton, 1975; Harpending, 1979; Okasha, 2016; Salter & Harpending, 2013). It is widely believed that inclusive fitness theory and multilevel-selection theory are formally equivalent (Birch & Okasha, 2014), but that they nonetheless are not interchangeable as theoretical frameworks (Okasha, 2016). For example, Gintis (2017) believes that neither multilevel-selection theory nor inclusive fitness theory is independently adequate for sociobiological analysis, arguing that the former is "structural" and the latter "atomistic" as theoretical orientations (a point on which we elaborate below); thus, in his view "[t]he correct way of thinking is to embrace both atomistic and structural approaches and analyze the corresponding interplay of forces" (p. 192). To appreciate the conflict between multilevel-selection theorists and inclusive fitness theorists, it is perhaps best to ask what those who identify as inclusive fitness theorists and those who identify as multilevel-selection theorists tend to argue about. The most striking basis of disagreement lies in the fact that whereas multilevel selectionists tend to believe that prosocial behaviors that benefit members of entire groups equally can be adaptive, inclusive fitness theorists are wont to reject this idea, searching instead for ways that prosocial behaviors advantage the inclusive fitness of those carrying genes for such behaviors over the inclusive fitness of *others within their group* (Alcock, 2017).

Unsurprisingly, then, inclusive fitness theorists typically deny the existence of altruism that does not boost the intra-group inclusive fitness of those carrying altruistic genes, which is here termed extreme altruism. Alexander (1989), for example, speculates that those that sacrifice themselves in war may enhance the intra-group fitness of their surviving kin through the reputational benefits associated with having a heroic relative (see discussion in Alcock, 2017, which though favorable to Alexander's explanation fails to improve on it in any way). In other words, apparent extreme altruistic behaviors are alleged to in fact have the effect of generally raising within-group inclusive fitness, and thus are merely altruistic behaviors as opposed to extreme altruistic ones. This explanation is unpersuasive, however, since it is far from clear that the mere fact of having an

altruistic relative will do anything to, say, advantage an individual in sexual selection. Since fitness varies substantially even within families, it seems reasonable to suppose that among individuals, selective outcomes for any individual depend more on its own traits than the traits of others with which it is tenuously associated via reputation.[28] Therefore, it is not obvious that apparent extreme altruism can be explained as an inclusive-fitness-boosting behavior.

The failure of inclusive fitness theory to explain extreme human altruism reflects the former's most critical general deficit, which is its failure to model the "social" quality of the genome (this is the reason Gintis [2017, p. 192] characterizes inclusive fitness theory as "atomistic"): "[I]nclusive fitness theory applies to a *single gene* in the organism's genome, or to several *non-interacting genes*. But the evolutionary success of an organism depends on the way the various genes *interact synergistically*. Claiming that inclusive fitness theory explains societies is like claiming that the analysis of word frequency in a book is sufficient to comprehend the book's meaning" (Gintis, 2017, p. 190; emphasis in original). The blindness of inclusive fitness theorists to intra-genomic interactions implies that they generally will not model the role of adaptive function in human evolution with adequate sophistication. Instead, they often prefer to theorize in terms of the effects of "genes" as such on fitness, rather than in terms of traits or adaptations, which involve the interactive effects of many genes, as well as the epigenetic[29] up- and downregulation of them. This narrow focus on genes may lead inclusive fitness theorists, and population geneticists generally, to effectively assume that genetic factors have highly stable

[28] One might object here that even granting all of our claims, it could still be that associations with kin of good reputation advantage fitness, all else equal, but probably only slightly. Ultimately, this uncertainty cannot be resolved without appropriate empirical investigation, which has not yet been conducted (as far as we know).

One possibility is that such association-based fitness advantages vary among populations as a function of individualism/collectivism, with collectivists more attuned to the family backgrounds of prospective mates than individualists. Nonetheless, one could doubt that information about deceased relatives tends to be salient and well-preserved enough to meaningfully affect mate choice, even in collectivist populations (of course, we have in mind those dying through altruistic sacrifices).

[29] Although its meaning is broader than this, we use "epigenetics" and cognate terms to refer to processes that suppress or activate genes, thereby allowing or disallowing their phenotypic effects. Social epistasis, a phenomenon introduced in Chap. 1 and that is especially important in later chapters (7 and 8), simply is epigenetic change of gene activity ultimately caused by a gene, or more than one gene, of at least one organism other than the one undergoing such change.

fitness effects across environments—genes that code for altruistic behavior should, then, "generally" harm the fitness of individuals within groups (Alcock, 2017, p. 388). In the world of actual adaptive behavior, however, assumptions of this sort are not always correct. For example, general intelligence was, a mere few centuries ago, highly advantageous for the fitness of groups and individuals in the West, but since roughly the mid-nineteenth century has had a role in greatly reducing the fitness of such individuals and possibly groups (Woodley of Menie, Figueredo, et al., 2017). Clearly, then, a trait's effect on fitness, and so the effects of the genes underlying that trait, can vary dramatically with environmental context.

If one theoretically models extreme altruistic behavior as a multilevel selectionist, and so conceives of evolutionary phenomena in "structural" as opposed to "atomistic" ways (Gintis, 2017, p. 192), at least two facts become salient. First, in the context of inter-group conflict, the presence of extreme altruists will benefit group fitness (a fact not even individual-selection theorists deny; Alcock, 2017). Therefore, second, the groups that will be most successful in conflicts with other groups in the long term will, ceteris paribus, be able to consistently generate large subpopulations of extreme altruists for inter-group conflicts. Inter-group conflict, likely the greatest source of group-selective pressure in human evolutionary history, should therefore have selectively favored not only the evolution of extreme altruism, but also mechanisms through which high frequencies of extreme altruists could be maintained in populations. Call realization of this condition the adaptive problem of inter-group conflict, or simply the adaptive problem.

If genes coding for extreme altruism must generally produce behaviors that reduce the fitness of those that carry these genes, it seems unlikely that any group could solve the adaptive problem, except under rare circumstances. But if the adaptations underlying extreme altruistic behavior only generate such behaviors under conditions of inter-group conflict, there is no necessary obstacle to solving the adaptive problem. Since inter-group conflict in humans is a recurrent, as opposed to a constant, phenomenon (Harpending & Harris, 2016; MacDonald, 2001), there would certainly have been times in the histories of human groups to produce high frequencies of extreme altruists without immediately losing large fractions of them to inter-group conflict. This could have potentially occurred if in times of peace, selection favored, or has favored, individuals that give signals of the ability to engage in extreme altruism, in the same way that signals of high g, such as humor, can enhance *prospective* indi-

vidual fitness (Miller, 2000; even if in modernized populations, *g* tends to lower realized individual fitness—see Chap. 8). Indeed, the sorts of mechanisms elaborated by Boyd and Richerson (1992), among others, may have had the effect of shifting sexual and social selection such that they favored those giving off these signals of high levels of altruism, potentially bringing altruism into genetic correlation with general intelligence and general fitness (that is, the degree to which a genome is free of deleterious mutations), thus further facilitating heightening population-levels of altruism—evidence in fact suggests that altruism is correlated with general fitness (Miller, 2000). As such, in times of peace occurring in a broader context of recurrent inter-group conflict, selection within human groups may have strongly favored the proliferation of adaptations underlying the ability to engage in extreme altruism since this would have enhanced prospective group fitness in inter-group conflict. While individuals with these adaptations would have typically been selectively disadvantaged in times of inter-group conflict, insofar as they would have tended to perform acts of extreme altruism, when cues of inter-group conflict were absent, those high in genetic potential for extreme altruism may have simply enjoyed the substantial favor of social and sexual selection. Evidence generally supports this possibility, given that mate preferences for altruism (in seeking long-term mates) are apparent and substantial in both men and women (Farrelly, 2013), and may be at least moderately heritable (Phillips, Ferguson, & Rijsdijk, 2010). Nevertheless, this possibility depends on the assumptions that the genetic potential to engage in extreme altruism can be signaled through behaviors that do not penalize fitness, and that extreme altruism occurs on the broader spectrum of altruistic behavior (so, for example, those finding altruism sexually attractive should be especially attracted to those that signal the potential for extreme altruism).

Extreme altruism could thus be understood as a group-selected adaptive response to the recurrent challenge to group fitness of inter-group conflict: in the same way that recurrent fitness challenges have given rise to unique traits that enable adaptive engagement with multiple environmental contexts at the individual level (e.g. general intelligence, covered in the next section, which allows humans and other species to cope with environmental novelty), so adaptations may have evolved with the same characteristics via group-level selective pressures. The adaptations underlying extreme altruism may be one example.

A potential problem for our model concerns the possible evolution of behavioral morphs that signal extreme altruism, but actually lack any tendency to engage in extreme altruism when exposed to relevant environmental cues. In other words, these morphs would enjoy all of the benefits of signaling extreme altruism, but suffer none of the costs of being extreme altruists, which would necessarily advantage their fitness over extreme altruists, ceteris paribus. However, inter-group conflict should favor those groups that develop "honest" signalers of altruism that can be targeted for positive social and sexual selection (on the concept of honest signals, see Biernaskie, Grafen, & Perry, 2014). Groups wherein "fake" extreme altruistic morphs were not effectively distinguished from actual extreme altruists would have tended toward defeat in inter-group conflict, since they would have lacked high frequencies of extreme altruists. An interesting implication of our model, then, is that group-selective pressures issuing from inter-group conflict should have shaped the social and sexual selective mechanisms that partly determine intra-group gradients of selection. Many inclusive fitness theorists would likely predict the evolution of such morphs, given not only their atomistic focus but also their tendency to assume that organisms maximize inclusive fitness; however, social organisms typically fail to maximize inclusive fitness (Gintis, 2017, p. 190); instead, they "interact strategically in a complex manner involving collaboration, as well as enhancement and suppression of gene expression" (Gintis, 2017, p. 209), which results in and sustains arrangements where organisms generally do not maximize inclusive fitness.

General Intelligence (g) and Its Evolution

General intelligence or *g* is the mental ability that underlies performance, to varying degrees, on all cognitive tasks, and that explains most of the validity of IQ tests (Ganzach & Patel, 2018; Jensen, 1998). It was originally discovered through the observation of the positive manifold of correlations on diverse cognitive tests (Spearman, 1904), meaning that individuals who do well on one cognitive test have an increased probability of doing well on others. Insofar as *g* exhibits *domain generality* with respect to the tasks on which it positively predicts performance, it has been argued that *g* is the basis of novel problem-solving ability and so was likely selected in species frequently encountering novel problems, that is, problems for which there was, and perhaps still is, no evolved specialized system (MacDonald & Woodley of Menie, 2021).

A number of considerations support the view that *g* corresponds to an evolved neurological system. For instance, *g* is not limited to humans but has been observed in other primates (Burkart, Schubiger, & van Schaik, 2017; Hopkins, Russell, & Schaeffer, 2014), other (non-primate) mammals, such as dogs, cats, mice, and rats (Galsworthy, Arden, & Chabris, 2014), and non-mammals such as ravens (Pepperberg, 2017). Moreover, interspecific differences in intelligence are concentrated on *g*, as opposed to domain-specific abilities (*s*), suggesting that the evolution of cognitive ability has primarily involved selection for *g* (Fernandes, Woodley, & te Nijenhuis, 2014). Furthermore, the abilities that show the strongest affinity for *g*, in both humans and non-human mammals, are also the most heritable and phenotypically variable, and show the greatest additive genetic variance, indicating that they are the most evolvable (González et al., 2019; Woodley of Menie, Fernandes, & Hopkins, 2015). Within humans, *g* correlates with a number of biological variables, such as velocity of nerve conduction and brain metabolism parameters (Rushton & Jensen, 2010) and white matter tract integrity (Penke et al., 2012). Taken together, these findings leave little doubt that *g* is a substantive biological and evolutionary phenomenon, and not merely a statistical artifact as some have contended (e.g. Gould, 1996).

g is relevant to the study at hand in that a population's average level of the trait may substantially determine its well-being and cultural vigor, and because population levels of *g* have not been temporally stable (Woodley & Figueredo, 2013; Woodley of Menie, Figueredo, et al., 2017; see also Chap. 8). As indicated in Chap. 1, it is also substantially through *g* that inter-group conflict and resultant group-level selective pressures are relevant to this book, in that such pressures may be the primary determinant of population levels of *g*, with greater such conflict placing fitness premiums on the collective ability of groups to develop innovations that advantage them in competition (Hamilton, 2000; Woodley of Menie, Figueredo, et al., 2017).

Life History Theory

Life history theory describes and explains the tradeoffs that organisms make among diverse fitness domains, that is, components of their phenotypes related to fitness[30] (Figueredo et al., 2006). Sets of phenotypic traits

[30] Life history theory applied to individual differences has recently been challenged (see Zietsch & Sidari, in press). For a response to this challenge, see Sarraf, Woodley of Menie, and Luoto (In preparation).

resulting from these tradeoffs are coordinated ensembles of adaptations, called strategies. As applied to humans, life history theory posits that variation in life history strategies occurs along a continuum of what is called life history speed, ranging from *slow* to *fast*, which is captured by variation in a general psychometric factor called *Super*-K (to be explained below). The term "speed" is used to indicate the fact that this variation in life history strategies tracks the length of the time horizon over which organisms are adapted to pursue fitness. In humans, slow life history strategies are those adapted to the pursuit of fitness over a long time horizon, and thus involve relatively late achievement of developmental milestones, such as pubescence, reproduction, and senescence. The opposite is true of fast life history strategies. Theory and empirical evidence indicate that both the type and level of environmental harshness (i.e. morbidity and mortality) and the temporal stability of these factors (environmental stability) to which organisms are exposed determine the evolution and, to a lesser degree via epigenetic effects, ontogenetic development of life history strategies (Figueredo et al., 2006). Environments in which harshness is relatively low and/or intrinsic (i.e. controllable by the organism to some degree) and/or environmental stability is high, or at least where environmental instability is predictable, typically select for slower life history speeds; environments in which environmental harshness is relatively high and/or extrinsic (i.e. uncontrollable) and/or environmental instability is high and unpredictable typically select for faster life history speeds.

Slow life history organisms are high on Super-*K*, a higher-order general psychometric factor that captures variation in three subordinate general factors of personality, health (mental and physical), and insight, planning, prosociality, and self-control, respectively (Figueredo et al., 2007). Thus, slow life history strategists are relatively healthy and have relatively high levels of broadly desirable personality traits: extraversion, emotional stability (the opposite of neuroticism), agreeableness, openness to experience, and conscientiousness—variation in all of which is captured by a general factor of personality (GFP) (Figueredo et al., 2007). Further, those with slow life history strategies are relatively future-oriented and prosocial, and thus biased toward the development of enduring and mutualistic social, sexual, and parenting relationships; they are generally sexually restrained and favor monogamy over multi-partner sexual and romantic arrangements. They typically have small numbers of offspring but invest heavily in the fitness of the offspring that they do have, as well as in others to whom they are genetically similar (thereby boosting inclusive fitness). (Nevertheless, there are contexts

in which slow life history strategists will tend to have larger numbers of offspring than fast life history strategists; Woodley of Menie, Cabeza de Baca et al., 2017.) The greater longevity of slow life history strategists, a function of their relatively high health, increases their opportunities to invest in genetically related conspecifics, including offspring. This approach to fitness enhancement is viable for slow life history strategists because they usually either face few risks of early incapacitation and death or can buffer against the risks that they do face. The specified package of slow life history traits is a proximate consequence of the fact that in developmental time, slow life history strategists invest heavily in fitness domains governing somatic development and parental and nepotistic behavior, but minimally in the fitness domain related to mating success (i.e. the acquisition and retention of short-term sexual partners[31]; Fernandes, Kennair, Hutz, Natividade, & Kruger, 2016; Figueredo et al., 2006).

Conversely, fast life history strategists are low on Super-*K*, and thus tend to be relatively unhealthy and short-termist, and to exhibit personality profiles generally considered to be socially undesirable. Their social schemas and interactions with others tend toward antagonism as opposed to mutualism, such that fast life history strategists generally have relatively few lasting or mutually beneficial relationships. They are typically less sexually restrained and seek multiple sexual and romantic partners. Resultantly, fast life history strategists are adaptively inclined to the reproduction of many offspring, but they typically invest minimally in the latter. Moreover, fast life history strategists sexually develop and reproduce early, as this lowers the probability that environmental hazards will kill or incapacitate them before they can reproduce; the health of fast life history strategists is relatively low because their fitness does not depend on long-term survival. The specified package of fast life history traits is a proximate consequence of the fact that in developmental time, fast life history strategists invest heavily in the fitness domain related to mating success, but minimally in the fitness domains related to somatic development and parental/nepotistic behavior (Figueredo et al., 2006).

[31] Figueredo et al. (2006) define "mating effort" (i.e. investment in the mating domain of fitness) as related to success in both acquiring *and* keeping sexual relationships. But the second part of this claim does not fit with the observation that fast life history strategists, who are high in mating effort, seem to have adaptations to end sexual relationships relatively quickly after they begin (see Fernandes et al., 2016, who define mating effort more narrowly, and in our view more accurately, as "the amount of energy, time, or other key resources invested in competing for and retaining *short-term mates*" [p. 222; emphasis added]).

Among the more interesting phenomena related to life history are cognitive differentiation and integration effort (CD-IE) and strategic differentiation and integration effort (SD-IE) (Figueredo, Woodley, Brown, & Ross, 2013; Woodley, 2011; Woodley, Figueredo, Brown, & Ross, 2013). Cognitive differentiation effort (CDE) is the hypothesized causal basis of the observed weakening of the manifold of g at progressively slower life history speeds, and cognitive integration effort (CIE) is the hypothesized causal basis of the observed strengthening of the manifold of g at progressively faster life history speeds (effects predicted by Woodley, 2011 and empirically corroborated by Figueredo, Woodley, et al., 2013, and Woodley, Figueredo, et al., 2013). Strategic differentiation effort (SDE) is the hypothesized causal basis of the observed weakening of the manifold of the Super-*K* factor and its three lower-order factors at progressively slower life history speeds, and strategic integration effort (SIE) is the hypothesized causal basis of the observed strengthening of the manifold of the Super-*K* factor and its three lower-order factors at progressively faster life history speeds (Figueredo, Woodley, et al., 2013). Slow life history strategists are thought to invest in the cultivation of specialized cognitive abilities and other behavioral traits through CDE and SDE[32] because the stable environments in which they are typically found have correspondingly stable niches, to which slow life history strategists can adapt themselves through behavioral specialization. Additionally, specialization should reduce competition for access to niches, and this reduced intraspecific competitive pressure should in turn facilitate the execution of the broadly prosocial behaviors of slow life history strategists (Figueredo, Woodley of Menie, & Jacobs, 2015). By contrast, fast life history strategists must contend with variable fitness challenges as a function of the instability, unpredictability, and uncontrollability of the environments in which they evolve and develop. This places a fitness premium on their ability to adapt to a variety of niches over the life course, and so favors behavioral generalism as opposed to specialism, and therefore a relatively equal investment in behavioral domains through CIE and SIE (Figueredo, Woodley, et al., 2013; Woodley, 2011).

Importantly, the ability to adaptively specialize through SDE and CDE has been hypothesized to require greater developmental plasticity[33] in

[32] In both cases, this is done through the greater allocation of time, calories, and other resources to the development of brain regions associated with specific cognitive and other behavioral traits.

[33] Developmental preparedness is "the degree to which an organism is genetically predisposed toward a particular developmental trajectory," whereas developmental plasticity is "the

slow life history strategists, as reflected in lower trait heritability (Figueredo et al., 2006). It has not yet been determined whether slow life history strategists exhibit lower heritabilities of cognitive abilities. But it has been confirmed that the heritability of life history traits and slow life history speed are negatively associated (Woodley of Menie, Figueredo, et al. 2015).

As we will explain in subsequent chapters, the life history traits of populations substantially bear on the societies and cultures that they develop and maintain. Furthermore, a certain syndrome of slowing life history speed, falling *g*, and minimal (or absent) inter-group conflict may characterize modernized populations generally and serve as key explanatory variables of their distinctive behavioral and cultural characteristics (see Chaps. 3, 7 and 8).

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degree to which gene-environment interaction induced phenotypic changes during development may alter that prepared trajectory" (Woodley of Menie, Figueredo et al., 2015, p. 2).

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CHAPTER 3

Medieval and Modern Worlds

The Virtues of Medieval Life

Academic literature concerning, implicitly or explicitly, the "decline" of the Western world tends to contrast an idealized vision of pre-industrial life with an essentially negative conception of industrial and "postindustrial" modernity. Sociology itself may have emerged as a reaction to perceived undesirable or at least dangerous effects of modernization: "What the analyses of the sociological classics, from Marx to Durkheim and from Weber to Simmel or Tönnies, have in common is that they all proceed from the observation of massive *changes in the conditions of life*—leading to the classical juxtaposition of 'archaic' versus 'modern' societies described by all of the founding fathers of sociology—and that they all exhibit great concern for the consequences these changes may have for the human condition" (Rosa, 2015, p. 105; emphasis in original). This tendency is especially pronounced in the writing of Ferdinand Tönnies, whose highly influential 1887 work *Gemeinschaft und Gesellschaft* casts pre-industrial societies as intimate, "self-contained," cohesive, and "homogeneous," and modernizing societies as impersonal, open, atomized, and "heterogeneous" (Greenfield, 2009, p. 402)—a taxonomy that has continued to shape academic understanding of variation in human social life over historical time and across populations (Greenfield, 2009; Reynolds, 1997, pp. xi–lxvi). To simplify matters (although not much), certain sociologists

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and historians have assumed that the pre-industrial (especially medieval[1]) Western past was essentially idyllic, secure, and wholesome, with daily life similar to that found in contemporary Amish societies, and that the modern world is harsh, competitive, and insalubrious: "The Romantic nineteenth-century depiction of the simple peasant, envied for a bucolic existence far from modern society, still clings to our perception. From a distance, the feudal model suggests that medieval peasants lived in a snug, secure world, protected by their lord in return for services" (Hazell, 2008, p. 213).

But this view of the contrast between pre-industrial and modernized life is difficult to square with a number of facts. Considering Western Europe[2] in the Middle Ages (spanning roughly the middle of the fifth to the end of the fourteenth century AD), among the most striking observations relevant to quality of life are the high levels of intra-group violence (Eisner, 2001, 2003), inter-group violence (Clark, 2007, pp. 126–128), poverty (Cipolla, 1993; Clark, 2007), food scarcity (Jörg, 2008), and infant and child mortality (primarily from high burdens of infectious disease; Caldwell, Caldwell, Caldwell, McDonald, & Schindlmayr, 2006) that characterized this period generally (though with substantial variation over time and among regions). To gain some perspective, consider the (per 100,000) homicide rates for a few notable contemporary Western countries (data pertain to the years 2011–2012): 4.7 in the United States, 0.9 in the United Kingdom, 1.0 in France, 0.8 in Denmark, 0.9 in Italy, 1.6 in Belgium, 1.1 in Australia, and 0.9 in New Zealand (UNODC, n.d.). These are all far below the 20 to 40 per 100,000 rate of late medieval Western Europe[3] (Frost & Harpending, 2015).

Studies of the skeletal remains of medieval persons offer further evidence to this effect, suggesting that these individuals had high levels of developmental stress and poor existential conditions, resulting in short stature and probable low average lifespans, lasting only to the mid-thirties (Sanderson, 1999; Wurm, 1984)—indeed, early medieval people may have had less optimal conditions for development than Mesolithic hunter-gatherers (Macintosh, Pinhasi, & Stock, 2016), despite the latter's far less

[1] "The Middle Ages" and "the Medieval Era," "medieval times," and so on, are used interchangeably.

[2] The use of "Europe" and cognates in this chapter should be taken to concern *Western Europe* unless otherwise indicated.

[3] Claims of high levels of violence in the medieval world have been strongly challenged (see Butler, 2018), a point to which we will return later in this chapter.

complex socioeconomic organization and cultural production. Some medieval graveyards offer evidence of remarkably high rates of early life mortality and astonishingly short lifespans not even reaching the twenties (Cohen, 1991). The poor outcomes that these groups experienced potentially indicate the long-term challenges that certain populations transitioning into agricultural ways of life faced, following millennia of largely nomadic hunting and gathering, a shift involving substantial selective pressure for adaptation to a highly evolutionarily novel subsistence paradigm for which very few were genetically suited (Hawks, Wang, Cochran, Harpending, & Moyzis, 2007; Woodley of Menie, Younuskunju, et al., 2017).

Further trouble for a "romantic" view of the medieval past comes from evidence of problematic social instability. For example, against assumptions to the contrary that long held sway among historians, there seems to be little doubt that medieval populations typically were highly geographically mobile, that is, the members of these populations were not settled in single villages, towns, or cities for their whole lives, and in fact moved quite regularly (Dyer, 2007; Hochstadt, 1983; Laslett, 2001). Laslett (2001, p. 113) discusses findings suggestive of high rates of marital dissolution and remarriage subsequent to spousal death in the Early Modern Era (spanning roughly the beginning of the sixteenth to the start of the nineteenth century AD)—it is reasonable to infer that the same problem applied to medieval life given that mortality rates changed little from the Medieval to Early Modern Eras (Rühli & Henneberg, 2013, p. 3). Additionally, and in spite of the contentions of sociologists such as Sombart (1916), it is not easily argued that the Medieval Era involved an essentially static division of European populations into social strata between which there was no mobility. Clark (2014), for example, finds little evidence of change in rates of social mobility from AD 1300–2000 in England. Nevertheless, some contemporary sociologists still write on Medieval Europe as if it were beyond dispute that its societies lacked social mobility. Greenfeld (2013), for example, maintains that "[n]o part of this rigid [medieval] world would change position vis-à-vis the others, nothing moved, and everyone was kept to one's place: it was as stable as a human world can be—not, perhaps, as stable as a castle, but eminently stable in comparison to the world that came to replace it" (p. 311). But she offers no substantive historical evidence for this claim, which is very likely incorrect (see Carocci, 2011).

Phillips (1993) offers perhaps the most sustained attack against a positive view of life in the medieval West available, directed specifically at those who would take European societies of the Middle Ages to exemplify a communitarian spirit from which the Western world has since fallen away. Among Phillips' (1993) central claims about the Medieval Era (primarily the High Middle Ages, that is, from around the start of the eleventh century to the beginning of the fourteenth century AD) are: (1) geographical mobility was not only substantial but driven in large part by social abuses and exploitation (p. 106); (2) "shared values," "affective ties," and "social solidarity" were likely minimal given high levels of inequality, violence, and conflict (pp. 106–112, 115–121); (3) political participation was severely limited through the exclusion of low-status individuals (pp. 112–115).

In light of all of this, it must be asked whether there was *anything* praiseworthy about life in Medieval Europe. There is certainly little good to be said about the material standard of living. The sort of poverty and physical insecurity that was typical in the Middle Ages is difficult to find in any modernized society—other than the homeless, it is not clear if any subpopulation of the developed world could be reasonably compared to European medievals in terms of material deprivation. To appreciate the seriousness of poverty in the Middle Ages, consider that Western Europe's GDP per capita at the beginning of the sixteenth century (the close of the Medieval Era) was around 771 (1990) international dollars—in 2003, the figure stood at 19,921 (1990) international dollars, which constitutes about a 26-fold increase (Maddison, 2007, p. 70). Rindermann (2018) offers the more tangible example of glass windows—to modernized people, these feature in virtually all habitable buildings, but for centuries in the West, they were rare luxuries: "Glass windows needed 700 years from the Middle Ages to the nineteenth century to become common" (p. 402; see also p. 26).

But in spite of, and perhaps to a large extent *because* of, these deficits, medieval people arguably were enormously advantaged, relative to their modernized counterparts, in different ways. This is most clearly apparent in their intense devotion to Christianity and the societies built around it, providing a strong basis for existential purpose, and their strength of character that enabled them to handle adversity directly, with limited mediation by powerful institutions. Contrary to Phillips' (1993) arguments, a great deal of historical evidence suggests that medieval Europeans were profoundly group-oriented. Perhaps one reason that Phillips (1993) denies this fact is that he seems to believe, in some respects following

Tönnies, that a spirit of communitarianism, social solidarity, or groupishness requires egalitarianism, and medieval European societies were clearly inegalitarian. But there is no reason to suppose that that is true. Susan Reynolds, probably the most distinguished living historian of community in medieval life, makes this point explicit: "As in many human societies throughout history, hierarchy and inequality [in the Medieval Era] were not incompatible with solidarity: in some ways the acceptance of inequality, by inculcating submission, may make solidarity easier" (Reynolds, 2010, p. 116).

Indeed, the historical record offers abundant evidence of the collectivist psychology of Europeans in the Middle Ages (without indicating that their collectivism was entirely overriding or that within-group conflict did not exist or was not substantial). For instance, Kaeuper (2011) recounts an event that occurred during a civil war in the time of Henry III of England, in which villagers attacked "royalist troops, who, remarkably, brought them [the villagers] into court rather than destroying them or their homes" (p. 89). The reason for this attack, according to the villagers themselves, was that the troops threatened the welfare of the community and opposed the barons, that is, noble landowners—this indicates not only that the villagers supported a certain ideal of community that was promoted widely in their time (Kaeuper, 2011, p. 89), but also that they willingly risked their lives on behalf of the interests of social superiors (the barons). Evidence of the communitarian behavior of English medievals is also present in records pertaining to times of peace, during which this behavior broadly took the form of cooperative "self-government at the king's command" (Kaeuper, 2011, p. 90), meaning the voluntary development of institutions, enforcement of laws, and fulfillment of duties consistent with the vision of the monarch. In Kaeuper's (2011) judgment, this general feature of social life in these times could not be made sense of unless a rather encompassing ideal of community had the endorsement of both elites and those of lower standing: "This idea of a larger community was powerful and could have succeeded only with support from all those whose political weight counted … [T]he idea of a community-wide realm did not simply flow top-down. Over time it may have reached, or grown from, surprisingly deep levels in the social pyramid" (Kaeuper, 2011, p. 89). None of this implies that English people of the Middle Ages lived free of intra-group conflict and friction (Kaeuper, 2011, p. 96)—indeed, one concrete example of groupish behavior provided above occurred in the context of such conflict. Still, even in periods of turmoil, such as the

Great Rising of 1381, "striking testimony to the strength of the basic ideals [including that of community]" is apparent—"[a]s revolts go, the Great Rising was almost orderly" (Kaeuper, 2011, p. 97). Reynolds (2010) offers a similar observation: "It is … testimony to the givenness—the supposed naturalness—of kingdoms that very few rebellious nobles demanded formal secession so that they could form separate kingdoms. The assumption that kingdoms belonged to peoples that constituted natural units of custom, law, and government may explain how the Kingdom of France survived the eleventh century and the Kingdom of Germany (by then conflated with the empire) survived the fourteenth, fifteenth, and beyond" (pp. 123–124).

In a similar vein, Dyer (1994) presents a number of considerations indicating that Phillips' (1993) pessimistic view is potentially overstated. Whereas Phillips (1993) portrays medieval villages as involving great socioeconomic inequality (p. 107), Dyer (1994) contends that the differences in status among villagers were in fact quite small—the gaps between peasants and lords were notable, but disparities were sufficiently limited among peasants so as not to present much of a challenge to social cohesion (p. 419). Further, as with Reynolds (2010, p. 116), Dyer (1994) asserts that inequality and difference did not necessarily constitute obstacles to social cohesion in the first place, and may have facilitated it: "Such social variety warns up against emphasizing the egalitarianism of medieval rural society but need not detract from regarding villages as cohesive. Differences between people could be a source of strength, leading to mutual dependence for labor and goods" (p. 419). Contradicting Phillips' (1993) case to the effect that medieval societies were riven by the opposing values of their members, Dyer (1994) stresses the common "values and ideas" of villagers and the many collective activities through which they could be expressed, especially those of a religious nature (p. 419). To be sure, Dyer (1994), as with so many other scholars of the medieval world, does not idealize the focus of his inquiry, stating that "villages were never, within our period of detailed documentation, very harmonious places" (p. 424). This fact seems in large part attributable to the unpleasant material circumstances of the era, but also to the competing interests among individuals and subpopulations (Dyer, 1994, pp. 421–424) that, needless to say, cannot be fully avoided in any large human social group. But this does not seem to have prevented substantial functional cohesion and unity in medieval villages, particularly when they were faced with serious threats to their survival (Dyer, 1994, pp. 419, 429). This echoes

another point from Reynolds (2010) who, while placing great emphasis on the "assumptions of collectivity, collective interests, and collective activities" that defined medieval life, does not take such phenomena to imply that "medieval people submerged their individual interests in their communities" (p. 123). The point here is simply that medieval collectivism was not absolute, in that it was undermined by the inter-personal and inter-subgroup conflicts that are ubiquitous features of human existence, and which the miserable material circumstances of the time surely worsened.

Even if Western Europeans in the Middle Ages exhibited significant in-group social cohesion and maintained basically collectivist/communitarian ideals, it is not yet clear how general this groupishness was, or how significant its real-world effects were. To clarify this matter, it is essential to consider the role of religion. Lynch and Adamo (2014) argue that Christianity, through the (Western) Catholic Church, served to unify medieval Western Europeans against out-groups, particularly Muslims and Jews, and gave them a basic commitment to the maintenance of Western Christendom (pp. 177–184), that is, Christian peoples as well as the lands that they controlled and their common religious culture in the West.[4] In fact, the unifying influence of Christianity was so intense that it became "more important, more real, than the other social groupings, such as regions or kingdoms, in which people lived" (Lynch & Adamo, 2014, p. 177). Inter-group conflict within Medieval Europe was far from absent, and it cannot be said that Western Christendom, let alone Christians of Western and Eastern Europe, ever achieved political unity (Lynch & Adamo, 2014, pp. 178–179). Despite these divisions, the sheer zeal that common High Medieval Europeans expressed in response to the Islamic threat to Christendom, culminating in the crusades, is remarkable—Lynch and Adamo's (2014) account is worth quoting at length:

> The response to [Pope Urban II's] call [to aid in the defense of Christendom against Muslim encroachment] was much greater and more emotional than he could have anticipated. A movement verging on mass hysteria swept the crowd of knights listening to his sermon. They cried out 'God wills it' and tore up cloth to sew crosses on their clothing, symbolising their resolve to rescue the Holy Land. In subsequent months, knights and ordinary people in much of France and the Rhineland were roused to a feverish activity by the call to arms against the foes of Christendom … the history of the church

[4] Lynch and Adamo (2014) offer the more limited definition of Christendom as "[t]he collective name for those territories inhabited primarily by Christians" (p. xvi).

> in the central Middle Ages is incomprehensible unless one realises how the papacy tapped into a growing sense of loyalty to Christendom, of which the crusades were a concrete embodiment … The elaborate administrative structures of the church in the central Middle Ages would not have been possible without the willingness of millions of people to accept and pay for them. (p. 180)

This suggests that medieval Western Europeans, at least of the High Middle Ages, accomplished a far-reaching ideal of Christian unity that succeeded in motivating acts of heroism and self-sacrifice on an impressively wide scale and across social strata (despite the various imperfections this ideal surely had in its manifestations).[5] This achievement is all the more extraordinary in that it was realized without the dense bureaucratic infrastructure on which modern states rely to initiate and manage military activities. In a study of France under the reign of St. Louis IX, Jones (2017) argues that medieval societies were able to coordinate in sophisticated ways through organic networks of *consilium et auxilium* (counsel and aid), or voluntary pacts to serve the interests of others. This sort of social organization may not have been possible without high levels of in-group altruism,[6] and the latter may have only emerged as a consequence of the high frequency of inter-group conflict in pre-industrial Western Europe selectively favoring cooperative and prosocial in-group behaviors.

MacDonald (1995a, 1995b, 2019), drawing on extensive evidence of a collectivist mentality among Europeans of the Middle Ages, argues that competition with out-groups may have triggered evolved psychobehavioral adaptations that facilitate population survival. These adaptations would have had the effect of promoting in-group cohesion and altruism alongside hostility and aggression toward out-group members. Indeed, Lynch and Adamo (2014) stress that the "other side" of strong in-group orientations is often hatred and violence directed at outsiders and certain

[5] Lynch and Adamo (2014) qualify their observation somewhat in noting that "there was lively debate about the details and the costs" of the Church; nonetheless, they go on to note that "from Greenland to Jerusalem most western Christians accepted the spiritual authority of the papacy because they were convinced that it was a legitimate embodiment of Christendom in visible institutions" (p. 180).

[6] An intriguing possibility is that extensive bureaucracy has become necessary in part to compensate for waning in-group altruism over the past two centuries. In the absence of sufficient prosociality, however, bureaucracies may become subverted and produce largely malign effects (Charlton, 2010).

non-conformists (pp. 180–184). Relatedly, Rushton (2005) elaborates his genetic similarity theory—derived from W. D. Hamilton's inclusive fitness theory (discussed in Chap. 2)—to argue that individuals' tendency to altruistically invest in those with whom they share a relatively high proportion of genes, thereby enhancing those genes' replicative success, often serves as the formative basis of exclusive human groups, the "dark side" of which may be seen in "ethnic nationalism, xenophobia and genocide" (p. 503).

In conditions of severe resource scarcity, such as in the Middle Ages, violent competition among genetically distinct groups is a typical outcome of each group's efforts to secure its own survival (Woodley of Menie, Figueredo, et al., 2017). As is obvious, such circumstances do not make for pleasant living, but they likely genetically and culturally select for the deep, even fanatical, commitment to transcendent ideals (e.g. Christendom) that enable profoundly altruistic behaviors. Rubin (2015) describes the morality of the High Middle Ages as consisting of "higher" aims, encouraging behavior that complied with Christian rules and existing social hierarchies. At the experiential level, these "higher" ideals may imbue life with a sense of supra-individual purpose, such as to override the ordinary tendency to highly prioritize personal interests, and instead enable voluntary suffering of tremendous costs for the good of a group to which one belongs. This would explain a longstanding current of human thought that links individualism, peace, and comfort to nihilistic sentiment, and conversely communitarianism, war, and hardship to existential purposiveness. For example, Watson (2014) documents the alacrity with which many German intellectuals met the prospect of a Great War (World War I), insofar as they expected such an event to rid their people of life-sapping individualism and spiritual emptiness:

> Henri Bergson thought that the war "would bring about the moral regeneration of Europe," and accused the Germans of being "mechanical men without soul." The French poet Charles Péguy, too, believed in 1913 that a war would be of value "because it brings regeneration." The Futurists in their manifesto released as early as 1909 had argued that war would be "the only hygiene of the world"; and elsewhere: "There is no beauty except in strife" … The German theologian Ernst Troeltsch was convinced the war increased the feeling of Deutschtum—Germanness—among his fellow countrymen, which was "equivalent to belief in God's divine power." "It is the tremendous significance of August," he added, "that under the impact

> of danger [the war] pressed the whole people together in an inner unity, such as never before had existed." (pp. 189, 192)

It is of note here that the leaders of the three great totalitarianisms of the twentieth century—Communism, Fascism, and National Socialism—successfully instilled in the populations they controlled historically rare levels of zealous devotion to what were, in effect, political religions, the power of which seems to have emanated precisely from their collectivist and religious character: "Totalitarians offer an interpretation of life and history, its existential meaning and goal—all put to the service of national competitive survival, economic development, and historic accomplishment. Theirs is a political religion. In retrospect, it is impossible to distinguish the faith that inspired the enterprise from the enterprise itself. What engages attention is the fact that, granted the appalling costs involved, totalitarian systems, nonetheless, managed to garner, organize, and employ a measure of voluntary human energy rarely, if ever, equaled in the history of humankind … the least murderous of these systems has transported countless young people to fight and die for a cause the leadership deemed redemptive" (Gregor, 2012, pp. 282–283; see also Gentile, 2006). The fact that even the staunchly atheistic Communists could not do without the ideals of a religious or transcendent character in generating support for their movement indicates that the totalitarianisms' efficacy lay in their ability to give meaning to the lives of unremarkable people: "Stalin frequently made allusions to the New Testament in characterizing his 'disciples.' On one occasion in 1933, he explained to Mikhail Sholokhov that he had no choice in the matter. 'The people need a god'" (Gregor, 2012, p. 227, n. 2). Certain historians, such as Griffin (2012),[7] have implicated the human need for existential meaning in the rise of totalitarianism, a point that is returned to in the next chapter. MacDonald (1998) notes parallels (and also distinctions) between medieval Christendom and National Socialism, highlighting in particular the common basis of their collectivist nature in inter-population conflict and the anti-individualist, transcendent (p. 162) belief systems both effectively employed to inspire mass self-sacrifice in

[7] "What resulted in the early twentieth century was an 'explosive combination of nihilist leanings' with 'a craving for totalitarianism' which 'became the ideal of philosophers, cultural critics, political theorists, engineers, architects and aesthetes long before it materialized in flesh and blood, not only in technology, but also in Fascism, Nazism, Bolshevism and radical European political movements'" (Griffin, 2012, p. 61).

their populations for the sake of group interests. These observations generally evidence the reality of a nexus among inter-group conflict, "higher" moral ideals (especially as communicated and enforced through religions and analogous systems), existential purpose, and extreme altruistic behaviors (e.g. heroism and self-sacrifice), which was clearly apparent in the High Medieval West and may have its ultimate evolutionary origin in group-level selective pressures imposed by warfare between populations. Compelling but partial (insofar as it does not bear on the matter of existential purpose) empirical evidence for this possibility is in the work of Woodley of Menie, Figueredo, et al. (2017), which, to reiterate, found that in Britannic populations from AD 1600–1999, the usage frequencies of altruistic words were positively predicted by rates of warfare deaths, which were in turn predicted by poor environmental conditions (cold and variable climate; see also the Google Ngram analysis in Chap. 2 above). As will be indicated in the following section, and more thoroughly argued in the next chapter, while industrial modernity has massively enhanced Western peoples' material quality of life, it may have severely diminished these sources of meaning in life.

Nonetheless, since this account of collectivist psychology in Medieval Europe depends heavily on claims about the crusades, it is important to consider alternative perspectives on the motivations of crusaders. The most salient among these posits that crusaders were not acting for altruistic reasons, but instead only fought for Christendom in search of personal benefits that could be obtained by looting Muslim settlements and the like. Evidence for this view is weak, however, and inconsistent with a number of historical facts. For example, European crusaders faced a very high probability of dying in battle (up to 75%), a fact of which they were aware, in that most of them "left expecting not to return" (Crawford, 2011, p. 17). Available personal accounts of crusaders suggest that some even planned "to die for God" (Crawford, 2011, p. 18), attesting to a sense of transcendent purpose behind their actions; more generally, it appears that crusading was driven not only by interests in serving God and attaining personal salvation, but also desires to perform acts of "charity" for fellow Christians (Crawford, 2011). These findings tell against cynical perspectives on the crusades, and are also consistent with theoretical expectations and empirical evidence that inter-group conflict should favor the genetic and epigenetic selection of altruistic traits (see Bowles, 2009; MacDonald, 1995a, 1995b; Woodley of Menie, Figueredo, et al., 2017).

As a final point on the medieval Western world, it should be stressed that in attacking "romantic" caricatures of life in the Middle Ages, historians are often guilty of denying or understating the important truths that these distorted portrayals contain. For example, although it would be incorrect to argue that medieval villages were typically fully "self-contained" (i.e. experienced no or very little migration, were entirely economically self-sufficient, etc.), it is worth noting that some apparently came quite close to this ideal, such as Cumbrian village communities in England[8] (Whyte, 2007). Similarly, Brown (2007) maintains that the cultural distinctiveness and political autonomy of English villages were eroded through industrialization, consistent with the impression that modernized societies are more "open" than their non-modernized counterparts. Medieval societies, while more violent than contemporary Western ones, should not be imagined as having been relentlessly violent and chaotic (Butler, 2018[9]). And to some extent, the greater violence of the medieval world could be understood as a price paid for the autonomy that individuals had in managing their affairs directly, without the coercive influence and mediation of police forces and standing militaries (Simpson, 2015). Indeed, that medievals could handle their affairs in this way, resorting to violence when necessary, arguably signals a level of fortitude difficult to find in modernized societies, where people are more apt to demand that powerful institutions act against their enemies, rather than act themselves (see Campbell & Manning, 2018). This autonomy had the additional benefit of allowing distinctive local cultures and ways of life to flourish under the broader unification of Christendom, as opposed to the "leveling" or "flattening" effects of the homogenizing institutions and bureaucracies of modernity that were to come: "In the Feudal realm there was

[8] Whyte's (2007) investigation pertains to a period around AD 1750–1850. Nonetheless, he attributes the "self-contained" quality of Cumbrian villages in this post-medieval time in part to their having retained an essentially medieval societal organization.

[9] Butler goes further than this, offering several challenges to evidence, such as that of Eisner (2001, 2003), that the medieval world was more violent than the modern; but given that even in the contemporary world, economic development has a robust negative association with rates of violent crime, likely because slow life history speed contributes to economic development (see Peñaherrera-Aguirre et al., 2019), which reduces inter-personal competitive pressure, and because environmental mildness associated with high standards of living selectively favors slower life history speeds (Woodley of Menie, Figueredo, et al., 2017), which favor cooperative over competitive inter-personal behaviors, it is hard to believe that the impoverished societies of medieval times were not substantially more violent than far wealthier modern ones.

never the drab sameness which modern folk too often conceive as 'order'. The 'Family Law' in a Tribal Monarchy was capable of infinite variation, and healthy adaptability" (Innes of Learney, 1945, p. 117). This diversity of local folkways was especially pronounced in the Holy Roman Empire,[10] the decline of which at the hands of modernization and its antecedents some academic historians have discussed.[11] That these more appealing elements of medieval life have been overlooked or denied may be related to the politicized interests of certain historians, who wish to prevent the European Middle Ages from serving as a source of inspiration to political movements thought to be objectionable (see, e.g. Devega, 2017).

In examining the medieval West, the picture we are left with is of a world that was brutal but deeply enriched with collective existential purpose—rather, where the former likely generated the latter. Clearly, medieval people enjoyed little in the way of material comforts and probably suffered from considerable physical pain often, given, inter alia, their lack of effective analgesics, medical care, and so on, and their serious poverty.

[10] "The [Holy Roman] Empire never demanded the absolute, exclusive loyalty expected by later nationalists. This reduced its capacity to mobilize resources and command active support, but it also allowed heterogeneous communities to coexist, each identifying its own distinctiveness as safeguarded by belonging to a common home" (Wilson, 2016, p. 7). Note that this is not incompatible with the willingness of large numbers of individuals from various communities to die for common *religious* reasons, as suggested above.

[11] "Two world wars and the technological and industrial revolution have accelerated a development which began with Napoleon's liquidation of the Holy Roman Empire. Deliberately uprooted, the colourful diversity of life in Europe has gradually withered away. The great drive to make countries, political institutions and men uniform and conformist, the drive so successfully promoted by Richelieu, Mazarin, Louis XIV and the great revolution, in the nineteenth century also made its impact on the German central core of Old Europe. Englishmen and continental Europeans assisted alike in the forward march of this process through which Europe developed its technical, economic and military potential and made for itself new and freely expanding labour markets, spheres of influence and battle-grounds" (Heer, 1968, quoted in Simpson, 2015, p. 35).

At this point, one could suspect that we contradict ourselves in that, in Chap. 1, we note a *homogenizing* tendency of pre-industrial societies, such that they generally limited genetic and behavioral diversity. But this fact is not inconsistent with a greater diversity along some axes of cultural variation having obtained in those societies, occurring within the context of particular constraints (such as the moral demands of Christianity). In the absence of the sort of centralization, standardization, and bureaucratization that are at the heart of modern societal organization, the people of pre-industrial societies had greater freedom to develop and maintain idiosyncratic folkways and traditions suited to their particular locales and histories. In the modern world, the need for this sort of variation has been largely eliminated through leveling out of the basic tasks and challenges of life with which people are faced.

An observation that is of special importance for later chapters of this book is that Western medieval societies, at least in certain periods of the Middle Ages, were very hostile to persons who deviated from particular norms of behavior, functionality, and appearance. Muslims and Jews and heretical Christians were targeted for violence (Lynch & Adamo, 2014, pp. 180–184), but even those guilty of what moderns would consider mild crimes or even non-criminal acts, such as adultery, were severely physically punished (Phillips, 1993, p. 110). Laslett (2001) notes that something as innocent as "sexual frailty" elicited "public humiliation" until around the mid-eighteenth century in England (p. 180). For all the moral evils such aspects of life involved or constituted, one suspects they favored the genetic selection for those traits enabling robustness against hardship, perhaps including the ability to perceive and act on existential purpose in opposition to adversity, as in the case of crusaders dying for the "higher purpose" (Rubin, 2015) of Christendom. As we shall also see, the extreme physical and reputational punishments meted out to criminals and others behaving in "deviant" ways in Medieval Europe may have involved selection for slower life history speeds, which, together with other evolutionary factors, may have provided the ultimate basis for industrialization and its consequences.

The Biocultural Roots of the Modern World

The origin of industrial modernity is a major topic in the social sciences and humanities. (Historians would generally understand the medieval world as having come to an end prior to industrialization, but in our view the most dramatic and complete break with ways of life resembling those characteristic of the medieval world occurred through industrialization, which we take to be what truly defines modernity, and hence we write of a transition between the medieval and modern worlds.) Oesterdiekhoff (2011, 2014) suggests that it is *the* most important issue to which the social sciences are addressed, and discusses other scholars who have reached the same conclusion or similar conclusions (e.g. Ferguson, 2011). The key problem associated with this topic lies in understanding why only the West achieved endogenous industrialization,[12] first apparent in the late-eighteenth century in Britain, with other parts of the world industrial-

[12] Nielsen (2017) takes industrialization to be defined by "increase in the use of machines powered by inanimate forms of energy (waterfalls, coal, oil, or electricity)" (p. 1).

izing primarily through the diffusion of Western technology and ideas. Since industrialization appears to be a necessary condition for sustained population growth and high material standards of living,[13] the uniqueness of this accomplishment to the West is of obvious interest. In just the past two decades or so, many academics, some very prominent, have devoted book-length analyses to unraveling this "riddle of the modern world" (e.g. Diamond, 1997; Landes, 1998; MacFarlane, 2000; McCloskey, 2006, 2010, 2016; Mokyr, 2016; Morris, 2010; Pellicani, 2001; Rindermann, 2018; see also Pinker, 2018). The theories offered in the great majority of these works suffer from the same problem—they either ignore, or outright deny (see especially McCloskey, 2010; Morris, 2010; and Pinker, 2018), certain potential roles of genetic factors in the rise of the industrial West, focusing exclusively on sociological, cultural, economic, and/or geographical factors instead.[14] A role for such differences in the variable timing of modernization is suggested by the fact that even today, enormous global inequality in socioeconomic development is apparent, despite intense efforts on the part of developed nations to achieve a more or less uniform level of modernization around the world. Avent (2016) notes that "historically, rich countries tend to stay rich while poor countries tend to stay poor. 'Rich' and 'poor' are stable equilibria. Rich countries become rich by growing at modest rates over very long periods of time. Poor countries enjoy short bursts of growth which tend to end in sharp reversals; very rarely do poor countries sustain rates of growth fast enough for long enough to push them from poor status to rich status"; further, he remarks that "social scientists lack a satisfying explanation" for how rich nations achieve high wealth and, by implication, why poor nations fail to do so (p. 167). Social scientists have potentially failed on this front because of their general refusal to consider biocultural theories of socioeconomic disparities.

Clark (2007) and Rindermann (2018), however, offer exceptions to the reigning environmentalist paradigm. In the case of the first, the British Industrial Revolution (the earliest instance of industrialization) is explained as a consequence of the centuries-long fitness advantage of wealthier compared to poorer individuals, a phenomenon of which ample evidence is

[13] At least for large societies, high standards of living do not appear to be possible until a population passes through a phase of industrial development (Inglehart & Welzel, 2005).

[14] Attempts have also been made to trivialize this accomplishment of Western peoples. See Duchesne (2011) for an extremely thorough critical response to such efforts.

provided. This may have had the effect of promoting higher levels of personality traits associated with economic success, such as diligence and future orientation, insofar as the genetic variants underlying these traits were under positive directional selection. Further, Clark (2007) argues that the progeny of elites were downwardly socially mobile, in that competition for limited numbers of desirable economic niches forced some individuals down the social scale, where they replaced the lower-status persons who were not effectively reproducing themselves. Economically valuable traits may have thus become more frequent at all levels of British society, boosting aggregate productivity to a degree that enabled industrialization. A serious limitation of Clark's (2007) thesis is that it denies the role of selection for intelligence in this process of social evolution, despite the profound importance of intelligence to the economic development of nations (Christainsen, 2013; Rindermann, 2018).

As reviewed in the introduction to this book, Woodley of Menie, Figueredo, et al. (2017) develop a novel theory that builds on Clark's (2007). It posits that the Little Ice Age of the Early Modern Era imposed high levels of intrinsic (controllable) morbidity and mortality and evolutionary novelty, the former positively selecting for slow life history speed and the latter for general intelligence (g). Further, social selection against adulterers and violent criminals in the Medieval Era, in the form of executions and severe corporal punishments, may also have favored slowing life history speed (Frost & Harpending, 2015). Moreover, high rates of inter-group conflict as a function of severe resource scarcity have been hypothesized to select for high levels of g (Woodley & Figueredo, 2013). Slower life history speeds potentially contribute to economic growth insofar as they involve cooperativeness, future orientation, and cognitive and behavioral specialization, traits which naturally promote division of labor and industriousness (see Figueredo et al., 2017; Woodley, 2012). More importantly, rising g accounts for phenomena that Clark's (2007) theory seemingly cannot explain, namely the increasing global rates of major innovations in science and technology and of eminent (genius) individuals observed across the Early Modern Era and into the Late Modern Era, both of which subsequently declined around the end of the British Industrial Revolution (Woodley & Figueredo, 2013; Woodley of Menie, Figueredo, et al., 2017). Major innovations and intellectual eminence seem to have been overwhelmingly European phenomena (Murray, 2003), and the temporal correlations of the global major innovation and eminence rates with the estimated level of g of Britannic populations is

nearly perfect (Woodley & Figueredo, 2013). Additionally, *g* and the major innovation and eminence rates peak around the end of the British Industrial Revolution (Woodley & Figueredo, 2013; Woodley of Menie, Figueredo, et al., 2017). These findings strongly evidence the possibility that increasing *g* over the course of the Early Modern Era, but potentially extending back to medieval times, enhanced the frequency of scientific genius in Britain, enabling high rates of major innovations that gave rise to industrialization.[15] The slowing life history speed and rising *g* of the general population facilitated the use of these innovations to generate large stores of wealth, in that these traits increased the economic productivity of laborers, merchants, and so on. Selective pressures favoring *g* have since reversed, likely ultimately due to the breakdown of group selection consequent to the enormous wealth generated through industrialization[16] (Woodley of Menie, Figueredo, et al., 2017). But selection for slower life history speed appears to be ongoing in some Western populations (Woodley of Menie, Cabeza de Baca, et al., 2017), with the possible effect of increasing support for economic growth through the cultivation of specialized cognitive abilities[17] (Figueredo et al., 2017; Woodley of Menie, Figueredo, et al., 2017).

[15] Recent work has provided further evidence for the possibility of recent evolutionary changes leading to higher levels of intelligence in humans. Most notably, Woodley of Menie, Younuskunju, Balan, and Piffer (2017) found that frequencies of genetic variants associated with cognitive ability likely increased over much of the Holocene epoch, consistent with earlier predictions (Cochran & Harpending, 2009).

[16] Insofar as life history speed slowing is favored in environments that are low in extrinsic (uncontrollable) morbidity and mortality and are stable or at least predictably unstable, it is important to note that higher levels of *g* may have the effect of extending individuals' control over their environments, such as to reduce the amount of morbidity and mortality that is uncontrollable. *g* may therefore have a role in making environments highly controllable, such that profound life history speed slowing becomes possible. But if environments become too mild and stable, one expects that they will no longer selectively favor *g* because they will lack the evolutionarily novel adaptive challenges that give those with high levels of *g* fitness advantages over those with lower *g*. This fits with observations of declining *g* and patterns of selection disfavoring *g* following industrialization in the Western world (Reeve, Heeney, & Woodley of Menie, 2018; Woodley of Menie, Figueredo, et al., 2017). A further possibility is that as *g* declines, the ability to maintain highly controllable environments will eventually also decline, leading to a reversal of selection for slower life history speed.

[17] This growth in specialized cognitive abilities seems to be reversing in certain populations, however (Pietschnig & Voracek, 2015; Woodley of Menie, Peñaherrera-Aguirre, Fernandes, & Figueredo, 2018).

Life history speed slowing resulting from both genetic and epigenetic[18] processes may have pacifying effects, leading humans to become progressively more peaceful and cooperative.[19] It may therefore be the ultimate substratum of the developmental dynamic that sociologists Ronald Inglehart and Christian Welzel have detailed several times (e.g. Inglehart & Welzel, 2005; see also Figueredo et al., 2017), whereby the wealth generated through industrialization shifts the existential priorities and values of populations, from a focus merely on survival and reproduction in pre-industrial conditions to interests in self-expression, freedom, fulfillment, and enjoyment in modernized conditions. Inglehart (2018) argues that these modernized values are the basis of the encompassing democratization, social tolerance, and inter-group peace (low frequency of war) characteristic not only of the post-1960s West, but increasingly the rest of the world as well.

A serious weakness in this sociological theory is that it lacks a compelling causal account of *why* values shift in this way—it appears to assume that all people are inclined to live in a basically modernized fashion, but that this is not practicable in trying material circumstances. This is not obviously true given the considerable heterogeneity in moral and social values and life history speeds apparent within modernized populations alone, the cultures of which aggressively promote modernized lifestyles, and especially the recalcitrance of some groups to the adoption of Western cultural norms in developed societies (Rindermann, 2018). Biocultural theories of spatial and temporal variation in life history speed seem to better explain patterns of variability in egalitarian values, inter- and intra-group peace, socioeconomic development, and so on, than their purely sociological/environmentalist alternatives—the latter cannot easily accom-

[18] Although substantially heritable, and therefore very likely less malleable (see Sesardic, 2005 and Chap. 2), at high levels of psychometric aggregation, lower-level life history factors may be quite developmentally plastic (Garcia et al., 2016), that is, responsive to environmental cues of morbidity and mortality and in/stability that alter patterns of gene expression (an epigenetic effect) such as to produce more adaptive fits between organisms and their environments (Figueredo et al., 2006). Modernized environments that are mild (low in morbidity and mortality) and stable may epigenetically bias human development toward slow life history speeds.

[19] The discerning reader may wonder if slowing life history speed through modernization contradicts claims of falling altruism in the West over the past two centuries made earlier. We do not think that it does, primarily because the prosociality associated with slow life history speed does not clearly involve the kind of altruism that encourages sacrifice in war. It may only promote social mutualism that has no tendency to reduce persons' *relative* intra-group fitness.

modate the uneven distribution of adherence to modern norms in highly developed nations, where inter-individual differences in relevant environmental factors are quite small (see Figueredo et al., 2017; Rindermann, 2018; Woodley of Menie, Figueredo, et al., 2017). (But as we will make clear later in this book [see Chap. 7], life history theory is not sufficient to explain modernization either.) Moreover, biocultural theories are fully compatible with recent work that persuasively argues that human capital, as opposed to any number of environmental variables, is the decisive factor determining the socioeconomic standing of nations (Rindermann, 2018)—because of its association with industriousness, life history speed is reasonably considered a human capital factor and since it is highly heritable (Figueredo et al., 2006), substantial slowing of life history speed may not be possible without genetic change.[20] Importantly, Welzel, in a forthcoming book (Welzel, Alexander, & Klasen, in preparation), acknowledges the relevance of life history theory to the question of modernization, but unfortunately sets himself the task of devising an implausible (largely) environmentalist alternative.

* * *

Even if the "riddle of the modern world" can be answered with reference to the biocultural theories outlined above, we are left with an even greater mystery: Why has the modernized world, if it has indeed enormously augmented humanity's wealth, comfort, self-expressivity, autonomy (political, social, etc.), and the like, been met with such intense hostility, even hatred, from so many both within and outside its boundaries? The phenomenon of anti-modernism has been documented or discussed in countless academic works (e.g. Herf, 1984; Pellicani, 1998, 2003, 2012, 2014; Pinker, 2011, 2018; Stern, 1961; Versluis, 2006; Watson, 2014), and anti-modernist inclinations are apparent in the writings of a number of prominent philosophers/intellectuals of the past ~200 years, such as Fyodor Dostoevsky, Martin Heidegger, Friedrich Nietzsche, Carl Schmitt, Richard Wagner,

[20] Note that massive increases in seemingly highly heritable phenotypes over time, such as height and IQ, most likely occur as a result of the concentration of those changes on the minimally heritable components of those phenotypes (Woodley of Menie, Figueredo, et al., 2017). The Flynn effect, the three-point-per-decade increase in IQ test performance, seems to be isolated to minimally heritable specialized abilities, the increase in which may primarily depend on the genetic slowing of life history speed (Woodley of Menie et al., 2016; Woodley of Menie, Figueredo, et al., 2017). Chapter 8 provides more information about temporal trends in intelligence.

and Max Weber. The Russian intellectual sphere of the late nineteenth and early twentieth centuries appears to have been a special hotbed of this sort of output, having spawned the revolutionary ideologies of Bolshevism and, more limitedly via the contribution of Alfred Rosenberg (whose major ideas were established during his time as a student in Russia; Gregor, 2012, p. 202), National Socialism, which have been interpreted as violent rejections of typical modernization (see, e.g. Pellicani, 2012). Poletaev and Punin's (1918) *Protiv tsivilizatsii* (*Against Civilization*) is a particularly striking example of Russian anti-modernist thought, which vigorously opposes egalitarianism, humanism, individualism, and pacified life, calling instead for a collectivist, hierarchical, and militaristic social order aggressively in service to the economic and cultural excellence of a population in its violent competition for survival and dominance with enemy groups. At a finer level of analysis, with the advance of modernization, various thinkers started to identify a new type of human, which Nietzsche named the *Letzter Mensch* ("last man") and Weber the *Berufsmensch* ("job man" or "career man," but intended to mean something more akin to "wageslave"), and which many other intellectuals, such as Wagner and Johann Wolfgang von Goethe, described in their writing. The common quality imputed to this new anthropological kind is an orientation to life that is fundamentally sublunary, that is, lacking a transcendent or spiritual aspect, or anything that might allow life to be treated with seriousness of purpose. These "last men" were taken to live only for the routinized pursuit of mere contentment, which they do in a rationalized and joyless way—without any passion or intensity whatsoever. Their desire only for bland comforts leaves them shrinking from any possibility of conflict or struggle, and eagerly willing to capitulate and compromise for the sake of peace.[21] They have no allegiance with grand moral or existential systems that might bind whole communities in an intimately shared culture, in that these are so often cause for strife—thus "the ultimate and most sublime values have withdrawn from public life": "today it is only in the smallest groups, between individual human beings, pianissimo, that you find the pulsing beat that in bygone days heralded the prophetic spirit that swept through great communities like a firestorm and welded them together" (Weber, 2004, p. 30).

What we see in all of this is a conflict between the pacified, atomized people that predominate in modernized societies—the products of the joint action of slowing life history speed and individual-level selection—

[21] This can be understood as perhaps the key individual-level correlate of liberalism.

and those who embodied (and in some rare cases, still embody) the groupish psychology characteristic of the Medieval Era. The remainder of this book is devoted to exploring how the contrasting natures of these two human "types" is central to the discontent surrounding modernization, and, more so, what the triumph of "modern man" indicates about the future of the West.

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CHAPTER 4

Discontent with Modernity

The current study is somewhat unusual, in that the very existence of the problem it addresses (the decline of the West) is controversial. If one considers the major human problems that capture academic attention—for example, poverty, war, crime, drug addiction, and so on—it is apparent that they do such great and obvious harm that there is little need to justify researching them. But when the decline of the West is broached—for example, it is argued that in some critical respect(s) or "all things considered," Western civilization is or has been worsening—things are not so simple.

As it happens, something of a cottage industry in academic publishing has sprung up in the past few decades, which has the goal of demonstrating that pessimists about the future of the Western world are totally in error. According to the optimists behind this scholarship and research, not only is Western (and perhaps even global) life *not* degrading, it is now as good or better than it has *ever* been, and it seems likely to grow better still (maybe indefinitely)—a view that one can reasonably term "progressivism."[1] Notable books advancing this basic argument, or something close to it, include Ben Wattenberg's *The Good News Is the Bad News Is Wrong* (1985), Christian Welzel's *Freedom Rising* (2014), Hans Rosling et al.'s *Factfulness* (2018), Indur Goklany's *The Improving State of the World* (2007), Johan Norberg's *Progress* (2016), Matt Ridley's *The Rational Optimist* (2010),

[1] It is "progressivism" because it involves the belief that Western (or even global) society has developed for the better and will continue to do so, that is, belief in *progress*.

M. A. Sarraf et al., *Modernity and Cultural Decline*,
https://doi.org/10.1007/978-3-030-32984-6_4

and Steven Pinker's *The Better Angels of Our Nature* (2011) and *Enlightenment Now* (2018).[2]

The great virtue of these optimistic works is their firm reliance on empirical data. Sociologists, and certain other social scientists, have the unfortunate tendency to bring little to their ambitious synoptic theorizing about "modernity" other than intuitions and vague impressions (e.g. Giddens, 1991). Academic projects that engage the "grand questions" of traditional sociology—among which some version of "Is life getting better or worse?" can be counted (Rosa, 2015)—with scientific rigor are thus refreshing and welcome.

In (for the most part) expertly marshaling a welter of empirical facts in defense of progressivism, the optimists have established[3] beyond reasonable doubt that the *material* quality of contemporary Western life is unsurpassed, thanks primarily to industrialization. By historical standards (and certainly those of premodern "state" societies), infant mortality has never been lower and, even controlling for changes in such mortality, life expectancy has never been higher; aggregate wealth is unprecedentedly high; and violent crime, famines, and plagues are relatively rare.[4] The basic picture that allegedly emerges from these trends is that life is now very *secure*, and so a narrow day-to-day focus on survival is no longer essential—resultantly, existential horizons, that is, people's choices and opportunities for living their lives, are enlarged, and human happiness and satisfaction have risen (supposedly) with this increasing autonomy (Inglehart, 2018; Inglehart & Welzel, 2005; Welzel, 2014). Unsurprisingly, these changes, occurring predominantly but not exclusively in the West, have apparently gone in tandem with an increasingly non-competitive social *ethos*, one in which maximizing pleasure or *enjoyment of life*, and thus living as one desires, is prioritized above objective success or achievement, such as earning the pride of one's parents (Minkov, 2011; Welzel,

[2] Heiner Rindermann's *Cognitive Capitalism* (2018) offers a similar argument. But unlike the other books mentioned, a positive assessment of (aspects of) modernity is incidental to *CC*'s thesis, which concerns the sources of variation in levels of modernization across nations. Moreover, *CC*'s prognosis for the West is not particularly optimistic.

[3] Admittedly, the optimism cottage industry has been most prolific in recent years, and little of what its members have to say is original. A fairly comprehensive review of the evidence for human "progress," encompassing everything from early hunter-gatherer bands to highly modernized Western societies, is available from Sanderson (1999).

[4] The case for the decline of war, which Pinker (2011, 2018) has perhaps most famously made, while, in the main, correct, may be exaggerated (see Mann, 2018).

2014). Indeed, among sociological variables, it is this *indulgent* attitude and a sense of control over one's life that most strongly predicts cross-national variation in "subjective well-being" (or SWB, which includes happiness and a sense of satisfaction with one's life ["life satisfaction"]; Minkov, 2011).

The basic dynamic, then, is as follows: industrialization, by enhancing material standards of living, redounds to "existential security" (Inglehart & Welzel, 2005), enabling people to explore and pursue their own fulfillment (desires, goals, etc.) rather than collectively struggle for survival; this relaxed survival pressure and concomitant growing demand for personal satisfaction shifts cultures in an indulgent or *hedonistic* direction (Inglehart, 2018; Inglehart & Welzel, 2005; Welzel, 2014). Some further theorize that such attitudinal developments bring individuals to demand political and institutional changes that will foster and protect autonomous life, such as democratization (Inglehart, 2018; Inglehart & Welzel, 2005; Welzel, 2014). We refer to this cascading process of social evolution simply as *modernization*—correspondingly, "modernity" is the sociocultural condition in which this process has at least started.[5] In all of the optimistic books enumerated above, something like this account of modernization is provided. Further, all of them treat modernization as the reason that contemporary life represents the peak of the human condition.

Conceptual Terrain

Before examining this optimistic narrative in some detail, certain aspects of how the "progress" question is approached in the literature bear mention. This is in part necessary because progressivists regrettably tend to treat modernization as an undifferentiated phenomenon in examining its benefits, which is not a tenable analytical choice. Pinker (2018), whose work is criticized at length in the following chapter, may be the worst offender in this regard. Even a casual read of his latest pro-modern book, *Enlightenment Now*, reveals that he fails to offer any promising theory of the origins of modernity, and (relatedly) of which elements of modernity are to be credited, individually or collectively, with bringing about the

[5] "Modernity" is understood in a variety of different ways, differing especially across academic fields. For historians, modernity is simply the time period beginning around the end of the 1400s (the start of the Early Modern Era) and extending into the present (which is within the Late Modern Era).

various goods (e.g. low infant mortality) that he celebrates. (Rosling et al., 2018 is also theoretically crude in this way.[6]) The upshot is that, for Pinker (2018), modernity is what one might call a "package deal": if societies that tend toward irreligion also are more "humanistic" and peaceful, the former tendency "plausibl[y]" causally contributes to the latter (p. 439); if, internationally and temporally, wealth positively predicts population-level SWB,[7] variation across countries in SWB can be attributed exclusively to variation in socioeconomic development (pp. 262–289); if education tends to promote secularization and individualizing[8] (what Pinker

[6] By contrast, Rindermann (2018), via rigorous theoretical and statistical analyses, offers a highly persuasive theory of the origins and "active ingredients," so to speak, of modernity.

[7] As we will see later, the claim that growth in GDP predicts rising happiness is probably false, contra Pinker (2018) and other optimists.

[8] Although touched on earlier, in considering the political views associated with the different moral foundation's clusters (individualizing vs. binding), it is important to understand the psychology of the "left-right" divide, which does not lend itself to an uncontroversial explanation. Some argue that this divide has become irrelevant or nearly so in recent decades (de Benoist, 1995; Milbank & Pabst, 2016). Still, persistent use of "left" and "right" as moral-political classificatory terms suggests that they continue to capture something important. The primary basis of the left-right split seems to be egalitarianism, or the idea that equality (moral, political, economic, and/or whatever) among some class of people (increasingly, all humans) should be promoted, or should at least factor into decision-making in morally consequential domains (e.g. it might be argued that the basic moral equality of persons should constrain political decision-making). (As noted earlier, differential concern for avoidance of harm and for compassionate treatment of others seems to be another basis of the left-right divide, with leftists exhibiting more of such concern than rightists, although more so in contemporary contexts [it does not seem, for instance, that Soviet communists were much interested in avoiding harm to others].)

Leftists need not treat equality as the most important value, contra Paul Gottfried (Hawley, 2016). But leftists do see equality of one sort or another (but almost always of economic resources, political power, quality of life, and/or interpersonal respect), among *at least* all members of a national community (but often far more people, even including everyone on Earth), as either *intrinsically* good or, in some sense, morally required. Contrariwise, rightists give equality far less moral salience, more commonly understanding it as having *instrumental* value at best, but not as good in itself or morally required (except in cases where equality, of whatever kind, would apply only to much more limited sets of people than entire national communities; nevertheless, certain rightists, particularly some Christians, may view all persons as having some sort of fundamental equality in terms of basic moral worth—intuitively, however, one would think that this makes them less right-wing than they would be without that belief). It must be again stressed that many or most so-called rightists of the contemporary West are more reasonably classified as leftists (Salyer, 2018) given the definition just provided, for example, most "right-wing" libertarians. They are "right-wing" in contemporary times, not because they ascribe minimal moral significance to equality (how-

presumptuously calls "enlightened") political/moral attitudes, that is because cognitive sophistication simply disfavors religiosity and rightism and promotes their opposites. The problem with these arguments is that they are made in ignorance of evidence that contradicts them: at the individual level, irreligion is negatively associated with prosocial psychology and behavior (even after many relevant variables are statistically controlled; Figueredo et al., 2007; Wright, Beaver, Morgan, & Connolly, 2017), making it difficult to consider non- or anti-religious attitudes as *direct* sources of moral betterment among individual persons (more on this in Chap. 5); genetic, rather than socioeconomic, factors probably explain a substantial amount of cross-population variability in SWB (Minkov & Bond, 2017; Proto & Oswald, 2016; Woodley & Fernandes, 2014); and intelligent people in the *contemporary* West may be inclined away from rightism and religion not because these belief structures offend rationality, but for culturally contingent reasons (Woodley of Menie & Dunkel, 2015).

Such evidence is perhaps ignored in that it is convenient for pro-modern types—who seem overwhelmingly to tend toward the world-historical left—to construe modernization as a purely *environmental* phenomenon, all benefits of which are inextricably clustered together. In this way, they can assert or imply that modernization can be brought to non-modernized societies (e.g. via institutional change promoting economic development) and that achieving maximum well-being for members of advantaged majorities somehow requires, however circuitously, that the equal standing of disadvantaged minority groups be promoted. For the pro-modernists, there is, in other words, one path to modernization, which is necessarily a totalistic phenomenon the various constituent elements of which collectively advance the basic goals of those committed to individu-

ever conceived), but because they are among those persons who do not give equality sufficient moral pride of place (sufficiency here being determined by current moral norms). But for our purposes, it is the left-right dichotomy, as just specified, that is relevant; to avoid confusion, we write, and have written, of the "world-historical" left and right because only quite recently in historical time, and mostly in the Western world, does it seem that egalitarians have started to identify or be classified as "right-wing" in large numbers (Salyer, 2018).

It should also be observed that this definition of the left-right split is not completely adequate because, for example, traditional Marxists are uncontroversially leftists but are not committed to thinking of equality in moralistic terms by virtue of their Marxism. In practice, however, it seems indisputable that leftists overwhelmingly tend to have *moral-psychological* commitments to equality of some kind(s), including Marxists especially (Gregor, 2012). For our purposes, it is the psychology of left and right that is key, and so the non-moralistic quality of orthodox Marxist theory is not particularly troubling.

alizing moralities: equality, freedom (understood as broad horizons of choice), cosmopolitanism, and the like.

There is no solid justification for understanding the various outcomes of modernization as neatly compatible, however. It is probably true, for example, that certain *sequelae* of economic growth are antagonistic to such growth: Longitudinal data indicate that the emergence of welfare states in Scandinavian nations has decelerated the latter's economic progress, consistent with the predictions of standard economic theory (Sanandaji, 2015). Similarly, modernization is associated with growing tolerance of out-groups, which enables mass migration and the related phenomenon of multiculturalism; but ethnic and cultural diversity are associated with reduction in the levels of social trust within nations (Putnam, 2007; Rindermann, 2018). Impeccably mainstream academics have noted that this loss of trust potentially endangers the very tolerance on which mass migration and multiculturalism depend (e.g. Dinesen, Schaeffer, & Sønderskov, 2020; Kaufmann, 2019; Kaufmann & Goodwin, 2018). Put simply, separate aspects of modernization may undermine each other. Moreover, certain elements of modernization may have costs and benefits that are quite unevenly distributed—this might be true of the high levels of ethnic and cultural diversity found in many Western countries (Rindermann, 2018; see also Woodley of Menie, Peñaherrera-Aguirre, et al., 2018). Any study of the effects of modernization should, then, strive to disentangle the causal effects of the process' myriad parts.

Additionally, the effects of modernization may be welcome or objectionable, or some combination, in a variety of ways. Pro-modernists are seemingly inclined to assess modernity with narrowly utilitarian and presentist criteria, which could be captured in, for the sake of simplicity, a question such as, "Are people living more comfortable and satisfying lives in recent years compared to [some time in the past]?" But it is clearly possible that that which promotes happiness at one point could engender misery at another. The research on general intelligence mentioned in the Introduction illustrates that possibility: War and novel environmental challenges to survival and reproduction historically advantaged the fitness of Western European groups and individuals high in g. These selective processes, at the group and individual levels, raised the average g of Western European peoples, rendering them sufficiently intelligent to produce an industrialized society for the first time in human history (Woodley of Menie, Figueredo, et al., 2017). In less scientific terms, one might say that the wealth and comforts of industrial (and postindustrial) life were

paid for with the blood of countless Europeans who failed to pass through these group- and individual-level selective filters. Industrialized existence has massively relaxed these selective pressures, which may be the primary reason that contemporary Western life is in so many respects pleasant. But one effect of this evolutionary shift has been to *reverse* selection on *g* (Reeve, Heeney, & Woodley of Menie, 2018; see Chap. 8). Even if one wholeheartedly approves of modernized life, there is every reason to be worried about this development. It is not prudent to be concerned only with how good things are now or have been recently—the question of sustainability is no less important, but progressivists seem to give it short shrift. Indeed, almost none[9] of them has even addressed the problem of falling heritable general intelligence and many other undesirable trends in human psychological traits, despite almost certainly, in some cases, knowing about these (see the following chapter on Pinker's *Enlightenment Now*).

There is then of course the question of which sociocultural changes ought to be considered "good" or "bad" (or given some other axiological judgment) and why. This book is not a work of philosophy, so we do not attempt to answer those questions. We are, however, mindful of the fact that such normative judgments are highly variable among individuals (Haidt, 2012), across space and (probably more so) over time (Inglehart & Welzel, 2005), and try to make some sense of the sources of such variation. Furthermore, we are aware of the fact that the axiological beliefs of individuals, and the broader moral-ethical characters of populations expressed in cultures, are not causally isolated from, inter alia, genetic and sociological factors (Gladden & Cleator, 2018). Indeed, it is quite plausible that the collective moral and other normative beliefs of populations have some relation to group-level fitness. Such belief clusters could, in fact, partially indicate the fitness of populations, that is, constitute group-level fitness indicators. For example, there is strong evidence that liberal and irreligious moral cultures go with low group-level fitness, insofar as these cultural qualities are strongly associated with sub-replacement fertility rates (Faria, 2017; Woodley of Menie, Sarraf, et al., 2017). From these possibilities and observations, we infer that it is unwise to reflexively privilege the favored moralities of modernized societies over others. Insisting

[9] One exception to this silence on the problem of selection against intelligence among progressivists comes from the work of James Flynn (2013). But Flynn's views on this matter and other trends in intelligence, at least in 2013, have not withstood the test of time (see Chap. 8).

on such moral views may lead us to ignore apparent problems—for example, high rates of childlessness—that pro-moderns, given their moral presuppositions, are likely to trivialize or dismiss.[10] And as already suggested, it should not be ignored that what is good to one is often, or often accompanies, what is bad to another. The indulgent/hedonistic values that attend modernization, while strongly positively associated with SWB (Minkov, 2011), enable lifestyles, behaviors, and cultural mutations that are (aesthetically and morally) repellent to many people, especially those with pronounced binding moral orientations (Haidt, 2012; Kalb, 2008; Simpson, 2015). It is an act of simple ideological prejudice to reject out of hand the moral beliefs and attitudes of such individuals.

Doubts: Nihilism and Pessimism

Turning now to an examination of pro-modern narratives, a first apparent problem with them is that they do not sit easily with many of the most prominent accounts of the modern condition—accounts that have accumulated since the onset of industrialization in Europe (although some accounts appeared earlier and accurately anticipated what was to come in crucial respects). These different views of modernity often do not flatly contradict each other, but the less sunny ones indicate a variety of problems to which their pro-modern counterparts are blind. (For ease of exposition, these alternative perspectives on modernity are called *pessimistic*, and their proponents *pessimists*.)

The very existence of these pessimistic views hints at an intriguing aspect of modernization, which is the tendency of modernized societies to produce some of the most vociferous critics of modernity itself, as indicated in the previous chapter. Even many notable non-Western enemies of modernity find some of their greatest intellectual support in Western figures. This seems to be true of certain radically anti-modern Islamic political movements, some leaders of which explicitly credit the German philosopher Martin Heidegger for having helped reveal "the toxicity of Western civilization" (Duff, 2015, p. 7). By contrast, at least

[10] For example, concern for personal autonomy may lead pro-modernists to embrace and celebrate rather than lament childlessness; indeed, a connection between sex-egalitarian ideas—which certainly comprise an element of the modernization syndrome (Inglehart, 2018)—and efforts to reduce fertility and "control" population size have been well documented (Cherry, 2016, p. 144; p. 130, n. 32).

some pre-industrial societies appear to be or to have been remarkably free of such social/cultural dissidents. It has been documented that certain hunter-gatherer societies, despite their (on modern standards) extraordinarily low material quality of life, exhibit this absence of cultural division:

> Ethnographers report a distinct lack of a discontented minority in band [hunter-gatherer] societies … Contemporary ethnographic accounts—of the smallest-scale societies—almost universally confirm positive attitudes among group members. Hill and Hurtado … write, "Among the Ache, there were no revolutionaries, no visionaries, and no rebels. Joking and happy-go-lucky demeanor were universal." (Widerquist & McCall, 2017, p. 179)[11]

[11] Edgerton (1992) challenges this view, collecting many examples of pre-industrial, including hunter-gatherer, societies in times of extreme misery, as well as cases of members of such societies who found the latter repugnant and/or felt alienated from them and the like (Hallpike, 2018 offers other reasons for pessimism about the quality of life in non-state pre-industrial societies). Edgerton's basic point is that it is a mistake to think that evolution adapts populations to ways of life such as to render them basically content with them.

It is admittedly difficult to evaluate the literature about the quality of life in hunter-gatherer and other non-state societies, since it presents a highly varied set of mostly qualitative investigations of sometimes very diverse populations—for example, some pre-industrial non-state societies have been documented with levels of violence below those found in certain modernized societies, but other pre-industrial non-state societies have been studied with levels of violence far above what is typical of modernized ones (Widerquist & McCall, 2015, 2017). It does seem to us that Widerquist and McCall (2017) present a very evenhanded survey of the available evidence and are far more sanguine in their conclusions than Edgerton (1992), who seems to have deliberately focused on the worst the pre-industrial world has (and had) to offer. Further, it is not always clear what caused the suffering to certain societies that Edgerton documents—in some cases, one suspects that negative effects from surrounding modernizing/modernized societies may have been to blame—or how accurately his isolated examples of discontent reflect the quality of life in the society generally. Moreover, for all his pessimism on the matter, he concedes that "[w]e are likely to think of people in small, traditional societies as being emotionally and psychologically committed to their way of life, and in fact this is often the case … Even the miserable Ik of Uganda, who were quite literally starving to death when Colin Turnbull visited them in the mid-1960s, preferred to stay together and die rather than move away from their sacred mountain in search of food and survival" (Edgerton, 1992, p. 148). And while Edgerton points to certain instances of high suicide rates in non-state societies as evidencing despair and societal dissatisfaction, Widerquist and McCall's (2017) more current and seemingly comprehensive and balanced review mentions that "[s]uicide tends to be very low or even negligible in stateless societies" (p. 147).

Far more controversially, this relative paucity of dissidents seemingly held in medieval societies, and societies with a roughly medieval "model" in some cases. The sociologist Luciano Pellicani (2003), despite his evident pro-modern attitudes,[12] observes that trends heralding the advent of modern society, chiefly the appearance of capitalism, seem to have generated entirely historically novel revolutionary activities opposed to these developments[13]: "It is no coincidence that the first signs of the extraordinary events accompanying revolutionary movements should have emerged with the introduction of capitalism in

Kaczynski (2019) presents what might serve as a counterpoint to some of Edgerton's observations, noting a variety of instances of hunter-gatherers and other non-state people unifying through and taking great pleasure in circumstances that modernized people would overwhelmingly consider horrific. Consider one case that Kaczynski offers (from writer Gontran de Poncins), which in a key respect parallels that of the Ache quoted in the main text above:

> [T]hese Eskimos afforded me decisive proof that happiness is a disposition of the spirit. Here was a people living in the most rigorous climate in the world, … haunted by famine …; shivering in their tents in the autumn, fighting the recurrent blizzard in the winter, toiling and moiling fifteen hours a day merely in order to get food and stay alive … [T]hey ought to have been melancholy men, men despondent and suicidal; instead, they were a cheerful people, always laughing, never weary of laughter. (Poncins, cited in Kaczynski, 2019, p. 160)

One fact that could have serious negative implications for quality of life among hunter-gatherers is the non-monogamy and strikingly lopsided reproductive participation ratios that have been found in some of their populations, favoring female over male reproduction (Brown, Laland, & Mulder, 2009). Although it has been asserted that hunter-gatherer populations tend to be highly monogamous, or at least that some are (e.g. Hallpike, 2018), genetic evidence does not align with this claim. For example, Lippold et al. (2014) find that far more females than males have participated in reproduction in human evolutionary history, and since hunting-gathering was the only subsistence paradigm for most of that history, this strongly suggests that Brown et al.'s findings accurately indicate a positive association between non-monogamy with high female/low male reproductive participation and hunter-gatherer life. The reduced mating opportunities for men in these societies reasonably count against the aggregate quality of life of hunter-gatherers—but it should be noted that such severe sexual selection likely helped to keep burdens of deleterious mutations low (see Chap. 6).

[12] See Pellicani (1998). Pellicani's pro-modernism is quite principled because he is fully aware of many of the serious problems with modernity.

[13] Pellicani (2003) quotes Alexis de Tocqueville's description of "revolutionaries" who "came into being" with the French revolution as "of a new species, never before seen." This species was "still before our eyes" in Tocqueville's time.

European society"[14] (p. 11). He further maintains that capitalism's "rapid weakening of the spirit of loyalty and tradition" (2003, p. 21) enabled such revolutionary projects.[15] Pellicani's view is consistent with historical evidence of strong general loyalty to medieval ways of life among industrializing European populations. For example, perhaps the leading contemporary historian of the Holy Roman Empire (HRE), Peter Wilson, writes that the Empire:

> fostered a deep-rooted, conservative ideal of freedom as local and particular, shared by members of corporate groups and incorporated communities … [L]iberals discovered that ordinary people often did not want their version of liberty, because uniform equality conflicted with treasured corporate rights which appeared to offer superior safeguards against capitalist market exploitation. Later problems stem at least partly from how those corporate rights were stripped away amidst rapid industrialization and urbanization after the 1840s. The attachment to corporate identities and rights helps explain why the Empire endured despite internal tensions and stark inequalities in life chances. (2016, pp. 12–13)

Having given that description, Wilson is quick to assure readers that the HRE "was [not] a bucolic, harmonious old-worldly utopia" (2016, p. 13). While the need to insert that qualification tells one something about the general sense of life in the HRE that Wilson offers, it should be stressed that, consonant with his remark, the point here is *not* to suggest that the worlds of European medievals and hunter-gatherers were/are free of strife or violence. We have already seen that Medieval European and (in some societies) hunter-gatherer life was/is very violent relative to their modernized counterpart (Chagnon, 2013; Eisner, 2003; Widerquist & McCall, 2017). But violence and strife alone do not imply opposition to the basic

[14] Pellicani's (2003) study is relatively obscure, but is nonetheless recognized by Roger Griffin, a leading scholar of revolutionary totalitarian ideologies, as a "masterpiece" (2012, p. 32).

[15] Pellicani's account is, in ways, similar to A. James Gregor's (2012) analysis of the rise of Russian socialism, which notes that "[populations displaced from rural to urban settings were d]isengaged from traditional roles, and traditional moral constraints, [making] such population elements … available for mobilization" (p. 90). Gregor goes on to observe that Russian revolutionary intellectuals were not always optimistic about their ability to radicalize the peasantry—but peasants nevertheless were ultimately essential to the Russian Revolution, seemingly because their opportunities to participate in traditional life became seriously limited, facilitating their exploitation by the intellectuals.

character of a culture and/or society—they do not alone suggest the presence of "revolutionaries" or "visionaries."[16] Reynolds (2010) indicates this distinction in noting that her "impression is that, despite the recorded radicalism of a few rebels, most of [those at the bottom of medieval society] demanded justice *according to existing norms* and greater participation within *existing structures* rather than anything entirely new [such as claims to equality and democracy]" (p. 124; emphasis added). Her observations clearly accord with Wilson's finding of broad commitment to the social order of the HRE among "ordinary people" even after the spread of liberalism in central Europe.

A further example comes in the form of the Massachusetts Bay Colony. In his study of a half-century period in the life of this settlement, from 1630–1680, historian Allan Carlson (2017) describes the society achieved as having exhibited a "remarkably stable social order" (p. 1) and its members as akin to "medieval peasants in a new land" (p. 5). The Colony, rather than having a basis in "individualism and liberalism," maintained a vision of collective existence that was "more 'atavistic' [and] 'folkish' … organic in nature" (Carlson, 2017, p. 6). Life was organized around "'nucleated towns' [that] were 'small, intimate, and essentially cooperative' places" (2017, p. 7). Most strikingly, for the Massachusetts Bay Puritans, "righteousness 'became another name for conformity'": "Obedience to town authority grew out of covenants freely embraced, among a largely homogeneous people. In these ways, Puritans' loyalty to their small towns provided the same kind of identity as had provincial loyalty back in England" (2017, p. 7).

Thus, the collective impression that the historical record gives is that the *revolutionary* posture vis-à-vis society and culture is largely a modern phenomenon.[17] One might be tempted to mention the Reformation as a

[16] In Pellicani's (2003) view, the uneducated and ignorant status of medieval populations has some role in explaining the apparently low rate of ideological revolutionaries that they exhibited. But he also treats the discontent of intellectuals with the movement away from traditional social life as perhaps the major driver of pre-industrial revolutions with an ideological character, indicating that the problem may have had less to do with levels of education than the attitudes of those who were educated. Gregor's (2012) account of the Bolshevik revolution (about which see the prior note) seems consistent with the view that malcontent intellectuals wield disproportionate influence in political revolutions, and that it is their reaction to certain social conditions rather than the mere fact of their having formal educations that explains their discontent.

[17] To be sure, Pellicani (2003) and others have documented revolutionary and millenarian movements in the Middle Ages. But they contend that these movements were typically a

clear example of ideological division in Medieval Europe. But this example does not contradict the general account so far sketched: As Pellicani (2003) observes, "'[a]ntagonism between the feudal system and the capitalist system' was at the origin of the Reformation … the Reformation was an anticapitalist movement" (p. 17). Revisionist histories of the Reformation that are now viewed as legitimate (though certainly not uncontroversial) among historians emphasize that the movement may have had, at least for a great part of its duration, little in the way of organic support from the unremarkable people forming the base of Western European societies, who were frequently strongly committed to Catholicism (Duffy, 2005). Rather, it appears that "declassed intellectuals" (Pellicani, 2003, p. 17) and political actors (e.g. Henry VIII in his quest for centralized power; Duffy, 2005; O'Connor, 2017) were key to the broad success, in Catholic Europe, of the Reformation—it was *not* "achieved on a tidal wave of *popular* enthusiasm" (Duffy, 2006; emphasis added).

All of that said, one should wonder what relevance any of it has to *contemporary* societies that are well modernized. Perhaps early capitalism and industrialization were widely experienced as traumatic and unwelcome, but the West of the twenty-first century is no longer in the throes of such profound socioeconomic transformations. To belabor a point, the standards of living of Western nations are unmatched, and these same countries maintain hedonistic cultures that may be a necessary condition of the West's singularly high average levels of SWB (in the global context). Remarkably, however, despite the fact that all of those claims are true, the "professional revolutionaries" that Pellicani (2003) documents—that is, those who "[embrace] revolution as a *Beruf* … [whose] disenchantment with the world makes [them] … [incapable] of accepting reality, [such that they aspire] to build a completely new world … in which everything will comply with desire" (p. ix)—have not disappeared. Some of the starkest evidence supporting this statement comes from Gross and Simmons (2007), who find that 50–60% of American professors in the social sciences and humanities politically identify as "Marxist," "activist," or "radical." Even the

response to fundamental changes undoing the "traditional" quality of medieval societies, chiefly, to repeat, the emergence of capitalism. Given that capitalism, especially industrial capitalism, is the sociological root of modernization, we treat it as a "modernist" phenomenon. In any case, however, note that Reynolds (2010) indicates the relative insignificance of revolutionary movements in the medieval period where she writes of "the recorded radicalism of a few radicals" (quoted in main text).

staunchest defenders of modernity, such as Pinker (2018), acknowledge that these "professional revolutionaries" are still with us, primarily in the form of intellectuals and academics. But progressivists have all signally failed to convincingly explain this persistence. Pinker (2018, p. 447), for example, relies on the arguments of Thomas Sowell and Paul Hollander, who contend that intellectual disdain for capitalist modernity lies in the fact that the cognoscenti do not feel that they are accorded sufficient esteem in the modern world. This explanation seems to us to capture an element of the truth, but has some apparent problems. For instance, academics are often highly paid, and that professorships carry high occupational prestige. Perhaps recognizing the limitations of that hypothesis, Pinker (2018) goes on to write that intellectuals' simple abhorrence for the cultural tastes of normal people may account for their anti-modernism. But Pinker does not bother to explain the provenance of that abhorrence.

The failure of modernity to win the allegiance of the intelligentsia is seemingly unexplained. This phenomenon is made all the more mysterious by the fact that the early *apparent* economic justifications for anti-capitalism, and therefore a substantial component of anti-modernism, in the industrial era were quickly discredited—indeed, in the lifetimes of Marx and Engels, it was clear that their predictions in the *Manifesto of the Communist Party* were fantastically wrong (Boyer, 1998). Where in Western Europe, Marx and Engels predicted "immiseration," there in fact followed sharply rising prosperity, but this did nothing to quiet their hatred of industrial societies[18] (Boyer, 1998; Gregor, 2012), even as it largely eliminated popular support for the revolution that they desired (indeed, the comfortable citizens of wealthy Western nations have, on the whole, no substantial interest in upsetting the economic system that has enabled their prosperity, and have long since lost connection to the traditional lifeways that might have given non-economic reasons to oppose capitalism). Opposition to the modern world has outstripped any material deprivation that may have once been its seeming basis. We submit that this stubborn persistence of anti-modernism—lasting, as noted above, into the

[18] It should be stressed that Marx and Engels believed capitalism was a necessary precursor to socialism in a broader process of societal economic evolution. There is thus *some* sense in which they were not anti-capitalists. Nonetheless, they inveighed against capitalism with profound and moralistic rage, making it difficult to avoid the conclusion that they hated this economic system (Gregor, 2012, p. 85).

present—constitutes a real problem in need of explanation: it is not something to be merely hand-waved away.

In light of this, a good point of departure in critically analyzing the progressivist narrative is the complaints against modernity that intellectuals have forwarded—what about the modern world do they oppose? It should first be noted that critics of Western modernity could be split into at least two camps: those on the political right and those on the left. Affinities between leftist and rightist anti-modernisms are substantial (Pellicani, 1998, 2012), leading some to question the utility of the left-right distinction (e.g. Gregor, 2009). For example, both left- and right-wing critics of Western modernity have attacked this sociocultural epoch as spiritually or existentially draining through its rationalized management of social life (Pellicani, 1998).

Nevertheless, and as Pellicani (1998) is aware, leftists and rightists do not make the same appeals in advancing their critiques. For rightists, it is modernity's tendency to liquidate traditional cultures and hierarchies, heroic virtue, and masculine power that is most objectionable (Furlong, 2012; Skorupski, 2015). For leftists, concerns about generalized domination and inequality, and also (oddly enough, given the hedonistic nature of modernized societies) repression of "sensuousness," tend to pervade their attacks on modernity (Horkheimer & Adorno, 2009; Marcuse, 2006; Zerzan, 2002). Pellicani (1998) fails to highlight the stark differences between the kinds of societies that leftist and rightist anti-modernists prefer. Whereas rightists typically want to restore elements of the Western past, such as traditional Christianity, high in-group homogeneity, and strongly normative monogamy, leftists would fulminate against such "atavistic" developments. Marcuse (2006) and other key enemies of Western modernity in the Frankfurt School, for instance, clearly sought anything but a return to tradition. Instead, they aimed at establishing an "erotically fulfilled, socialist society" (Gottfried, 2017, p. 7), in part because "the Freudian Left/Frankfurt School" believed in an "intimate connection between sexual repression and authoritarianism"[19] (Adamson, 2017, p. 23). It is hard to imagine a right-wing critic of modernity longing for a

[19] The Frankfurt School was, and remains, aggressively anti-fascist and anti-National-Socialist in reaction to the Holocaust. Wolin (2004, p. xi) quotes perhaps the most noted figure of the Frankfurt School, Theodor Adorno, as having written the following: "Hitler has compelled humanity to accept a new categorical imperative: orient your thinking and acting so that Auschwitz would never repeat itself, so that nothing similar would recur."

sybaritic world that caters to "sexual fantasies" à la "Cultural Marxist" intellectuals (Gottfried, 2017, p. 60).

It would be reasonable to argue that "anti-modern" leftists, despite their disapproval of modernized Western societies, are not in any deep sense anti-modern. That is because the moral culture of the modernized West has the effect of promoting the equal and maximum freedom of persons to be as happy, fulfilled, or satisfied as possible (Kalb, 2008; Rubin, 2015). Greater overall human happiness has been described as the "promise of [the] Enlightenment" (Veenhoven, 2015; though to this we should add "greater freedom"). The "anti-modern" complaints of Western intellectuals are thus made in the very "grammar" of modernized morality—their objection seems to be that the West, if anything, is not modernized enough, not free, equal, or happy enough. True anti-modernism, in the sense of a rejection of the moral and other ideological underpinnings of distinctly modernized life, seems to be the preserve of the right.[20] This follows from the fact that, again, the (world-historical) right is not interested in happiness or equality, and in fact often sees endeavors to achieve these outcomes as indications of cultural decadence (e.g. Weaver, 2013). Rather, it seeks cultural excellence, human virtue, and so on. One could say that the right values that which promotes or indicates the flourishing (and thus fitness, though rightists are usually unaware of this) of groups, whereas explicit pro-modernists (and many or most [at least contemporary] leftists) in the end value human satisfaction and its equal distribution among persons (within certain limits[21]).

As we will eventually see, the story of leftist "anti-modernists" is not this simple. Indeed, it appears that their opposition to modernity is not

[20] There are complexities here, however. Ohana (2019) distinguishes "modernity" and "Enlightenment," the former referring to the condition in which humankind aims at shaping its own nature and destiny as it (or some or all of its various constituent groups) desires and the latter referring to a "normative" outlook involving commitment to the equality and freedom of all people, as well as to progress through education and open "rational criticism" and ideological exchange (pp. 1–28). Pellicani (1998) elides this distinction, and we follow suit here, in that the only significant non-"Enlightened" (i.e. non-liberal-egalitarian) forms of modernization—fascism, National Socialism, and Communism—have all but disappeared. Even those nations that might appear to be following a path of modernization alternative to the liberal-egalitarian one, such as China, seem to be exhibiting the same cultural changes that have attended modernization in the West (Zeng & Greenfield, 2015).

[21] For example, liberals, about whom more will be said later, will only count as positive human satisfaction that is acquired without violating others' rights, understood as restrictions on what can be done to those others.

consistent with their stated interests. But for now, it is rightist anti-modernists whose ideas will be considered at length.

One of the most recurrent themes of anti-modern rightist thought is that of *nihilism*. In its most basic sense, nihilism is simply disbelief in something. Thus, Joyce (2009) observes that, strictly speaking, atheists could be called "theistic nihilist[s]" (p. 213, n. 1). When it is typically used, however, "nihilism" refers to the belief or sense that human life, or at least one's own life, is meaningless, in the sense that it lacks a purpose or a point (this is often called *existential nihilism*). Even this definition might be too narrow, insofar as the phenomenon that anti-modernists have in mind when they discuss nihilism does not seem to be restricted to those who explicitly believe or strongly feel that life is meaningless. A broader understanding of nihilism would seem to include people who lack strong commitments to anything other than their own enjoyment—those who, while contingently invested in relationships, ideologies, places, and so on, stand at a certain remove from them by virtue of caring about them in a limited way. The nihilist's depth of investment or concern is restricted insofar as his ties to the world are matters of convenience, to be severed and replaced once they fail to sufficiently enhance personal psychological well-being.

The philosophers Martin Heidegger and Carl Schmitt, both allied to the "extreme right" in that they were National Socialists, saw this withdrawal into personal interests as a manifestation of nihilism[22] (Dreyfus, 1993; Wittrock, 2014). Dreyfus (1993) understands Heidegger's conception of nihilism to be basically continuous with that of another major German philosopher, Friedrich Nietzsche,[23] who also construed nihilism as a modern phenomenon: "Heidegger agrees with Nietzsche that 'there is no longer [in the modern world] any goal in and through which all the forces of the historical existence of peoples can cohere and in the direction of which they can develop.' Nihilism is Nietzsche's name for this loss of meaning or direction" (pp. 290–291). Equating with nihilism this absence of a "goal" for "peoples" on the basis of which they might "cohere" again

[22] As intimated in the previous chapter, the sociologist Max Weber also understood nihilism, which he saw as a consequence of "disenchantment," to involve a retreat into the personal realm, but he was not a rightist. Critically, however, Weber seemed relatively sanguine about individuals' ability to draw meaning from the personal realm, though nonetheless regarded the loss of public sources of meaning as tragic.

[23] The nature of Nietzsche's political beliefs is a matter of controversy among relevant academics. Nonetheless, he was clearly illiberal and inegalitarian.

suggests that, for these philosophers at least, meaninglessness has some intimate relation to a lack of connection between individuals and their broader "life worlds." Indeed, Dreyfus (1993), expounding on Heidegger's thought, goes on to note that "[i]n a non-nihilistic age there is something at stake … But in our age, everything is in the process of becoming equal. There is less and less difference among political parties, among religious communities, among social causes, among cultural practices—everything is on a par, all meaningful differences are being leveled" (p. 291); "[w]hen everything that is material and social has become completely flat and drab, people retreat into their private experiences as the only remaining place to find significance" (p. 292).

For Schmitt, similar concerns applied. His critique of liberalism, a defining feature of modernized and many modernizing societies, is especially relevant here. Liberalism (which will be treated in more detail later in this chapter), to reiterate, is essentially the principle that governments should remain neutral with respect to the various ways in which their citizens may live their lives, within certain limited constraints.[24] This is sometimes referred to as neutrality vis-à-vis "views of the good life" or "comprehensive visions of the good," and liberal theorists typically understand this neutrality as a means of avoiding deadly human conflicts that are so often rooted in religious and moral differences between groups (Simpson, 2015). What this commitment to neutrality entails and to what degree and in which senses a government must be neutral to be liberal are matters of contention among political philosophers and theorists (compare, e.g. Gaus 2011, 2016 and Kramer, 2017). But in the case of Schmitt's work, liberalism is defined by its tendency to erode the distinction between "friend" and "enemy": "According to liberals, it is not necessary or desirable for individuals to form groups constituted by friend–enemy distinctions. Liberals hold, rather, that all conflicts among human beings can, in principle, be solved through amicable compromise, as well as through the improvement of civilization, technology, and social organization" (Vinx, 2015, p. 30). In effect, liberalism creates or endeavors to create peace in part by "neutraliz[ing]" (Ci, 2015, p. 174) or rendering insignificant human differences, for it thus eliminates potential grounds of violent political or otherwise ideological conflict. Schmitt, in the end, thought this neutralization was undesirable because it would rob life of the "values

[24] These constraints limit one's ability to interfere in the lives of others, for example, by killing them.

that would license risking one's own life, and thus give a meaning to one's existence that transcends the satisfaction of private desires" (Vinx, 2015, p. 30). So we see repeated in Schmitt's corpus the idea that a loss of collective or public meaning, and a resultant withdrawal into concern only with narrow personal interests, is a condition of nihilism.

It is rarely easy to determine if philosophical speculations of this sort track empirical reality. One way to *start* an inquiry into whether modernity engenders nihilism would be to determine if more modernized nations have greater proportions of citizens with nihilistic sentiments than their less modernized counterparts. At least two studies on this matter exist, from Oishi and Diener (2014) and Froese (2016) (though the relevant data in both come from Gallup). Both find that wealthier nations—national wealth being a strong proxy for modernization—have greater shares of their populations reporting a subjective lack of purpose in life. The differences among nations are quite striking—roughly 28% of the French lack a sense of existential purpose, whereas this is true of about 0% of the Senegalese (Oishi & Diener, 2014, p. 424). In a multiple regression analysis, Oishi and Diener (2014) found that differences in religiosity among nations were most predictive of variation in levels of existential purpose, whereas other variables, such as individualism, were not predictive.

The fact that differences in religiosity but not individualism were predictive of levels of meaning in life cross-nationally may seem to bode poorly for the German philosophers' general conception of nihilism described above. However, measures of individualism (and its opposite, collectivism) are generally poorly specified and inconsistent, failing to correlate strongly with each other (A.J. Figueredo, personal communication). Frequently, they track attitudes, such as positive self-appraisals, that seem to have little to do with the phenomena that interest the theorists of nihilism. In the absence of sound individualism-collectivism measures, another approach is to focus on aspects of the syndromes of values and behaviors that are strongly associated with different measures of economic development—that, in other words, track a society's level of modernization.

Minkov (2011) has identified the key dimension, for current purposes, along which relatively less compared to more modernized societies vary, which he calls Monumentalism-Flexumility. More premodern societies are relatively "monumentalist," with "many people" who exhibit strong national and parental pride and "[i]mmutable identities, values, norms and beliefs, associated with strong religiousness" (Minkov, 2011, p. 97).

Monumentalist societies are further highly "cohesi[ve]," especially at the familial level, and exhibit low suicide rates—in fact, monumentalism is currently the best single predictor of national suicide rates, with which it strongly negatively correlates[25] (Minkov, 2011, p. 108). It would seem, then, that an aspect of the premodern syndrome of behaviors and values is a devout commitment to identity, kin, values, and religion. Conversely, societies that are high on "flexumility" are characterized, as the name suggests, by a combination of flexibility of identity and beliefs and modesty. These societies have generally higher suicide rates than more monumentalist ones. (One suspects that the deep, firm commitments that characterize monumentalism would militate against nihilism, especially given that religious commitment in particular is included in the construct—but an empirical study of this possibility should be conducted.)

* * *

These contrasts between premodern and modern societies offer indications of the source of discontent that attends the former, but must be supplemented with certain other ideas. First, it is possible that the evolutionary value of intellectuals, and especially rare genius intellects, is substantially a function of inter-group conflict. Hamilton (2000) first proposed that geniuses have historically compensated for their low individual-level reproductive success (see Simonton, 2003) through the fitness benefits that they provide their groups in times of war—for example, military innovations that geniuses develop might provide decisive advantages allowing their groups to overcome enemies. To this, it should be added that even great works of art, inspiring religious sermons, and ingeniously crafted propaganda may serve to enhance intra-group cohesion and altruistic behavior. But with the rise of modernization and growth of wealth, intellectuals have been increasingly deprived of these roles given the concomitant attenuation of inter-group conflict, roles which they may well be genetically predisposed to occupy. This may explain what Pellicani (2003) describes as "[t]he sensation of profound alienation and impotence experienced by intellectuals [deriving] from the incompatibility between the role of spiritual leadership they aspire to fulfill and the specific nature of the social order that revolves around values and forces that are completely

[25] In Minkov's (2011) analysis, once monumentalism is included, SWB is a weak predictor of national suicide rates (p. 108).

foreign to them. In this material world, pervaded by material values, intellectuals feel like aliens, who are unable to leave a mark on society" (p. 4). It may also account for the unique hatred of "decadent" capitalistic life among intellectuals that many authors have extensively documented (Stern, 1961; Watson, 2014). In effect, intellectuals may be divorced from their evolutionarily appropriate niche, a condition inducing dysphoria. The French fascist intellectual Pierre Drieu La Rochelle offered especially revealing statements on this score, expressing "his gratification at the way Hitler had managed, in his view, to lower consumption. He praised the historical phenomenon of Hitlerism for arresting the encroachment of European decadence, and envisioned it as an enlivening cure to the depressing complacency of the French Last Humans [i.e. Nietzsche's last men]" (Landa, 2018, p. 290).

It would appear that liberalism, the influence of which has expanded in proportion to economic development (Inglehart, 2018), has historically been especially repugnant to many intellectuals, possibly for reasons that Schmitt and Heidegger identified: the tendency of liberalism to level the distinctions and neutralize the values[26] that provide a basis for inter-group conflict, thereby inducing nihilism. Liberals may respond to the complaint of intellectuals that liberalism is nihilistic by insisting that this is false, given that liberalism, in endorsing neutrality toward alternative values and ways of life, affords every person the ability to pursue his own vision of the good, and thus have a meaningful life. But if the liberal state is to succeed in avoiding the violence that emanates from *illiberal* commitment to belief systems and ways of life, then it has to cultivate in the general public a certain detachment from and unseriousness about all particular "visions of the good"—it cannot merely intervene in whatever conflicts do emerge, taking no steps to avoid them in the first place. Thus liberal governments aim to convince people, through, among other mechanisms, public education (Gottfried, 2002) that common humanity is the source of each individual's (equal) moral worth, that differences of spirituality or religiosity or metaphysical commitments reflect mere personal preferences with no

[26] As we will discuss in Chap. 7, in recent decades political polarization has potentially started to increase in the Western world, which may signal the waning ability of liberal regimes to cope with rising genetic diversity in Western populations. It may nevertheless be that moderns remain without the deep commitment to their moral and political values that their premodern counterparts had.

bearing on anyone's goodness or value.[27] For many of the intelligentsia, liberalism thus offers an impoverished, even mutilated form of life, in which what we would naturally value most we are forced to value least (see Simpson, 2015). This may go a long way toward explaining the tremendous enthusiasm that, again, many intellectuals of the early twentieth century had at the prospect of a Great War (Stromberg, 1982; Watson, 2014; see Chap. 3), and that many other intellectuals had for the militaristic totalitarianisms that were to follow (Gentile, 2006; Gregor, 2012)—a number of these modern movements and revolutions, and even much earlier (though far more limited) ones apparent in times of upheaval in the Middle Ages, appear to have been directed as restoring a lost cohesion or groupishness (Pellicani, 2003; Stern, 1961).

But so far, liberalism has triumphed, and the discontent of the intellectuals has persisted. Set adrift from their martial purpose, the behavior and intents of the clerisy have grown ever more aberrant in historical context. Their hatred of the modern world less often takes the form of seeking to restore a premodern past, but instead aims at the dissolution of whatever remains of the traditional West (indeed, this is clearly apparent in leftist anti-modernism; Gottfried, 2002). In Chaps. 6 and 7, we offer an explanation of the evolutionary dynamics underlying this perversion of the typical stance of the intellectuals. But before proceeding, we think it necessary, in the next chapter, to consider at length one of the most visible recent cases for the view that anti-modernist complaints ought only to be rejected. Among other things, this will give us an opportunity to consider problems with modernity that pro-modernists, and not just discontented intellectuals, may recognize as such, but of which they currently tend to be unaware.

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[27] Again, the neutrality of such differences is in fact a basic tenet of liberal political philosophy (Ci, 2015).

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CHAPTER 5

Enlightenment Never

Preamble

While modernization has certainly provided many material benefits to those in its reach, cases for a positive view of modernity can be and have been wildly overstated. We have already indicated and explored some of the potential problems with the modern condition, but a thorough inquiry is necessary. The recent publication of Steven Pinker's especially high-profile defense of pro-modernism offers an opportunity to undertake this investigation.

Introduction

Steven Pinker is a cognitive and evolutionary psychologist, who first rose to prominence through his work in psycholinguistics. But since the publication of his 2011 book, *The Better Angels of Our Nature* (*BAN*), Pinker has taken on a different image—that of evangelist for modernity and the "progress," or betterment of human life, that it allegedly brings. The aim of *BAN* is to show that violence has been falling globally for millennia (though plenty of recent trends are analyzed) and to explain this phenomenon in the light of various factors, such as the development and spread of civilization and the Flynn effect (i.e. the rise in IQ test performance apparent in all populations that have undergone or are undergoing modernization). His latest work, *Enlightenment Now* (*EN*), is a far more ambitious undertaking: an effort to demonstrate that life has been improving in just

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about every important way through the emergence and proliferation of Enlightenment ideals. Each of these ideals—reason, science, humanism, and progress—is defended against criticisms in *EN*, although the defense of progress constitutes the bulk of the book, which consists in showing that many aspects of life simply have, in fact, improved or been improving.

EN has received many impressive endorsements. Most strikingly, Bill Gates calls it his "new favorite book of all time" (2018). *Publisher's Weekly* avers that it is "sober, lucid, and *meticulously researched*" (n.d.; emphasis added). Unfortunately, and despite the preceding, *EN* is highly imperfect. Indeed, the authors of the current book found it difficult to keep track of the numerous factual errors, convenient omissions, and glaring inconsistencies that riddle the work's pages. A critique that comprehensively addressed these failings would be far too long. The treatment of *EN* offered here is therefore partial, though hopefully more than sufficient to justify our negative assessment. And while these individually minor problems as a whole severely mar *EN*, it has one especially great shortcoming: the remarkably superficial theory that holds the entire narrative together—ultimately, it is little more than an excuse to present readers with a long series of comforting graphs.

Summary

The substance of *EN* is a long three-part argument, which consists of (1) an overview and history of Enlightenment thought, a description of humanity's existential predicament, and a distillation of prominent criticisms of Enlightenment philosophy; (2) an empirical case for the reality of progress, involving a welter of data indicating positive developments in various domains relevant to human welfare (and some psychological explanations for the failure of humankind to appreciate how far it has come); and (3) a defense of "reason, science, and humanism" (2018, p. 6).

EN's essential thrust is that "[t]he Enlightenment has *worked*" (2018, p. 6)—in other words, the promise of Enlightenment ideals to enhance human life has been fulfilled, and this can be shown "with data" (p. 6). According to Pinker, humanity's lot has been miserable overall—indeed, "99.9 percent of our species' existence" (p. 54) was characterized by poor life expectancy, high infant mortality, brutal material poverty, and related problems. These hardships are attributable to "entropy" and "evolution," the former referring to the tendency of order in systems, on which all life depends, to break down, and the latter referring to the morally offensive behavioral dispositions that have been bequeathed to humans as part of

their evolutionary legacy (pp. 15–28). Fortunately, evolution has also left humankind with admirable capacities, such as sympathy and abstract cognition, which can be and have been applied to tame basal instincts and exploit useful information, and thereby develop and sustain dense urbanized societies founded on peaceful and mutually beneficial cooperation, rather than on vicious competition (allegedly a prevailing feature of human existence for most of its history). Such arrangements enable long-term wealth growth, which in turn redounds to the cooperation on which those arrangements depend: "the availability of energy beyond the minimum needed for survival gave more [people] the luxury to think and talk" (p. 27; "[e]nergy channeled by knowledge is the elixir with which we stave off entropy" [p. 23]).[1]

It is of critical importance for Pinker (2018) that Enlightenment intellectuals—who shifted the focus of moral concern from groups to individuals, abhorred both "religious violence" and "secular cruelties" (p. 11), and extolled the power of reason and moral sentiments to improve society—promoted the "norms and institutions," for example, free speech and democratic elections, that are, so the argument goes, best for human welfare and thus for managing the onslaught of entropy (p. 28).

But for all its alleged success, the Enlightenment, and the modern world it has produced, is not high in the esteem of Western academics or, in a different way, ordinary people. Pinker gives a historical snapshot of "counter-Enlightenments," which have highlighted the dangers of technology, the deleterious effects of material comforts, and much else as providing reasons to oppose modernity (pp. 29–35). He goes on to explain why negative views of modern life are so common among its supposed beneficiaries, emphasizing that news outlets have become increasingly focused on upsetting material (a claim that he empirically substantiates: pp. 50–51) and that aspects of human cognition, especially when interacting with negative news, will lead people to the false impression that the state of the world is degrading. Attention here is chiefly on the availability heuristic—"people estimate the probability of an event or the frequency of a kind of thing by the ease with which instances come to mind" (p. 41)—and negativity bias, the tendency for bad experiences, outcomes, and events to have greater effects on and salience in human psychology than good ones.

[1] By this point, one is reminded of Ernest Gellner's argument that in the "agrarian age… coercion or predation was the central theme and value of life," whereas in "the industrial age…production took over as the dominant theme and changed the whole organization and ethos of society" (1989, p. 145). But Gellner is mentioned nowhere in *EN*.

Next, *EN* turns to the task of showing in what ways and to what extent human well-being has risen. The sprawling nature of this second part of the book makes it difficult to summarize. The areas covered are as follows (and as named by Pinker; pp. xi–xii): life, health, sustenance, wealth, inequality, the environment, peace, safety, terrorism, democracy, equal rights, knowledge, quality of life, happiness, and existential threats. Many agreeable trends are presented with the help of 75 figures. Readers are told that infant and child mortality rates have fallen precipitously while life expectancy has done the opposite (indeed, the latter is substantially, though not entirely, a result of the former). Deaths from famine have declined for centuries. Modernization has driven average intelligence, as reflected in IQ test performance, up for about a hundred years in some parts of the world, and has also made people happier. Concerns about increasing mental illness are unwarranted, although worsening psychiatric distress is possibly a real problem (something Pinker acknowledges with obvious reluctance). By historical standards, poverty has been all but eliminated in the developed world and is falling rapidly in poor regions. Democracy is spreading and bringing its sundry benefits across the globe. Terrorism, the relevant data supposedly show, is an overblown problem. And on and on. Part two of *EN* concludes with an optimistic case for the future of progress, which relies heavily on speculations concerning advances in technology and untapped human capital in the developing world that further modernization will unleash. It also addresses two sources of doubt about continuing progress: economic stagnation and the rise of "authoritarian populism" (p. 333). Pinker answers the former concern largely by appealing to the optimistic judgment of economist Joel Mokyr, and the latter mainly by asserting that more reactionary generations will eventually die off, with the "enlightened" left to inherit the Earth.

The third and final part of *EN* begins with a defense of reason (one of the three remaining Enlightenment ideals, the other two being science and humanism; progress, as already noted, is handled in part two). Pinker argues that criticizing reason itself is incoherent, because the very act of arguing for a claim assumes the norms of reason.[2] He also discusses sources

[2] This reflects total misunderstanding of conservative critiques of the Enlightenment idealization of human reason. Consider Simpson's (2015) accurate presentation of one such critique:

> A people or a nation is, supposes [Edmund] Burke, not a momentary reality but instead endures through centuries and even millennia. It is a product and a continuing cause of traditions and practices that may be more worth preserving from the

of bias and irrational thinking at length, concluding that the existence of such things does not entail that humans cannot be rational, or that it is pointless for them to endeavor to become more rational. Strategies to make people more adroit users of reason are considered as well.

In his analysis of science, Pinker addresses challenges to this ideal posed by political ideologues and romantic critics, that is, those who are displeased with science's (partial) displacement of the humanities and supposed disenchantment of life. He maintains that such criticisms impede valuable progress in science that almost no one could seriously oppose, for example, new and effective treatments for harmful diseases, and that science need not compete with the humanities but can instead be integrated with them in fruitful ways.

The last section of *EN* offers arguments in support of humanistic morality and against two competing views: "theistic morality," according to which the content of morality depends on "the dictates of a deity," and "romantic heroism: the idea that morality consists in the purity, authenticity, and greatness of an individual or a nation" (p. 419). Pinker's critique of theistic morality rests primarily on three claims: there is no good reason to believe in a deity that could provide a basis for morality; there is no good reason to believe that any deity could serve as a basis for morality anyway (appealing to the Euthyphro dilemma); there is no good reason to think that religious belief makes people moral. Despite great effort on the part of the current reviewers, little substance could be extracted from *EN*'s critique of "romantic heroism." To the extent that there is substance, it is found in Pinker's brief effort to attack the idea that there are powerful genetic foundations supporting nationalism and individuals' identification with biogeographic ancestry (BGA) groups. The rest consists of a somewhat breathless expression of indignation vis-à-vis "romantic heroism,"

> point of view of the concrete good of the people than any number of changes that, abstractly considered, are more rational. To overthrow tradition and custom in the name of an alleged universal reason is, more often than not, neither good nor wise. Men are not robots or computers that can be reprogrammed at will. They are living souls who preserve, as they measure, the passages of time, and who thereby come to love the familiar things of their native land merely because they are familiar. Man may be a universal being with a universal nature, but it is part of this nature, and a dispensation of reason too, that he should be formed in the concrete through the accidental and particular circumstances of his birth…the habits of the ages…likely contain more wisdom…than the inventions of a new generation or the nostrums of intellectual fashion. (p. 38)

especially the views of Friedrich Nietzsche—this is hardly befitting of such a vociferous proponent of reason and of humanity's power to temper its biases.

Bad Historical Scholarship

As indicated above, *EN* is a profoundly flawed work. In (partially) documenting its many faults, we begin with its use of historical sources and evidence (and lack thereof). Signs of careless scholarship appear early. For instance, in examining the history of the Enlightenment, Pinker (2018) states that "not all of the Enlightenment thinkers were atheists" (p. 8), implying that non-atheism was the exception among these individuals. If one consults an earlier endnote, a more moderate claim about Enlightenment intellectuals is found: they were mostly "non-*theists*" (emphasis added) rather than atheists (p. 455, n. 6). If one follows up the source that Pinker provides, one finds an author who strongly emphasizes how *rare* thoroughgoing atheism apparently was among the figures of the Enlightenment: "For all that the Enlightenment's onslaught on religion had banished any notion of a benign and caring deity or of a divine and omnipotent judge, there were, nonetheless, *very few* who were prepared to contemplate Smith's 'fatherless world' entirely without flinching. David Hume, however, was certainly one of them…. Yet even he doubted the existence of outright 'atheists'" (Pagden, 2013, p. 104; emphasis added). To be sure, the same author notes that it is difficult to ascertain how many Enlightenment intellectuals were concealing their atheism to avoid persecution. Nonetheless, he never indicates that there is sufficient evidence for the claim that they were mostly atheists. Pinker's evasiveness on this point, seen in the equivocation in phrasing between main text and endnote, is perhaps related to his partisanship for atheism, a stance made abundantly clear in *EN*.

Later on in part one, readers are treated to some especially bizarre readings of "counter-Enlightenment" thinkers. "Rousseau, Johann Herder, Friedrich Schelling, and others" are said to deny, inter alia, that "peace and prosperity were desirable ends" and to believe that "violence is inherent to nature" (p. 30). Nothing is adduced to show that these thinkers maintained such beliefs. Basic material on, for example, Jean-Jacques Rousseau makes explicit that he did not at all believe that violence was natural to humankind, at least—quite the opposite, in fact: "Rousseau portrayed human nature as peaceful and argued that social institutions—at least the ones [characteristic of state societies]—are corrupting" (Widerquist & McCall, 2017, p. 85).

It is a mystery how Pinker could have reached his view of Rousseau, a thinker so prominently associated with the idea that human nature is essentially benign. Indeed, this is an instance of stunning cultural illiteracy for a high-profile academic. To make the matter stranger, Pinker (2018) earlier includes Rousseau in a list of *Enlightenment* thinkers (p. 10).

Further on, Arthur Schopenhauer, along with a number of other intellectuals, is characterized as a "[prophet] of doom" (pp. 39–40). In fact, Schopenhauer was a metaphysical pessimist, not a declinist or an apocalypticist—he denied the reality of "progress," taking suffering to be an entrenched part of the human condition that could not be meaningfully mitigated, but was no forecaster of "doom." Schopenhauer even noted that "things in former times one could hardly afford are now obtainable at a low price and in quantities, and even the life of the humblest classes has greatly gained in comfort" (quoted in Slaboch, 2015, p. 941), evidently presaging the arguments of Pinker and like-minded scholars. The closest Schopenhauer came to declinism would appear to be in his concern over the growth of the state, which was wedded to his individualism and anti-nationalism (Slaboch, 2015); though Schopenhauer was no liberal (Slaboch, 2015, p. 946), aspects of his anti-nationalism ironically appear to be entirely consistent with Pinker's.

Most problematic of all, however, is perhaps Pinker's reading of, or rather fiery polemic on, Friedrich Nietzsche. In complete defiance of, and indeed without regard for, major secondary literature on the German philosopher, Pinker suggests that Nietzsche was an unprincipled relativist about truth (*cf* Clark, 1990; Leiter, 2015a, p. 234), that the *Übermensch* is an important concept in the Nietzschean corpus (*cf* Leiter, 2015a, p. 92, n. 4), that the concept of "will to power" is somehow entangled with genocidal politics (*cf* Leiter, 2015b), that Nietzsche's thought can be reasonably connected to Ayn Rand's "deification of the heroic capitalist" (*cf* Leiter, 2015a, pp. 1, 26), and that Nietzsche's philosophy was friendly to the aims of National Socialism (*cf* Leiter, 2015a, p. 233) (Pinker, 2018, pp. 443–446). Bizarrely, and despite this portrayal of the German thinker as a diabolical proto-fascist, Nietzsche is elsewhere lumped in with the leftist Foucault and Critical Theorists as a man who believed "works of art are tools of oppression" and "liberal democracy is the same as fascism" (p. 406). And Martin Heidegger, who *was* a National Socialist (Young, 1997), is somehow ascribed those beliefs as well (p. 406; though it is perhaps not unreasonable to suggest that Heidegger would have drawn parallels between liberal democracy and fascism). Despite that, on page 447,

Heidegger *is* identified as a National Socialist, giving a sense of the confused and inconsistent quality of *EN*.

Pinker's (2018) vitriol against Nietzsche reaches its zenith where he asks readers to consider a fantasy of sorts in which he (Pinker) travels back in time to "confront" the philosopher, or "[s]horty" as Pinker awkwardly refers to him, with physical threats, directed at both Nietzsche and his "Nazi sister"—the threat against the latter has a disturbingly sinister turn of phrase to enliven this reverie. The ostensible purpose of this sequence is to highlight the irrationality of Nietzsche's moral inegalitarianism (p. 446).

Now, Pinker is of course free to object to any of the readings of Nietzsche found in contemporary philosophical publications, and thus perhaps justify his dislike of the man, but one will find nowhere in *EN* an effort to seriously engage the philosopher's oeuvre or sophisticated readers' interpretations of it—the treatment is shrill, moralistic condemnation, from start to finish. This includes an attempt on Pinker's part to spread his cultural ignorance as far as possible, with an apparent recommendation to avoid even reading Nietzsche's writings: "Finally, drop the Nietzsche" (p. 452).

In another passage from his screed against "romantic heroism," of which the attack on Nietzsche is only one part, Pinker is guilty of a further glaring error, which is obvious to anyone who has bothered to become even minimally apprised of the germane literature: He introduces Baron Julius Evola as if the latter were an important "early Fascist intellectual" (p. 448; in an endnote, Evola is called a "Fascist theoretician" [p. 491, n. 118]). A. James Gregor, probably the leading contemporary authority on the intellectual bases of fascism, maintains that "whatever the case may be with respect to Evola's connections with contemporary extremism, there are virtually no grounds for identifying him as a spokesman for Fascist doctrine. Such an identification has become possible only because Fascism as an historic reality has receded further and further into the mists of stereotypy and political science fiction" (2005, p. 16); "Julius Evola [was] a marginal thinker in Fascist Italy" (2005, p. 158, n. 91); "serious Fascists were to forever dismiss [Julius Evola] as the 'Magic Baron'" (2005, p. 194). Indeed, Evola was an aristocratic traditionalist and reactionary who had considerable disdain for fascism, which he saw as an essentially egalitarian ideology (Evola, 1974). His claim to "superfascism" is evidently quite meaningless, or was perhaps meant to indicate that he was above fascism—if anything, he was an anti-fascist (Gregor, 2005, p. 133, n. 85, 2006, p. 87).

In characterizing Evola as a fascist, and elsewhere in *EN*, it becomes apparent that Pinker has regrettably succumbed to a popular form of intellectual laziness common on the left (and increasingly the libertarian right) for decades now, which is to misrepresent most or all forms of right-wing nationalism as "fascist." He is apparently aware, in some tenuous way, that use of the word has become quite unprincipled (see p. 448) but nonetheless indulges in this misbehavior himself. He alleges that Stephen Bannon is a fascist by virtue of the fact that the latter has read Julius Evola (who, as we have already seen, was not a fascist) and Charles Maurras, a monarchist whose influence on the right has been very broad, that is, not restricted to fascism—even if Bannon accepted every significant political idea Maurras offered, and of course nothing close to this has been demonstrated, it would be entirely unwarranted to infer from this that Bannon is a fascist: "It has been well enough established that Maurras's ideas had only a very limited influence on the development of Italian Fascism and no real influence at all in Germany" (Sutton, 1982, p. 248).

As it happens, the life of anything recognizable as fascism has been very limited following World War II, and almost all claims of rising "neo-fascism," especially in the developed world, are baseless (Gottfried, 2017; Gregor, 2006). Gottfried (2017) amusingly intimates that strains of Communism have had as much or perhaps even more in common with the doctrines many on the contemporary left attack as "fascist" than did actual fascism: "Communist parties and Communist regimes did (and still) engage in 'homophobic' insensitivity; and the French Communist Party stood at the forefront of those who resisted Third World immigration into France after World War Two, because it would depress the wages of French workers" (p. 316). Pinker also seems to think that fascism and related right-wing ideologies have some special connection to the moral prioritization of group over individual interests, and that they therefore have a unique affinity for group-selectionist theories of evolution (p. 448; this will be discussed in more detail later in this chapter). Although he is elsewhere critical of Communists, he fails to mention that the Soviets were no less group-ish, in the foregoing sense, than the fascists (see Gregor, 2012).

Moreover, Pinker's (2018) treatment of Communism is in other ways problematic. He is not quite willing to square up to the fact that the explicitly atheistic Communists were the most prolific mass killers of the twentieth century; Pinker (2018) thinks that the lack of moral content of atheism as such absolves irreligion of any responsibility for these atrocities (p. 430; curiously, however, he says nothing of the fact that Communists

frequently took their doctrine to be the supreme realization of "humanism"—see Billington, 1980; Pellicani, 2003—a moral orientation that Pinker seems to think could only ever have salutary effects). But this is to badly miss the point.[3] Rindermann and Carl (2018) offer compelling evidence that the percentage of Christians in a society has a strong positive effect on respect for human rights at the national level. This is perhaps because Christians typically view human life as sacred—at minimum, this is an open possibility. Insofar as the Communists aggressively did away with this source of morality, their atrocities may thus have been facilitated.

The descriptions of other historical intellectuals, especially those of a "counter-Enlightenment" and anti-modern bent, including in the passages of *EN* already noted, are similarly problematic, but there is not space here to address them all.

* * *

It would be difficult to come away from *EN* without the impression that Pinker dislikes, even hates, religion. This sense builds up from the repeated association of religion with various evils, and almost never with anything good, which can be found on pages 10, 30, 31, 39, 84, 91, 221, 287, 334, and 340, and in a great deal of chapter 23 (though this is not an exhaustive list). Positive remarks about religion are largely restricted to pages 431–432, but these are nonetheless backhanded and hostile to many *traditional* religions.

Operating in a long line of atheistic evolutionists with the same sort of animus, for example, Richard Dawkins and Daniel Dennett, Pinker is seemingly unable to recognize that something so universal to human life across time and space is not intelligently dismissed as a collection of ignorant and arbitrary beliefs that can be thrown aside without consequence, but rather almost certainly has adaptive significance (see Norenzayan et al., 2016; Norenzayan & Shariff, 2008; Wilson, 2002), a point to which we will return later.

Evolutionary thinkers who insist on a moralizing orientation when considering a complex biocultural phenomenon such as religion are not meaningfully advancing their field. But Pinker makes matters worse by compounding ideological bias with historical ignorance. From the caricature

[3] Although he disparages certain anti-atheist views of history as "dunce-cap" (Pinker, 2018, p. 430), the anti-religious history that Pinker offers is no less worthy of that insult (see Johnstone, 2018 for a critique of the poor historical scholarship on which contemporary anti-theist activists and intellectuals rely).

version of history that *EN* offers, one would think that Enlightenment philosophy was close to the sole fount of humane ideals. The role of Christianity, well before the Enlightenment, in fostering compassionate morals and behavior[4] and the rise of truly civilized life (MacDonald, 1995a, 1995b) is not discussed in *EN* (see Hart, 2009; Sidentop, 2014). Unsurprisingly, Pinker does not consider the possibility that some Enlightenment-inspired movements resulted in mass murder, even genocide. Certain arguments to this effect, such as in Secher's (2003) analysis of killing in the Vendée in Revolutionary France, are highly controversial (conveniently enough, the French Revolution, with its explicitly "humanistic" philosophical bases, is never mentioned in *EN*). Nevertheless, plenty of distinguished academics recognize the Vendée killings as constituting a genocide (e.g. Jones, 2011, pp. 6–7; Rummel, 1997, p. 55). Again, Pinker is at liberty to dispute any of these accounts and arguments—perhaps they are all gravely mistaken. But to omit from consideration a wealth of respectable literature that so strongly contradicts one's thesis is simply poor scholarship.

Misleading on Progress, And Badly Explaining It, Too

At the outset of this section, it must be noted that certain elements of Pinker's case for progress cannot be reasonably disputed. As conceded earlier in this book, the available data leave no real doubt, for example, that per capita rates of violence have fallen at least to some extent, that infant and child mortality have diminished enormously, and that life expectancy and wealth have increased. The authors of this book see no empirical justification for an unalloyed negative judgment of modernity (assuming a relatively "progressive" evaluative frame). Indeed, we believe that evidence shows that modernized and modernizing societies have become more socially mutualistic, self-controlled, and long-termist in their psychobehavioral nature, changes captured by slowing life history speed (Woodley of Menie, Figueredo, et al., 2017, pp. 24–26). Through these developments, they have acquired "successively higher levels of social equality, within-group peace, between-group peace, sexual equality, strategic differentiation [a kind of behavioral variation that happens to be conducive to economic growth], macroeconomic diversification, human capital, and aggregate IQ" (Woodley of Menie, Figueredo, et al., 2017, p. 38).

[4] The reduction in the prevalence of slavery that occurred in medieval Europe was likely related to the spread of Christianity (Jordan, 2004).

Unlike Pinker, however, we have taken great care to understand not only the boons of the modern world but also the "dark side" that has attended them. We have already noted research finding that high levels of general intelligence (*g*) and the *K*-factor likely enabled the British Industrial Revolution. Britannic populations in the eighteenth and nineteenth centuries were probably high on these traits due to a legacy of selection for them in the Early Modern Era, which was in turn driven by extremely harsh environmental conditions and frequent inter-group conflict during this period (Woodley of Menie, Figueredo, et al., 2017; Woodley of Menie, Figueredo, & Sarraf, forthcoming). Industrialization and its *sequelae* have massively enhanced humankind's material quality of life. Sadly, they have also reversed the selection pressures making the former possible, at least with respect to intelligence.[5]

[5] The best evidence for genetic selection against intelligence, also called dysgenic selection or simply dysgenics, comes from a paper by Kong et al. (2017; further information about dysgenic selection is provided in Chap. 8). This study discusses molecular genetic findings indicative of selection against "educational attainment" (which is very highly genetically correlated with intelligence) in the Icelandic population, derived using a model that estimates the joint effects of both the timing and quantity of fertility on the decadal change in polygenic scores (i.e. indexes of genetic variants associated with a phenotype[s] or outcome[s]) associated with educational attainment. In a similar vein, Rindermann's (2018) simulation of changes in intelligence over time, which also factors in data on the quantity and timing of fertility by cognitive ability level, reaches an estimate of a decline in average IQ of about 17 points in two centuries (or 0.87 points per decade), and a loss of 28 points over the same time span for those at the 95th percentile of intelligence (or 1.4 points per decade; p. 427).

A reanalysis of Kong et al.'s (2017) data by Woodley of Menie, Figueredo, et al. (2017), in which Kong et al.'s "conservative" estimate of the additive heritability of educational attainment (0.30) was replaced with a biometric structural equation model behavior-genetic estimate of the adult narrow-sense heritability of *g* (0.86), yielded an estimate of 0.87 points of *g* lost per decade. Rindermann (2018) is very cautious about the results of his simulation, but this is prudent largely because he focuses on the broader construct of IQ, rather than the narrower (and more heritable) *g* (but note that, given the large amount of heritable IQ variance for which *g* accounts, selection against IQ will strongly tend to involve selection against *g*). Also, simulations necessarily make simplifying assumptions, although the convergence between Rindermann's and Kong et al.'s (disattenuated) intelligence-loss estimates is nothing short of incredible—with both indicating that failure to consider timing of fertility, in addition to quantity of offspring, constitutes a significant source of attenuating bias in "classic" dysgenics studies, which focus only on number of children as a function of IQ (via simplistic applications of the breeder's equation).

Congruent with findings of genetic selection against intelligence, phenotypic *g* appears to have declined for over a century in at least some parts of the West at a rate of 1.21 points per

A further concern about industrialization and related developments is that these have probably relaxed selection against deleterious mutations (to be discussed in greater detail in the following chapter; Lynch, 2016; Rühli & Henneberg, 2013; Tooby, 2016; Woodley of Menie, Sarraf, & Fernandes, 2018). Such mutations accumulate in populations primarily due to errors of DNA replication in the absence of mortality and/or reproductive failure that prevent their intergenerational persistence (Lynch, 2016; Rühli & Henneberg, 2013; Tooby, 2016). Increasing burdens of deleterious mutations have potentially contributed to rising rates of mental illness (Sarraf & Woodley of Menie, 2017; Woodley of Menie, Sarraf, Pestow, & Fernandes, 2017; see Chap. 7), diabetes (Rühli, Schaik, & Henneberg, 2016), obesity (Budnik & Henneberg, 2017), cancer (You

decade (this estimate includes more factors than differences in the quantity and timing of fertility by cognitive ability level; Woodley of Menie, Figueredo, et al., 2017; Woodley of Menie, Sarraf, Peñaherrera-Aguirre, Fernandes, & Becker, 2018). On a standard IQ scale, the median IQ is 100 and the standard deviation is 15, so such a rate of decline in *g* is severe. More recently, Abdellaoui et al. (2019) presented molecular-genetic evidence consistent with a large decline in the genetic basis of *g* in the UK white population over several decades. They note that the population-level decline in their index of variants associated with "educational attainment" (the EA3 polygenic score) is "consistent with [enrichment for the indexed variants] being negatively associated with fertility rate" (p. 4). Abdellaoui et al.'s (2019) data indicate that EA3 has been declining at -0.02 Haldanes per decade in the UK. EA3 correlates with *g* at 0.252 (Woodley of Menie, Rindermann, Pallesen, & Sarraf, 2019). One Haldane of EA3 therefore equates to 4.71 *g* points (on a standard IQ scale). Multiplying the decadal decline in EA3 from Abdellaoui et al., scaled in terms of *g* equivalents, by the quotient of the "missing heritability" and the variance in *g* accounted for by EA3 yields a *g*-decline estimate. Assuming an additive heritability value from GCTA-GREML studies (40%; Plomin & Deary, 2015), the decline is 0.628 points per decade. Assuming an additive heritability value from classic behavior-genetic studies (~80%; Bouchard, Jr., 2004), the decline is 1.256 points per decade.

Arguments to the effect that certain findings contradict indications of dysgenic fertility require that one ignore the picture that all relevant data collectively offer. For example, Kolk and Barclay (2019) find evidence of a *positive* association between intelligence and fertility in Swedish males. But the fact that such correlations are found in males in some populations is not surprising (Woodley & Meisenberg, 2013); what is critical is that selection is typically dysgenic overall when female fertility is factored in, and also that even in male populations potentially exhibiting a positive association between intelligence and fertility, performance on IQ subtests most strongly associated with *g* tends to be very weakly associated with fertility, with perhaps some possibility of a weak dysgenic effect (Woodley & Meisenberg, 2013). In any case, a systematic review of the relationship between cognitive ability and fertility, including data from the United States (primarily), Europe, Dominica, and Asia, found that the association between these variables is negative in males and females, and that the magnitude of this negative association has increased over time (Reeve, Heeney, & Woodley of Menie, 2018).

& Henneberg, 2017), and subclinical medical abnormalities (Rühli & Henneberg, 2013) in many populations.[6]

Further, and perhaps related to mutation accumulation (see Tooby, 2016; Woodley of Menie, Sarraf, et al., 2017), fertility rates are more or less ubiquitously at sub-replacement levels among all human populations with highly developed cognitive capital and are continuing to fall in some of them (Inglehart, 2018); enduring high fertility rates in parts of the developing world are not easily explained through rational choice models (Meisenberg, 2009), such that it is difficult to tell if or when they will reduce significantly. These trends, coupled with the aforementioned and seemingly global tendency toward within-group selection against intelligence (Al-Shahomee, Lynn, & Abdalla, 2013; Reeve et al., 2018; Wang, Fuerst, & Ren, 2016), augur poorly for the future of global human cognitive ability.

The Flynn effect, the average three-point-per-decade increase in IQ test performance among modernized and modernizing populations, may be invoked to quell anxieties about these trends, but it is either stagnating or *reversing* in the developed world (Bratsberg & Rogeberg, 2018; Flynn & Shayer, 2018; Woodley of Menie, Peñaherrera-Aguirre, Fernandes, & Figueredo, 2018). The potential for the developing world to realize Flynn effect gains as great as those observed in the modernized world is far from certain (Woodley & Meisenberg, 2012). Moreover, the Flynn effect, contrary to earlier theories, has not masked declines in intelligence, but has in fact *co-occurred* with declines in *g* at the phenotypic level (Wongupparaj, Wongupparaj, Kumari, & Morris, 2017; Woodley, 2012a; Woodley of Menie, Figueredo, et al., 2017). These co-occurring trends are possible because the Flynn effect is independent of *g*, occurring on specialized abilities that exhibit high environmentality (Woodley of Menie, Figueredo, et al., 2017). Further, this negative trend in *g* strongly correlates with real-world indicators of precipitously falling global intellectual performance since the mid-nineteenth century, such as declines in the per capita rates of major or "macro" innovations (Huebner, 2005; Murray, 2003) and also the eminent intellectuals responsible for conceiving them (Murray, 2003;

[6] John Tooby could well be the most prominent living academic who has publicly acknowledged the problem of mutation accumulation in modernized populations. Curiously, Pinker (2018) references, and cites, Tooby's contributions to *Edge* from 2015 and 2017, but not 2016 (p. 520). This is most peculiar, since in the uncited entry Tooby notes that mutation accumulation is an unfortunate consequence of one of the "greatest…humane triumphs of the Enlightenment," that is, reduced mortality rates (2016). One would think a researcher defending Pinker's thesis would endeavor to tackle such striking challenges to it head on.

see also Simonton, 2013) (Woodley, 2012b; Woodley & Figueredo, 2013; Woodley of Menie, Figueredo, et al., 2017). This is in contrast to Pinker's (2018) assertion that "no one can second-guess the warp speed of advances in science and technology of the past half-century" (p. 244). These negative developments are especially important because cognitive capital, not ideas, institutions, or geography, is the prime mover of civilizational development, the main substratum of the "burgher-civic world" that is near synonymous with behaviorally and societally modernized life (Rindermann, 2018; see also Rindermann & Thompson, 2011). In light of all of this, the prognosis for a civilization losing both *g* and specialized abilities, as reflected in the Flynn effect (Woodley of Menie, Figueredo, et al., 2017), is extremely poor. Pinker recognizes that the Flynn effect is likely an important driver of wealth growth and "non-economic measures of well-being" (pp. 244–245); therefore, the reversal of the Flynn effect does not bode well for his progress narrative.

Economic stagnation is one sign that modernization, or "progress," is already being undone. Nonetheless, Pinker (2018) argues that economic stagnation is not a threat to future progress, because it is allegedly illusory to at least some extent. But he makes this claim appear convincing mostly by framing his discussion in such a way as to suggest that Joel Mokyr, an optimist about contemporary economic productivity, has had the final word on the matter (Pinker, 2018, pp. 332–333). In fact, Mokyr and Robert Gordon, another prominent analyst of economic stagnation, remain in sharp disagreement on this issue, with Gordon maintaining that the economic slowdown is real (Stoner, 2016). Indeed, Gordon has addressed the arguments of Mokyr's on which Pinker relies (Goldman Sachs, 2015), but Pinker nowhere discusses this. We may shore up the case for the pessimistic view of economic stagnation with the (already indicated) observation that declines in economic performance at the national level are what one would expect from the anti-Flynn effect (see Woodley of Menie, Peñaherrera-Aguirre, et al., 2018). The occurrence of apparent economic stagnation alongside the plateauing and reversal of the Flynn effect is therefore unsurprising—indeed, Pinker's own extolling of the benefits of the Flynn effect seems to commit him to the expectation that the latter should lead to the former.

Exacerbating these dangers is the fact that *g* underlies novel problem-solving ability, so the capacity of populations to stop reductions in intelligence, and thus the probable reversal of modernization (following Rindermann's, 2018 thesis concerning the cognitive basis of modernization)

is degrading as the problem itself advances. One of the great tragedies of modernity may be that it has brought into existence billions of people who will very likely perish once highly developed technological, economic, and political infrastructures can no longer be sustained (Weiss, 2007; Woodley of Menie, Figueredo, et al., 2017).

The foregoing detour into biohistorical research is a means of illustrating the convenient oversights on which *EN* depends. *Nowhere* in Pinker's book is the reversal of the Flynn effect, or anti-Flynn effect, mentioned, *even though* it is discussed in a paper (Pietschnig & Voracek, 2015) that is *repeatedly* cited in *EN* (see chapter 16 of Pinker, 2018). Pinker only indicates that Flynn effects have *stagnated* in some places, not that they are being *lost*. Nowhere does Pinker report Murray's striking finding in *Human Accomplishment* (2003) of falling rates of major innovation and genius, *even though* he cites that book (for an unrelated purpose; 2018, p. 485, n. 1). Nowhere in *EN* is evidence of falling *g* presented or discussed, *even though* it has appeared prominently in the psychometric literature since 2012 (Woodley, 2012b) and despite the fact that Pinker *cites* a paper offering such evidence—the paper being by Woodley, te Nijenhuis, and Murphy (2013) (citation on p. 473, n. 40).[7]

[7] Pinker wrongly construes the paper of Woodley et al. (2013) as arguing against the idea that the Flynn effect has led to an increase in "real-world genius" (Pinker, 2018, p. 473, n. 40). In fact, the paper found that simple reaction times have slowed for over a century among a sample of Western nations, potentially indicating a *loss* of *g* of roughly one standard deviation (to repeat, on a typical IQ scale, a standard deviation is 15 points), not merely the absence of a gain. Furthermore, *g* seems to be the component of cognitive ability most closely associated with genius, and the Flynn effect does not involve gains in *g* (Woodley of Menie, Figueredo et al., 2017); increased rates of guessing on IQ tests give the Flynn effect a small spurious *g* loading, because people are more likely to guess on more *g*-loaded items, as they are more difficult (Woodley, te Nijenhuis, Must, & Must, 2014). When aspects of the Flynn effect and the decline in *g* are tracked across time with ratio-scale measures, they are of approximately equal magnitudes, and their divergent trajectories suggest that the Flynn effect acts on factors of cognitive ability independent of *g* (see Wongupparaj et al., 2017; Woodley of Menie & Fernandes, 2015).

Pinker (2018) also claims that Pietschnig and Voracek (2015) maintain that the Flynn effect has boosted "real-world genius" (p. 473, n. 40). This is incorrect, and indeed Pietschnig and Voracek (2015) simply do not cover the topic of genius. Additionally, Pinker does not seem to be aware that about one-third of the three-point-per-decade increase that constitutes the Flynn effect is probably due to the Brand effect, named after psychometrician Chris Brand, which is the tendency, mentioned above, of IQ test-takers to guess more on multiple-choice questions over time, and therefore answer questions correctly more often simply by chance (Woodley et al., 2014).

Nowhere is the threat to global human capital posed by *sub-replacement* fertility in the developed world examined. Rather, readers are told only that "[f]ertility rates have fallen most noticeably in developed regions like Europe and Japan" (p. 125), and that "world population" is "projected to level off and then decline" at some point after 2070 (p. 125), to allay concerns about overpopulation.

Nowhere is informed pessimism about the future of the Flynn effect in developing regions analyzed; instead, readers are offered nebulous speculations about the "brain power" of "a million people with a genius-level IQ" in "the world's bottom billion" being "put to full use" (Pinker, 2018, p. 332).[8]

Relatedly, concerns about the potential harms of immigration are given virtually no attention, *even though* the latter are richly documented in the relevant literature. Rindermann's (2018) book—which also deals with the origins of modernized life and the challenges it faces—was published in the same month as *EN*, and the former cites enough studies on the harmful effects of immigration to necessitate a section largely devoted to discus-

[8] The problem with this argument is that it is unclear what "putting to full use" means. Read in context, the suggestion seems to be that increased wealth and access to technology will augment people's innovativeness. But consider what Rindermann (2018) says on this matter: "[T]he assumption that wealth is a precondition for exceptional accomplishment is wrong. Mozart and Einstein were raised in above average conditions of their time, but Mozart frequently suffered from poverty, and of course, above average conditions of their time equate to living conditions seen as unacceptable today.… [I]t is reported that Albert Einstein's height was only 1.75 m and Mozart's 1.63 m. The male averages today in Germany and Austria are 1.79 m—height is a good indicator of long-term wealth" (as well as overall so-called quality of life) (p. 500).

Further to Rindermann's point, the world is much wealthier and more technologically advanced today than it was in the mid-nineteenth century, and yet, as discussed above, per capita rates of major innovation were much higher then than now, as were rates of genius or intellectually eminent people. Acknowledging the decline of neither major innovation nor genius, but instead considering why rates of genius did not clearly *rise* in the twentieth century relative to earlier times, Pinker (2018) offers the familiar "low-hanging fruit" argument, which he *could* deploy against the observations of decline already noted: "[G]eniuses of the past had the advantage of exploring virgin territory" (p. 244). This argument was addressed half a decade before the publication of *EN*, with the observation that what does and does not constitute "low-hanging fruit" is at least in part a function of levels of general intelligence (see Woodley & Figueredo, 2013). Moreover, one would have to believe that it is merely *coincidental* that declines in *g* and rates of major innovation and genius are so strongly correlated in time (see again Woodley & Figueredo, 2013; Woodley of Menie, Figueredo, et al., 2017) to take the "low-hanging fruit" argument to contain the sole explanation of these apparent losses.

sion of them (pp. 396–399). Reading *EN*, however, the uninformed would come away with the impression that, apart from the tendency of natives to have reduced support for social spending "when beneficiaries are disproportionately immigrants or ethnic minorities" (p. 110), there are no grounds for doubts about the goodness of immigration that do not reduce to morally objectionable (and, as at least implicitly suggested, irrational) attitudes (pp. 339–340, 449–450).[9] It is critical to note here that substantial harm associated with immigration or its long-term effects, e.g. reduced academic performance of young students, afflicts *immigrants* as well as natives, and thus that immigration could be opposed in the interest of the *well-being of those immigrants* (for information on the effects of immigration and diversity on immigrants and natives, see Arbatali, Ashraf, Galor, & Klemp, 2019; Brunello & De Paola, 2017; Brunello, Lodigiani, & Rocco, 2017; Brunello & Rocco, 2013).[10]

Finally, nowhere are evolutionary theories of the rise of the Western world through the Industrial Revolution considered, *even though* Pinker cites a work (Clark, 2007) in which one of the best of such theories is offered. Clark's book is cited once (Pinker, 2018, p. 239), and as with Murray (2003), for an unrelated reason. Strongly contrary ideas, it would seem, are allowed no meaningful place in *EN*'s pages. But this selectivity is especially problematic given that Pinker is a kind of cynosure in, and thus key representative of, the field of evolutionary psychology. One would struggle to find another work from a practitioner of evolutionary behavioral science that is so poorly informed by research in his own academic domain.

Indeed, *EN* reads much more like the work of a sociologist or cultural/social anthropologist than that of a biologically informed scientist. We came away with the distinct impression that Pinker wanted to cast the emergence of modernity in the most pleasant and politically inoffensive way possible. The theory is roughly this: Prior to the eighteenth century,

[9] Oddly enough, two papers from Heiner Rindermann are cited in *EN*, and he is also mentioned as an influence on the book (Pinker, 2018, p. xix). But the cited papers nicely fit Pinker's progressive cosmopolitan narrative. Relevant work of Rindermann's that does not fit so easily (e.g. Becker & Rindermann, 2016; Woodley of Menie, Piffer, Peñaherrera-Aguirre, & Rindermann, 2016) is never considered.

[10] Silveira, Dufur, Jarvis, and Rowley (2019) claim to find evidence of immigration benefiting the academic performance of immigrants and natives. But they remove variance associated with "economic, social, and cultural status" (p. 11), which refers to factors that are confounded with immigrant status.

violent, miserable, and primitive-minded savages more or less exclusively peopled the Western world. Their violence, misery, and savagery are best explained in terms of their failure to be sufficiently *reasonable*, *scientific*, and *humanistic*. But mercifully, the appearance of Enlightenment philosophy in the 1700s equipped humankind with the ideas that were to liberate the West, and later (though not yet fully) "the rest," from the yokes of premodern existence: poverty, superstition, war, famine, and so on. This is a very unimpressive theory, especially from an ostensibly evolutionary thinker. Its major deficits are that it fails to persuasively explain *why* Enlightenment thought came about, *why* it led to endogenous industrialization in the West (but nowhere else), and *why* a cultural factor (i.e. the Enlightenment), and not something else, is in fact the fundament of modernization.

The closest Pinker comes to addressing any of these basic problems for his theory is where he perfunctorily, and uncritically (no dissenting scholarship is cited), appeals to the work of Jared Diamond and Thomas Sowell: "Vibrant cultures sit in vast catchment areas in which people and innovations flow from far and wide. This explains why Eurasia, rather than Australia, Africa, or the Americas, was the first continent to give birth to expansive civilizations (as documented by [Sowell and Diamond]…)" (Pinker, 2018, p. 450). The obvious problem with this explanation is that it implies that diffusion of innovations and movement of people are more or less sufficient to account for variation in socioeconomic development; but the analytic focus here should be on the production of innovations themselves (without which there would be no innovations to spread), in which there is massive inequality between global populations historically and contemporarily (see Murray, 2003; Rindermann, 2018). The idea that non-biological explanations of the variable socioeconomic development of populations fail to get at the ultimate causes of this phenomenon is not new, nor are arguments that such explanations are plagued with a variety of other fatal problems (see Christainsen, 2013; Cochran & Harpending, 2009; Cofnas, 2016; Figueredo, 2009; Hardin, 1997; Levin, 1997; Meisenberg, 2014; Rushton, 1999; Woodley & Figueredo, 2014; see also Chaps. 2 and 3 of this book where this issue is treated in more detail); therefore to present the arguments of Diamond and Sowell as if they are definitely on firm ground is just irresponsible. Of course, if Pinker were to take biology seriously, modernized life would not look so secure or easily spread around the world (Rindermann, 2018; Woodley & Bell, 2013), and its origins would seem far less romantic—think mass death and reproductive failure among the Western European peasantry (Clark, 2007;

Woodley of Menie, Figueredo, et al., 2017). *EN*'s narrative, in other words, would not survive the inclusion of such evidence.[11] Even setting aside biology, Pinker's appeal to Diamond and Sowell still does not hold, since the best relevant work has made clear that prehistoric geographical isolation positively predicts long-term economic development (e.g. Ashraf, Galor, & Özak, 2010).

And yet, we have not even scratched the surface of *EN*'s flaws, which go well beyond issues related to the history of philosophy, psychometrics, and recent human evolution. Pinker evidently wants his readers to believe that modernized life is far superior to its alternatives in every way that counts. And again, making this case involves repeated overstatement of evidence and omission of incongruous data. Take the following line, for example: "[The] awe-inspiring achievements [of science] put the lie to any moaning that we live in an age of decline, disenchantment, meaninglessness, shallowness, or the absurd" (Pinker, 2018, pp. 386–387). One suspects that Pinker has lost the plot in believing that the advance of science cannot coexist with, or even worsen, widespread existential nihilism. Had he been consistent with his own explicit commitment to empirically informed scholarship, he might have checked for data related to the matter of whether or not modernization—which is intimately connected with

[11] Perhaps Pinker (2018) does not bother to consider biologically informed theories of the ascendancy of the West because he has dealt with two of them elsewhere. In *BAN*, Pinker (2011) briefly considers and prematurely dismisses the books of both Cochran and Harpending (2009) and Clark (2007). In attacking the latter, and consistent with the pattern of tendentiousness found throughout *EN*, he cites criticisms of Clark's theory, but not Clark's (2008, 2009) cogent replies. Pinker should have perhaps noticed that the critique from Samuel Bowles, which he cites contra Clark (2007), rather comically denies the possibility of human evolution through a confused reliance on the concept of regression to the mean (Clark, 2008). In attacking the former, Pinker seems to assume that inferences about recent evolutionary changes of human behavior are unwarranted in the absence of molecular genetic data, a standard of evidence that would have us doubt a great deal of work in the evolutionary sciences. In any case, one could not at all reasonably have relied on that idea in 2018, since by then there *was* plenty of molecular genetic evidence of recent human behavioral (mostly cognitive) evolution, none of which Pinker cites (see Beauchamp, 2016; Kong et al., 2017; Woodley of Menie, Younuskunja, Balan, & Piffer, 2017). The paper by Woodley of Menie, Younuskunja, et al. (2017) is especially relevant insofar as it provides strong evidence of an increase in the frequency of genetic variants associated with cognitive ability in Holocene Eurasia, supporting Cochran and Harpending's (2009) hypothesis that rapid psychological evolution occurred in Eurasian human populations of that epoch. One might say that Pinker could not have had the opportunity to cite such recently published papers, but in fact *EN* includes citations to many items published in 2017.

scientific development—and subjective existential meaninglessness are associated. As we have previously noted, there are, in fact, data on this, based on a sample of 134 countries, and they do show that the populations of wealthier (more modernized) countries are more nihilistic than those of poorer ones (Oishi & Diener, 2014), which indicates the possibility that as nations have gone through modernization, they have lost subjective meaning in life. The higher religiosity of the populations of poorer nations seems to be a significant factor driving their greater perceived meaning in life[12]—but for Pinker (2018), religiosity is without unique value and also harmful: even its apparent benefits have nothing to do with religion as such (p. 489, n. 56).[13]

The study from Oishi and Diener (2014) also finds that meaning in life and higher religiosity at the national level predict higher fertility rates and lower suicide rates (pp. 423–424), suggesting that low suicidality is not part of the modernization syndrome; correspondingly, of course, richer

[12] There is a good deal of research on the association between religiosity and meaning in life at the individual-differences level of analysis. Flannelly (2017) reviews studies on UK and US populations, which indicate that religiosity (indexed with measures of belief and behavior) and perceived meaning in life are positively associated (pp. 226–227). But Speed, Coleman, and Langston (2018) find no evidence in a sample of about 1200 US individuals that irreligiosity positively associates with nihilism or that religiosity is negatively associated with nihilism. Chan, Michalak, and Ybarra (2019), in a total sample of 19,775 individuals, report evidence that religiosity enhances meaning in life to the greatest extent in individuals who are relatively socially disconnected—correspondingly, they observe weaker positive associations between religiosity and meaning in life among those high in social connectedness. Chan et al.'s (2019) research also supports prior findings of a positive relationship between religiosity and social connectedness (something even Pinker, 2018, concedes, while disputing that its basis has anything to do with religion as such), indicating one aspect of a broad nexus connecting religiosity and general health and well-being, which others have noted (and of which higher meaning in life is potentially another component; Flannelly, 2017).

We argue in Chap. 7 that the ultimate source of this nexus is substantially genetic. For now it is sufficient to note that these results generally indicate positive associations between perceived meaning in life and religious belief/behavior at the individual-differences level, although some discrepant evidence is also apparent.

[13] Again, it must be stressed that international differences in perceived meaning in life are quite marked. Froese (2016) reports that while only 6% of Americans claim to have no sense of purpose in life—likely because the United States is a highly religious country by the standards of the modernized West—over a *quarter* (27%) of very secularized Netherlanders have no such sense of purpose, and Belgium, Austria, France, and the United Kingdom are not far behind (p. 63).

nations are more suicidal (Dückers, Reifels, De Beurs, & Brewin, 2019[14]), despite being higher in life satisfaction. In the context of noting that wealthier nations are happier (though never pointing out that, *globally*, they are more suicidal), Pinker mentions the "paradox" that happier *Western* nations and US states are more suicidal than their less happy counterparts (p. 278). The findings of Oishi and Diener (2014) suggest that there may be nothing paradoxical about this, although they perhaps raise some concerns about the validity of subjective well-being (SWB) scales. Indeed the research of Minkov (2011), discussed in Chap. 4, is congruent with the results of Oishi and Diener (2014), and Dückers et al. (2019), insofar as it ties low suicide rates to a broader premodern syndrome that includes probable correlates of meaning in life, such as stable and well-defined personal identities and strong religious commitments, despite the fact that there is much evidence, which Minkov (2011) also ably presents, that modernization associates with high population-level SWB.

There are other ways in which Pinker (2018) potentially misleads on suicide. He presents longitudinal data on the suicide rates of the United States, Switzerland, and England, asserting that "in all three countries for which *we* have historical data, suicide was more common in the past than it is today" (2018, p. 279; emphasis added). In point of fact, suicide rate data covering over a century are available for other nations—the highest quality historical data are from Finland (Stack, 1993). Pinker's (2018) longitudinal data sets on suicide are not optimal for analyzing the effects of industrial modernity on suicide because none of them has data for the *pre-industrial* period of the country. This is not true of Stack's (1993) analysis of Finland, which reveals an age-standardized suicide rate per 100,000 near 0 in 1800, rising to 25 per 100,000 around 1985. In 2015, the age-standardized suicide rate per 100,000 in Finland was 14.2 (WHO, 2017), well above the 1800 level. Additionally, Finland has a long cultural history of permissiveness toward suicide (Stack, 1993, p. 146), which reduces the likelihood of an undercounting of suicides, a problem that has bedeviled other nations at various times, potentially and recently including the United States (Rockett et al., 2010). Rossow (1993) offers data on the Norwegian male and female suicide rate from 1911 to 1990 (although

[14] Dückers et al. (2019) find that, paradoxically, factors thought to increase vulnerability to psychiatric problems are *negatively* associated with suicide rates at the population level. They note the unsurprising fact that those populations considered "less vulnerable" in this sense are "more affluent," so correspondingly those more vulnerable are less affluent (p. 5).

note that in 1911 Norway was industrializing). The male suicide rate in 1911 was around 9 per 100,000, and the female suicide rate around 2 per 100,000. The male and female suicide rates reached their peak in the 1985–1990 range in Rossow's data, with the male rate near 25 and the female rate around 9. The 2015 male suicide rate in Norway was 12.9, and the female rate 5.7 (WHO, 2017). It is true that, as Pinker (2018) notes, suicide rates have generally declined in recent decades in Europe (p. 280). But this may be due, at least in part, to the fact that changes in the categorization of deaths have likely led to underestimations of the number of suicides in at least some areas[15] (Steven Stack, personal communication, July 25, 2017).

On the topic of mental health, which naturally connects with discussions concerning suicide rates, Pinker is quite confident that it has not been worsening over time. One of the more striking shortcomings in his discussion of this topic concerns his treatment of a paper from Twenge et al. (2010): "Twenge found that from 1938 to 2007, college students scored increasingly higher on the Depression scale of the MMPI…. That doesn't necessarily mean that more of the students suffered from major depression…and the increase may have been inflated by the broader range of people who went to college over those decades" (Pinker, 2018, p. 282).

[15] To the extent that declines in suicide are substantive, this potentially relates to the weakening of group selection in Western populations (which is not at all to suggest that the weakening of group selection is the only or even the primary cause of the suicide declines). Hamilton (2001) maintains that individuals may withdraw from life when they are sufficiently burdened with deleterious mutations, allowing resources to be devoted to members of their group with better fitness prospects. Corrigan (1998) argues similarly that depression may have evolved because it "has advantages for the species in allowing those 'least fit' to fail to survive" (p. 9). The prevalence of suicide may rise substantially following industrialization because this process relaxes negative selection against deleterious mutations, leading greater numbers of individuals to become sufficiently burdened with these, such that suicidal behavior is triggered, thereby enabling more resources to be devoted to members of the group with higher genetic quality, or who for other reasons have higher prospective fitness. This particular suicidal response depends on group-selected adaptations, however, because, so the hypothesis goes, it evolved due to its group-level fitness benefits. Since modernization also massively attenuates group-level selective pressure, these adaptations will predictably become less frequently distributed in modernizing and modernized populations, which could ultimately depress suicide rates despite ongoing mutation accumulation (but this would not be a *necessary* consequence in light of the [very likely] fact that a variety of different factors influence suicidal behavior). Nevertheless, inclusive fitness dynamics may maintain more limited dispositions to "altruistic suicide" in populations (refer to Chap. 2 for information about the concept of inclusive fitness).

The remarkable thing about this claim is that Twenge et al.'s (2010) study meta-analyzes data on college *and* high school students, and she and her colleagues *explicitly* use the high school data to preempt "inflat[ion]" arguments of the sort that Pinker employs: "High school students increased in self-reports of psychopathology between 1951 and 2002…. This suggests that decreases in mental health are not due to changes in college populations, and that the decline in mental health begins at least by mid-adolescence" (p. 152). Moreover, Twenge et al. (2010) found increases on more than the depression scale: in high school students, large increases were found on the "Paranoia, Hysteria, Hypochondriasis, *and* Depression scales" (p. 152; emphasis added); in college students, large increases were found on the "F scale (a measure of unusual responses), Psychopathic Deviation, Paranoia, Schizophrenia, and Hypomania… Hypochondriasis, Depression, Psychasthenia, and…Hysteria" (p. 149). Further misusing this researcher's work, Pinker (2018) then cites Twenge (2015) in support of the claim that "other studies (some by Twenge herself) have found no change or even a decline in depression" (p. 282). He summarizes Twenge (2015) in the following way: "Between the 1980s and the 2010s, teenagers had fewer suicidal thoughts; college students and adults were less likely to report that they were depressed" (Pinker, 2018, p. 476, n. 74). Somehow, the key takeaway of Twenge's (2015) study, made clear from the first sentence of her abstract, was missed: "Across four surveys (N = 6.9 million), *Americans reported substantially higher levels of depressive symptoms*, particularly somatic symptoms, in the 2000s–2010s compared to the 1980s–1990s" (p. 437; emphasis added). More current work from Twenge presents substantial evidence of worsening mental health among young Americans, especially females (2017; see also Duffy, Twenge, & Joiner, 2019; Twenge, Cooper, Joiner, Duffy, & Binau, 2019). Pinker (2018) does not mention these data (though of course he could not have discussed the 2019 findings).

In the case of another study, by Baxter et al. (2014), its findings are trivialized in such a way as to favor Pinker's thesis: "Though in some surveys people have reported more symptoms of distress, anxiety that crosses the line into pathology is not at epidemic levels, and has shown no global increase since 1990" (Pinker, 2018, p. 283). As it happens, Baxter et al. (2014) found that "*8 of the 11* [General Health Questionnaire] studies [reviewed] found a *significant* increase in psychological distress over time" (p. 1; emphasis added), which has a rather different meaning than that conveyed by Pinker. More generally, Pinker makes no mention of various

studies that have found increasing rates of major depression, not just distress (see, e.g., Andersen et al., 2011; Compton, Conway, Stinson, & Grant, 2006; Goldney, Eckert, Hawthorne, & Taylor, 2010; Jeuring et al., 2018; Mojtabai, Olfson, & Han, 2016; Weinberger et al., 2018; Wiberg, Waern, Billstedt, Ostling, & Skoog, 2013[16]).[17] Results from the highly rigorous Global Burden of Disease Study, covering the years 1990 to 2017, show substantial increases in the prevalence of a number of mental illnesses over nearly 30 years in highly developed nations—indeed, schizophrenia prevalence has a near perfect positive correlation with time, as does depression prevalence.[18] These results strongly indicate genuine worsening in mental health over time in the developed world, and are consistent with Twenge et al.'s (2010) long-run study of psychopathological symptomology. (The possibility the increase in psychopathology is associated with losses of meaning in life [proxied by a measure of secularization] is statistically tested in Chap. 7. It is revealing that experiences of both depression [Ratcliffe, 2014] and schizophrenia [Sass, 2017] often involve feelings of existential meaninglessness.[19])

In addition, Pinker makes some very odd and contradictory use of evidence to argue that depression has not risen over time. Consider, first,

[16] Wiberg et al. (2013) found evidence for increases in the prevalence of "minor" depression in Swedish septuargenarians, but no evidence of increases in major depression.

[17] A study published too late for Pinker (2018) to have reasonably cited it is that of Lim et al. (2018). Their findings are worth considering in that they meta-analyzed the results of 90 studies conducted in 30 countries across a 20-year period (1994–2014), including a total of over one million individuals. Their study is thus unusually comprehensive among research that examines time trends in mental health. Consistent with the hypothesis that the prevalence of depression has been increasing, they note that "the aggregate prevalence was 15.4% (95% CI: 12.9%–18.3%) for studies published from 2004 to 2014 and 9.8% (95% CI: 6.7%–14.1%) for studies published from 1994 to 2003. The difference was significant ($P < 0.001$)" (Lim et al., 2018, p. 5). Nonetheless, it should be understood that factors other than an actual increase in the prevalence of depression could be driving this trend. (Equally, however, there could be factors concealing the extent of rising depression prevalence.) Some of these possibilities, such as the idea that apparent rises in the lifetime prevalence of depression are due to recall bias, have been critiqued (Warshaw, Klerman, & Lavori, 1991; but see Costello, Erkanli, & Anglod, 2006; Patten, 2003). Others, such as the claim that people have become more "conscious" of mental health, and therefore report psychopathologies more frequently without any underlying changes in illness rates, are nebulous and difficult to evaluate.

[18] Data available from http://ghdx.healthdata.org/gbd-results-tool.

[19] A more minor point on mental health is that Pinker (2018) perfunctorily dismisses the possibility that social media use may lower psychological well-being, an issue that in fact remains controversial (see Twenge et al., 2017, and germane references therein).

that he complains about studies finding an increase in rates of depression that are potentially contaminated with recall bias: "the longer ago an episode took place, the less likely it is that a person will recall it" (Pinker, 2018, p. 281). But in adducing support for the claim that depression has not become more common, he relies on a study that *is itself* subject to recall bias: "The recall period is of considerable length, probably introducing recall bias"; "[r]ecall bias probably affects our study substantially because of the length of follow-up, even if multiple sources of information…partially compensate this methodological problem" (Mattisson et al., 2005, p. 151, p. 157; this paper is cited in Pinker, 2018, p. 476, n. 72). Further, Pinker misuses the Mattisson et al. (2005) paper, as seen in his claim that it evinces that there has been "[n]o rise in depression over a century" (Pinker, 2018, p. 476, n. 72). Mattisson et al. (2005) in fact compare depression incidence between 1947–1972 and 1972–1997—incidence being the rate of new cases of a disorder in a given period, whereas prevalence is the rate of a disorder in a population. What is more, they note that "[i]n a classic paper based upon the 1947 cohort an *increase* in the incidence of depressive disorders with mild and moderate degree of impairment was reported for both sexes, when the 10-year period, 1947–1957, was compared with the 15-year period, 1957–1972 [though the reverse was found for depression with severe impairment]" (Mattisson et al., 2005, p. 152; emphasis added). Given this, what they in fact take their results to show is that "the trend of increasing rates of depression in the Lundby cohort has terminated" (Mattisson et al., 2005, p. 151). Consider also the following: "[O]ur results must be cautiously interpreted and the incidence rates must be regarded as *low* estimates. To summarize, the earlier field investigations had pointed out a rise in the incidence of depression after World War II.… This trend now seems to have terminated in the Lundby Study" (Mattisson et al., 2005, p. 159; emphasis added). A second study cited to support the view that there has been no increase in depression over the course of a century is that by Murphy, Laird, Monson, Sobol, and Leighton (2000). The very title of the paper indicates that it examines the prevalence of depression over 40 years, not a century. Its results apply to one region in Canada.

Finally on the topic of mental health, a great deal of work finding undesirable psychological changes in Western populations is given no attention in *EN*. A small sampling of what has been overlooked: Twenge (2013) reviews a substantial amount of evidence indicating a temporal trend of ris-

ing narcissism.[20] Konrath, O'Brien, and Hsing (2011) offer a meta-analysis revealing that aspects of dispositional empathy have fallen in American college students (the study covers the years 1979–2009). Zarins and Konrath (2017) observe that "[r]esearch suggests that compassion-related variables have indeed been declining over time [in the United States]" (p. 331) and consider contrary arguments and evidence. The research of Konrath and her colleagues is consistent with evidence of declining altruistic disposition over the past 150 years or so in at least some Western populations reported by Woodley of Menie, Figueredo, et al. (2017) (see also Chap. 2, Fig. 1). Lester (2013) finds a "small but significant trend" of increasing hopelessness, as measured by the Beck Hopelessness Scale, in American undergraduate students from 1978–2010 (p. 1204). (All of this aligns with evidence of decreasing within-group altruism that we have already discussed.)

Relevant to issues of mental health, Pinker (2018) also attends to the question of increasing loneliness. The analysis is, again, tendentious. Strangely, he is happy to present data on college students in this context (Pinker, 2018, p. 276), but argues against their use in the case of Twenge et al. (2010) discussed above. Nevertheless, data showing declines in loneliness in 8th, 10th, and 12th graders are also included. But Twenge's (2017, p. 97) finding of recent increases in loneliness among children of the same grades is not discussed (see also Twenge, Spitzburg, & Campbell, 2019). Work that has found possible decreases in the average size of Americans' "discussion networks"—or the group of persons with whom one can "[discuss] important matters" (Brashears, 2011, p. 332)—which

[20] Wetzel et al. (2017) argue that positive trends in narcissism are merely an artifact of failure to control for measurement variance, that is an instrument's measuring different things across different measurement occasions. This interpretation is probably too strong, however. The mere fact that some trend can be eliminated through controls for measurement variance does not indicate that the trend has no substance. The Flynn effect, for example, while largely or perhaps entirely eliminable with such controls (Woodley of Menie, Figueredo et al., 2017), is nevertheless substantive, because even though the mental factors that individuals bring to bear on IQ tests have shifted (leading to measurement variance), increases in aspects of intelligence nonetheless seem to have occurred (Rindermann & Becker, 2018; Woodley of Menie, Figueredo, et al., 2017). (Twenge and Campbell have noted to one of the current authors that a response to Wetzel et al., 2017 is forthcoming [personal communication, August 9, 2018].)

Note that Pinker cannot consistently deny that the "narcissism epidemic" is substantive because the trend in narcissism may not be robust to controls for measurement variance and also accept that the Flynn effect is substantive, as he gladly does, since it *also* is not robust to controls for measurement variance.

accounts for the criticisms of earlier such work by sociologist Claude Fischer, also goes uncited (see Brashears, 2011; Brashears & Brashears, 2015; for discussion of evidence of increasing loneliness by one noted expert on the topic, see Entis, 2016; Dykstra, 2009, presents evidence from European nations that individualism, which is positively associated with modernization, is correlated with lower societal rates of loneliness in older people, and also reports slight declines in the prevalence of loneliness over time; but Swader, 2018, in an analysis also concerning European societies, while finding evidence that societal individualism reduces loneliness, notes that the mechanism through which this occurs is unclear—a disturbing possibility for which there is some evidence is that individualism enhances "tolerance for being alone" [p. 1331], which one could take to indicate normalization of social atomization, but the author also suggests that individualist societies may have greater "infrastructure … catering to the lonely" [p. 1331] than collectivist ones).[21]

Pinker (2018) further observes that people are "less likely to have a large number of friends but also less likely to *want* a large number of friends" (p. 277; emphasis in original). In the same chapter where the foregoing statement is found, he asserts that the median number of friends has not changed (p. 275); even though these statements are not necessarily contradictory, it is odd indeed to offer them both and not explain how they are compatible. In any event, it seems to have escaped his notice that decreasing apparent desire for many friends may be a concern in itself—since extraversion has increased over time (Jokela, Pekkarinen, Sarvimäki, Terviö, & Uusitalo, 2017), professed desires for fewer friends are dubious, and are perhaps a rationalization for involuntary low social contact (see Twenge, Spitzburg, & Campbell, 2019 for evidence of decreasing social contact among certain segments of the US population). Another set of findings relevant for the discussion of loneliness, but that Pinker (2018) largely ignores and at best seriously trivializes, concerns the rising number of persons who have never married or had children at advanced ages in the West in the past few decades (Miettinen, Rotkirch, Szalma, Donno, & Tanturri, 2015; Sobotka, 2017).[22]

[21] Pinker (2018) is apparently drawing on Claude Fischer in claiming that people have "the same median number of friends" (p. 275), and also refers to Fischer's critical discussions of earlier findings of shrinking social networks, but, again, does not contend with the Brashears work above. Fischer (2011), whom Pinker cites, also does not reference Brashears (2011).

[22] Although these trends are likely bad for the emotional well-being of Western people, one could ask whether they are offsetting the problem of mutation accumulation mentioned

Discussions concerning the suicide rates, mental health, and social well-being of populations may raise questions about their happiness. Indeed, in the same chapter of *EN* that analyzes suicide rates and mental illness, worries about unhappiness in modernized societies are also handled. Pinker maintains that these are unfounded. He argues that wealthier countries are happier and that increasing wealth over time boosts happiness (2018, p. 270).

Before examining Pinker's claims in detail, certain preliminaries must first be covered, which are not considered in *EN*. There is little doubt that SWB is generally higher in more compared to less modernized countries[23]—note that modernization and national wealth are tightly positively correlated. But this observation must be tempered with certain considerations. First, while it is clear that happiness or, more broadly, SWB scales are valid (Minkov, 2011, pp. 79–80), concerns about *how* valid they are remain. A study from Ponocny, Weismayer, Stross, and Dressler (2016) found that the "usual 10-point-scale self-ratings of life satisfaction and happiness" likely significantly overestimate individuals' SWB, at least in an Austrian population from which data were gathered (p. 2635). One possible explanation of these results is the action of "self-serving biases" in "rating *one's own life*" (p. 2649; emphasis in original). If members of individualistic cultures—individualism and modernization being strongly related—are more prone to self-serving biases, as has been suggested (Eckersley, 2009), then at least some of the SWB advantage that they have over members of less individualistic cultures may be illusory.

Second, there are notable exceptions to the positive association between modernization and SWB. Tov and Diener (2007), reporting data gathered with SWB scales the validity of which Pinker (2018) strenuously defends,

earlier by increasing the opportunity for selection against such mutations. It is difficult to say. Certain features of contemporary life, such as access to contraception and cosmetics, appear to attenuate the relationship between reproductive success and proxies for mutation load (see Lynch, 2016; Pflüger, Oberzaucher, Katina, Holzleitner, & Grammer, 2012); g is another proxy for mutation load (specifically rare variants), and is inversely correlated with reproductive success in many, possibly all, modernized populations (see Woodley of Menie, Figueredo, et al., 2017). Moreover, in the very long run, population decline will likely increase the fixation rate of deleterious mutations. These issues are discussed in greater detail in the next chapter (Chap. 6).

[23] Bond and Lang (2019) raise problems for a number of findings in the SWB literature, including that of higher happiness in more compared to less wealthy nations and the Easterlin paradox (about which more in the main text), on the basis that they are highly dependent on statistical assumptions that do not necessarily hold.

find that rather premodern societies, specifically the Pennsylvania Amish and Inughuit, have the same average level of life satisfaction as "Forbes richest Americans" (Tov & Diener, 2007, p. 694). Textual analysis suggests that SWB may have actually fallen over the long run in the United States from 1800 to contemporary times[24] (Varnum & Hampton, 2018). The African Maasai (also a non-modernized group), in addition to the Pennsylvania Amish and Inughuit, have average levels of life satisfaction exceeding the highly modernized Swedes, although the Illinois Amish trail these groups, with average life satisfaction equal to that of an international sample of college students (Diener & Seligman, 2004, p. 10). There is also some evidence that members of more premodern societies have lower rates of mental illness[25] (see Gove & Tudor, 1973; Montgomery, 2018; Widerquist & McCall, 2017).

In making the case that modernization improves SWB, Pinker addresses the Easterlin paradox, which he describes in the following way: "[t]hough in comparisons *within* a country richer people are happier, in comparisons *across* countries the richer ones appeared to be no happier than poorer ones. And in comparisons *over time*, people did not appear to get happier as their countries got richer" (Pinker, 2018, p. 263). It should be noted that in the recent literature, the Easterlin paradox is almost always treated as concerning only the purported lack of association between income and happiness over the *long run* within countries (which is paradoxical because of the tendency for richer people to be happier than poorer people within nations and for richer countries to have populations on average happier than poorer ones): "The striking thing about the [Easterlin] paradox is that over the long-term—usually a period of 10 [years] or more—happiness does not increase as a country's income rises" (Easterlin, McVey, Switek, Sawangfa, &, Zweig, 2010). Right from the start, then, Pinker makes things easy on himself by tackling a formulation of the paradox that has long been irrelevant.[26]

[24] Notably, Bond and Lang's (2019) concerns about research based on SWB scales do not apply to this textual approach to measuring the happiness of populations.

[25] As argued in following chapters, higher mental health in premodern or non-modernized populations may be a result of stronger negative selection against mutations that increase the risk of developing mental illnesses.

[26] Easterlin (2017) argues that the paradox "has always been the contradiction between the time series and cross section relationship of happiness and income" (p. 315), but this is disputable.

Pinker's (2018) argument against the Easterlin paradox is encapsulated here: "The trends over time close the books on the Easterlin paradox: we now know that richer people within a country are happier [added note: Easterlin never denied this], that richer countries are happier, and that people get happier as their countries get richer (which means that people get happier over time)" (pp. 270–271). Keeping in mind that only the third and last part of that sentence contradicts the Easterlin paradox as it is now understood, on what evidentiary basis does Pinker make this confident assertion? He cites three papers and two webpages—"Sacks, Stevenson, & Wolfers (2012); Stevenson & Wolfers [2008]; Stokes, 2007; Veenhoven, 2010; Roser, 2017" (p. 475, n. 24; a relevant item cited in a different note is "Inglehart[, Foa, Peterson, & Welzel] 2008" [p. 475, n. 20]). An uninformed reader would not know, because Pinker nowhere mentions, that Easterlin has responded to Stevenson and Wolfers (Easterlin, 2015, 2017); Sacks, Stevenson, and Wolfers (Easterlin, 2015, 2017); and Inglehart, Foa, Peterson, and Welzel (Easterlin, 2015). Ortiz-Ospina and Roser (2017), in addressing the Easterlin paradox, rely largely on the Stevenson and Wolfers article, so this citation of Pinker's is close to redundant. Ortiz-Ospina and Roser (2017) also present Eurobarometer data showing an increase in happiness over time in several countries. But as Clark, Flèche, Layard, Powdthavee, and Ward (2018) point out, Eurobarometer data on at least some countries (possibly all, though they do not comment on this) are not ideal, because the sample sizes are "much smaller" than those in other studies of national SWB (p. 260, n. 16). Moreover, the same authors observe that "[i]f we look only at countries with long series of data on happiness, there is no relationship between economic growth and increases in happiness" (p. 42). This supports the reality of the Easterlin paradox as Easterlin et al. (2010) formulate it (quoted above).

Easterlin (2017) also responds to pertinent work by Veenhoven that is more recent than that cited by Pinker (2018). The Stokes piece considers data covering a mere five years, a time span that is too short to test the Easterlin paradox (see Easterlin et al., 2010). Easterlin (2017) mentions recent papers not involving him that are supportive of the Easterlin paradox (p. 312, n. 1). Pinker (2018) cites none of these. Indeed, he fails to cite any papers arguing in favor of the Easterlin paradox except Easterlin's original report of the finding from 1973. And yet, any fair-minded consideration of the international happiness literature, even a brief one, makes quite apparent that the books are far from closed on the paradox (for recent work on this subject, which makes the ongoing controversy clear,

see Beja Jr., 2018; Headey, 2019[27]; Rusen, 2018; Slag, Burger, & Veenhoven, 2019; Yasar, 2018).

Possibly in tension with Pinker's human development view of the happiness of nations, evidence has been accumulating for some time that genetic variation among nations significantly predicts international happiness differences (see Minkov & Bond, 2017; Proto & Oswald, 2016).[28] Minkov and Bond (2017) found that "national percentages of very happy people…are consistently and highly correlated with national prevalence of the rs324420 A allele in the FAAH gene," and that "[while] climatic differences are also significantly associated with national differences in happiness…*economic wealth*, *recent economic growth*, *rule of law*, *pathogen prevalence*, and the distribution of short versus long alleles in the serotonin transporter gene SLC6A4 are *not* significant predictors of national happiness" (p. 321; emphasis added). The authors urge caution in the interpretation of their findings, observing that stable differences in the rank order of levels of a trait among groups do not exclude the possibility of any given group's absolute level of the trait changing. Still, as heritability increases, limits on the responsiveness of a trait to environmental effects typically become more pronounced (Sesardic, 2005), and a potential explanation for the Easterlin paradox is thus clear. Therefore, genetic contributions to international differences in happiness are threatening to Pinker's (2018) optimistic view. Little wonder that evidence of them is nowhere discussed in *EN*.

To his credit, Pinker (2018) does at least acknowledge that the level of SWB in the United States has not much changed in recent decades. In attempting to explain this, he argues that economic inequality may be partly to blame, since GDP growth has gone disproportionately to the wealthy (p. 272). And yet, in *EN*'s chapter on inequality, the following is written: "When poverty is defined in terms of what people consume rather than what they earn, we find that the American poverty rate has declined by *ninety percent* since 1960, from 30 percent of the population to just 3 percent. The two forces that have famously increased inequality in income have at the same time decreased inequality in what matters" (Pinker, 2018, p. 117;

[27] Headey's (2019) work is especially interesting insofar as it finds "strong confirmation of the Easterlin Paradox" by considering the "combined effects of *changes* in wealth, income and consumption on *changes* in Life Satisfaction," rather than taking the standard approach of "focuss[ing] solely on static income effects" (p. 167).

[28] The closest Pinker (2018) comes to considering this possibility is attacking the theory of the hedonic treadmill (p. 270).

emphasis in original). It would appear, then, that relative income does the explanatory work regarding stagnating happiness, surely. But what does Pinker say about this? "Absolute income, not relative income, is what matters most for happiness (a conclusion that's consistent with the finding discussed in chapter 9 on the *irrelevance of inequality* to happiness)" (2018, p. 270; emphasis added; in an endnote on the foregoing sentence, the reader is referred to a study that shows the "[*i*]*ndependence* of happiness and inequality" [p. 475, n. 21; emphasis added]).[29]

Beyond its discussion of psychological and social well-being, many problems in *EN*'s defense of progress are apparent. In addressing life expectancy, Pinker (2018) does not point out recent negative changes in the United States (Eckersley, 2019).[30] *EN*'s chapter on inequality mentions the work of Scheidel (2017), but does not explicitly discuss its highly pessimistic argument that inequality is very likely to progressively worsen unless some catastrophe(s) brings about equalization—the first half of this argument has found support in other work (see Scheffer, van Bavel, van de Leemput, & van Nes, 2017); rather, Pinker (2018; p. 107) would have readers believe that Scheidel's thesis is largely irrelevant to the contemporary world, a claim no one who consulted the latter's book, which gives much page space to the topics of contemporary and future inequality (Scheidel, 2017, pp. 405–444), would accept. Pinker (2018) believes that the institutions of modernity "ha[ve] brought a more benign way to reduce inequality" than the disasters that Scheidel invokes (p. 107). But consider Scheffer et al. (2017), whom Pinker does not cite: "Over the past decades…globalization has given way to a more unconstrained use and accumulation of wealth…. The financial playing field for the wealthiest is now global, and mobility of wealth has greatly increased, providing immunity to national taxation and other institutional obstacles to wealth accu-

[29] Pinker (2018) seems to be unaware of other psychological problems that appear to be more robustly related to inequality (through factors such as high visibility of inequality) than SWB, even though he references (p. 519) a paper that discusses some of these by Starmans, Sheskin, and Bloom (2017; see also Charlton, 1997; Nishi, Shirado, Rand, & Christakis, 2015; Woodley, 2010).

[30] This highlights one of the frustrating things about reading *EN*: Pinker shifts his attention back and forth from short- to long-term and global to more local trends as is convenient for his argument. So, for example and as already discussed above, he tries to defuse Twenge et al.'s (2010) finding of a long-term rise in mental health symptoms by (tendentiously) citing findings of a leveling off or reversal of that trend in recent decades. But the recent undesirable change in US life expectancy is not discussed.

mulation" (p. 13157). Falling *g*, which potentially afflicts not just the developed world but also developing nations (see Al-Shahomee et al., 2013; Wang et al., 2016), and anti-Flynn effects, which may now be present in some developing countries (see Dutton, Bakhiet, Essa, Blahmar, & Hakami, 2017; Dutton, Bakhiet, Ziada, Essa, & Blahmar, 2017), are likely to exacerbate inequality, insofar as they reduce the number of people able to participate usefully in "knowledge economies."[31]

Where he handles the topic of war, Pinker does not engage recent critiques of his position, made famous in *BAN*, which, among other things, indicate that evident declines in warfare violence are in part an "artifact of scaling factors [related to population growth]" (Falk & Hildebolt, 2017). Mann (2018; a draft of the latter paper has been available since 2016 at the latest[32]) also critiques the thesis of declining warfare[33] and offers an interesting alternative take on reductions in homicide rates—linking them to potentially undesirable expansions of the coercive power of nation-states—which are a focus of *EN*. Pinker (2018) also fails to account for evidence that declines in violent behavior over time are due at least in part to genetic selection, even though such evidence is compelling (Frost & Harpending, 2015). These data indicate that the pacific nature of modernity is substantially due to the brutal practices of medieval European governments that Pinker would presumably see as irrational barbarity (e.g. severe corporal punishments for what would today be considered minor crimes)—and yet they seem to have had a significant role in laying the groundwork for the way of life with which he is so enamored.

Pinker (2018) addresses quality of life by, inter alia, examining temporal changes in working hours and leisure time. The working hours data begin when much of the Western world was industrializing, so it is hardly surprising to see a decline over time from that point. Left out are data

[31] Itzkoff (2014) and Rindermann (2018, pp. 400–402) discuss the link between cognitive and economic inequality. Woodley of Menie, Figueredo, et al. (2017, pp. 98–102) speculate about the possible relationship between dysgenics and rising inequality.

[32] http://www.havenscenter.org/files/Michael.Mann.Wars.and.Violence.pdf.

[33] Mann's (2018) arguments do not challenge the view of declining inter-state warfare in the West, which is critical to our own thesis, but does raise potential problems for Pinker's (2018) global optimism. One could wonder how dysgenics in developing (non-Western) countries is compatible with substantial inter-group conflict in those regions of the world, since we have elsewhere maintained that group selection drives positive directional selection for intelligence. The potential answer is that the introduction of advanced technology rendered the effects of warfare dysgenic with respect to intelligence (for instance, Corley, Crang, & Deary, 2009, find that the mortality selection of World War II was dysgenic).

indicating that prior to industrialization, European people worked far less than they now do (Hoch, 1998; Schor, 1993).[34]

Furthermore, Pinker (2018) treats as uncontroversial the finding that hours spent on housework have fallen enormously from the twentieth to twenty-first centuries, without accounting for contradictory findings: "[N]ew estimates suggest that time spent in home production by prime-age women fell by around six hours from 1900 to 1965 and by another 12 hours from 1965 to 2005. Time spent by prime-age men rose by 13 hours from 1900 to 2005. Averaged across the entire population, per capita time spent in home production increased slightly over the century" (Ramey, 2009). Gains in leisure over a century in the United States are quite possibly far more modest than he suggests as well: "Overall, per capita leisure and average annual lifetime leisure increased by only four or five hours per week during the last 100 years" (Ramey & Francis, 2009).

Pinker (2018) would have readers believe that experts have authoritatively refuted the idea that global declines in poverty "are *inflated* by the rise of populous China" (p. 90; emphasis added). But one of the sources on which he most heavily relies in addressing changes in poverty has this to say on the matter: "The biggest force behind the decline in poverty is clear: China.… Indeed, the impact of China is so large that some people have concluded that the decline in poverty is *exclusively* [emphasis in original] about China. That claim is incorrect, since dozens of other countries are also reducing poverty. *But China is the largest contributor*" (Radelet, 2015, p. 35; emphasis for last sentence added).

From Pinker's discussion of democracy, one would think it beyond question that this form of government is the best in virtually every way that counts. The selectivity here becomes apparent upon the most superficial scrutiny, however. For example, democracies are supposedly "faster-growing [economically]" than non-democracies (Pinker, 2018, p. 470, n. 4). Here, Pinker relies on a crude discussion of how democracies fare in terms of economic growth relative to non-democracies (in Radelet, 2015) that is blind to the variety of non-democratic regimes, and to the degree to which differences in cognitive capital are confounded with variation in mode of government (with populations higher

[34] Critics have misconstrued some of these data on hours worked in medieval times as not offering estimates of the total hours that pre-industrial Western people worked in a year (see Worstall, 2013).

in cognitive capital tending toward democratic government *and* greater economic development). Moreover, "government effectiveness" "correlates with cognitive ability (r = 0.61)" (Rindermann, 2012, p. 110). Notably, Singapore, the population of which has an average IQ of 105, is "in the lead" on this measure (Rindermann, 2012, p. 110), despite being an authoritarian nation; taken together, this information suggests that at least some of the problems associated with non-democratic regimes are attributable to the low cognitive capital typical of non-democratic nations in the contemporary world. At least one historical analysis, covering 1820–2000, finds that monarchies exhibit economic growth no slower than republics and are better able to handle "large reforms" than republics (Bjørnskov & Kurrild-Klitgaard, 2014; see also Guillén, 2018; Salter & Hebert, 2014). Additionally, democracies are far more likely to undergo financial crises compared to autocracies (Lipscy, 2018), and analyses finding that democracy positively figures in economic growth myopically focus on the post-WWII era, features of which, such as "[suppressed] capital mobility," may "[mask] some potential sources of democratic instability" (Lipscy, 2018, p. 3; see Acemoglu, Naidu, Restrepo, & Robinson, 2019, for an example of a paper that depends on such analytic myopia).

To belabor a point, Pinker could dispute all of these arguments and bodies of evidence. Certainly they have not gone without criticism.[35] But throughout *EN*, the best evidence challenging the pro-modern view is never considered, and what little is reviewed is presented inaccurately.

[35] For example, the idea that slowing simple reaction times indicate falling g has been critiqued (see, e.g., Flynn, 2013). (The critiques have also been answered [see Sarraf, 2017 and references therein].) The notion that selection has been acting against intelligence has been questioned, though the arguments seem to be incorrect (Woodley of Menie, Reeve, et al., 2016; for compelling evidence of selection against intelligence, see Kong et al., 2017; Reeve et al., 2018). Perhaps Western demographic decline is not as dangerous or inexorable as some think, as Coleman and Basten (2015) argue—though this paper has no shortage of its own defects, especially with respect to its optimism about immigration and blindness to human capital differences across populations. Maybe evolutionary theories of the ascendancy of the West are terribly mistaken and one need only invoke culture, and/or environmental factors, to make sense of this phenomenon (see McCloskey, 2010). (But these notions have met with powerful rebuttals from Rindermann [2018, esp. pp. 497–500; see also Cochran & Harpending, 2009; Frost & Harpending, 2015; Woodley & Figueredo, 2014].) And so on and so forth.

Is Bias Sufficient to Explain Declinism?

Pinker (2018) argues that "the negative coloring of misfortunes [in autobiographical memory] fades with time," and that this, along with the degradation of people's faculties with age, is the reason that people are "wired for nostalgia," that is, tend to see the world as in decline (p. 48). Together with negative news and the availability heuristic and negativity bias (discussed in the summary above), Pinker seems to believe that declinism, that is the idea that the world or at least some society or culture is getting worse, can be explained away in terms of distorted cognition. (Protzko & Schooler, 2019 also attempt to explain declinism about desirable human traits in terms of psychological biases, never giving any serious attention to evidence that indicates that it has substantive bases [see above for evidence relevant to at least one of the traits that they consider], saying only that they "cannot *rule out* actual declines [in desirable human traits; emphasis added]," which almost seems to presume that evidence has been favoring the non-reality of such declines.)

As with so much else in *EN*, Pinker's treatment of declinism is blind to contradictory evidence. Steenvoorden and van der Meer (2017) and Turchin (2016, see also Turchin, 2010) both provide empirical evidence that social pessimism is significantly related to adverse developments in, for example, economics and politics, making it difficult to attribute this attitude solely to bias. Turchin's (2010, 2016) analyses are especially interesting, since they involve long-run historical data indicating that "the United States and Western Europe [are likely to experience growing political instability]" (2010, p. 608). Turchin offered this prediction in 2010, and in light of the election of Donald Trump, Brexit, and related events, he has been at least partially vindicated.

Odd aspects of Pinker's attempt to blame some amount of pessimistic sentiment in the West on negative news require comment. As argued above, there is reason to believe that members of more individualistic cultures are more prone to self-serving biases, potentially giving them an artificial advantage in SWB compared to members of less individualistic cultures. In keeping with this possibility, the casual observer will note that Western cultures, which are highly individualistic, are bloated with "therapeutic" ideas and media products of various sorts, some of which come close to explicitly promoting the cultivation of pleasant delusions to enhance mood and outlook (e.g. Peale, 1959). The relatively recent and enormous success of the positive psychology movement indicates that this

phenomenon has not abated. And yet while Pinker is willing to contend that the news has made Western people unduly pessimistic, he never considers the possibility that this "therapeutic" culture, and associated delusions, is behind increases in happiness that he insists have occurred in some parts of the West. Why is only one aspect of media culture thought to matter?

Pinker (2018) tries to empirically substantiate his association of increasingly negative news with deepening pessimism, but only succeeds in contradicting himself again. For example, readers are informed that news watchers have heightened anxiety and depressed mood (p. 42). But Pinker also wants to argue, as discussed above, that mental health and happiness are no worse, and indeed that the latter has become better in much of the West. So we apparently must infer that the effects of consuming negative news on outlook are lasting but on mental well-being are transient. But it is unclear what justifies this belief on Pinker's part, especially since, as we have seen, he rejects hedonic treadmill theory. Pinker could perhaps appeal to the increases in psychiatric distress that he acknowledges, but he maintains that these have been plateauing in recent decades. Conversely, "world broadcasts" have become more negative roughly since 1980 (Pinker, 2018, p. 51).

How Bad Are Rightism and Religion, and What Future Do They Have?

In the course of *EN*, Pinker exhibits an apparent tendency to shift his stance on various issues. For example, chapter 23, on reason, gives the impression that Pinker at least wants to be seen as more sympathetic to people on the political right than the broader academic establishment. But earlier, in chapter 20, on the future of progress, Pinker seems gleeful at the prospect of more conservative generations dying off (pp. 341–343). Part of the problem here may be that Pinker, as with so many others on the world-historical left, wants to seem reasonable and bipartisan by having a "right" that is regarded as a legitimate opponent, when in fact this "right" is barely distinguishable from ordinary progressivism—one of the few real, though nevertheless weak, distinctions is in their differing orientations to economic regulation and redistribution. Actual opponents of progressivism, that is, those who differ in their basic values and ultimate goals relative to progressivists, can then be safely discarded as members of a "reactionary fringe of conservatism" (p. 363), and the specious image of

having rationally engaged competing worldviews is preserved. So make no mistake: Pinker opposes the traditional right no less than the "social justice warriors" (2018, p. 31) from whom he elsewhere attempts to distinguish himself.[36]

Much the same is apparent on the matter of religion. As we have already seen, Pinker seems to have little good to say about it. He identifies religiosity as part of a populist values syndrome of sorts, along with authoritarianism and certain rightist beliefs (2018, p. 340). The general impression that readers of *EN* will get is that this values syndrome is an impediment or threat to the development of good societies, while the allied forces of reason, atheism, and progressivism drive such development: Pinker (2018, pp. 438–439) posits that reductions in religiosity, thanks at least in part to "reason,"[37] might make societies more humanistic and thus better.

Unfortunately, Pinker has overlooked evidence that renders this thesis highly implausible. Atheists are higher on psychopathy (Jack, Friedman, Boyatzis, & Taylor, 2016) and, consistent with the foregoing, lower on the general factor of personality (GFP), a measure of social effectiveness, than religious persons (Dunkel, Reeve, Woodley of Menie, & van der Linden, 2015). The GFP is negatively correlated with the dark triad, though more consistently with Machiavellianism and psychopathy than narcissism (Musek, 2017, p. 147). Congruent with these data, Stack and Kposowa's (2006) international study finds that less religious individuals are more accepting of tax fraud, even after controlling for relevant factors.[38] Moreover, the percentage of Christians in a population is a strong positive predictor of the extent to which it exhibits support for human rights, whereas cognitive ability is a poorer predictor (Rindermann & Carl, 2018).

[36] But consider that his diatribe against Nietzsche, motivated by what could be described as the rightist aspects of the latter's thought, certainly resembles the impassioned arguments of those whom Pinker labels "social justice warriors."

[37] It is typical for those of Pinker's ilk to state or suggest that religiosity is to at least some extent a function of inadequate levels of intelligence. While it is true that atheists have on average higher IQs than religionists, differences in IQ across groups of varying religiosity are likely not on general intelligence (Dutton, te Nijenhuis, Metzen, van der Linden, & Madison, in press), and general intelligence is responsible for almost all of the positive association between IQ and real-world success (Ganzach & Patel, 2018), and so seems to be the true "substance" of cognitive ability. It may well be that it is not intelligence but a specific sort of cognitive *style* that predicts irreligiosity (Dutton et al., in press).

[38] It is worth noting that Pinker (2018) seems irritated by claims that New Atheists are personally unpleasant (p. 430), and he appears to think such charges are inaccurate. But in fact, such perceptions of atheists may correspond to their low average GFP.

The study by Rindermann and Carl (2018) analyzed other plausible contributors to support for human rights: "Political institutions were highly correlated with human rights…but the background variable of religion also shaped political institutions" (p. 62). Qualifying their findings, the authors also point out the following: "[P]ercentages of certain religious adherents not only capture a short-run effect of people with certain beliefs but also a long-run effect of people with a more secular worldview shaped by religion: cultural, personality and institutional effects tend to persist even if religious affiliation and faith fade out, as has happened in most Western European countries" (p. 59). However, if the influence of Christian religion continues to wane in the very long run, it is difficult to say whether its beneficial effects on moral behavior will persist.[39]

In the United States, liberal ideology is positively correlated with self-reported involvement in crime, such that "very liberal" people are the most criminal and "very conservative" ones are the least criminal, a finding that is robust to controls for several covariates, and potentially related to the stronger religiosity of conservatives compared to liberals (Wright, Beaver, Morgan, & Connolly, 2017). Wright et al. (2017) note the following: "There is apparent scholarly agreement that conservatives more strongly value social order, respect for authority, and social conformity and that conservatives are more religious, more conscientious, and demonstrate higher levels of self-control…. These traits and values likely influence lifestyle choices in ways that better insulate conservatives against criminal behavior. Moreover, conservative narratives about 'free will,' personal responsibility, and morality may gel into cognitive scripts that condemn criminal conduct as immoral and worthy of social sanctions" (p. 240).

[39] Perceptive readers may think that we contradict ourselves in identifying such humanistic benefits of religiosity given that we have implicated religion in both inter- and intra-population violence and other cruel activities. But this is incorrect. First, the noted humanistic benefits have largely been observed in relatively modern populations; it is possible that religion overwhelmingly inclines people to prosocial behavior in times of peace (and for Western populations, life has certainly been quite peaceful since the end of World War II) even though it facilitates out-group hostility in times of war. Second, even historically, Christianity has been associated with humanistic *in-group* behavior, such as the liberation from slavery of many Christians (Jordan, 2004). Members of Christian European populations could of course be effectively marked as out-group members, and exposed to brutal treatment, through some abnormality (see Chap. 7), and religious beliefs and practices may well have been involved in this, but that does not somehow make the prosocial in-group benefits non-existent.

This evidence, taken together, offends Pinker's notion that making societies (at least the predominantly Christian ones) less religious and rightist will improve their moral character. But, of course, none of it is considered in *EN*.[40] Note that in a different context, Pinker (2018) mentions a study finding that liberals are more aggressive than conservatives (p. 362), so presumably he had some inkling that findings of the sort described above were in the research literature.[41]

A further concern about irreligion, unrelated to moral concerns, is found in the work of Murray (2003), who argues that falling per capita rates of major innovation and genius are due to the loss of transcendent values motivating scientists and intellectuals to pursue abstract goods, such as truth. Again, even though Pinker cites Murray (2003), this argument goes unmentioned.

A final potential problem with irreligiosity, which Pinker never quite engages directly, is that it is maladaptive, that is, depresses fitness. Evidence for this view is abundant: "prosocial religions continue to convey a reproductive advantage…which means that religious societies are still growing faster than secular ones, countervailing the great inroads made by secularization" (Norenzayan et al., 2016).[42] Moreover, atheism and (apparently) individualizing (specifically contemporary leftist) moralities potentiate selection against intelligence, and thus pose a threat to the cognitive capital of populations under their influence (Meisenberg, 2019). Although failing to mention the problem of dysgenic fertility, Pinker (2018) does attempt to hand wave away concerns about the future of secularization by

[40] The study of Rindermann and Carl (2018) is sufficiently recent that Pinker cannot be blamed for this omission. But this applies to none of the other studies cited in the discussion concerning religiosity/rightism and morality.

[41] Invoking the "ecological fallacy," one could note that the mere fact that religiosity and rightism have beneficial effects at the individual level does not *entail* that they have such effects at the group level. This is true, but the positive individual-level effects make it reasonable to *anticipate* group-level benefits in the absence of good reasons to think otherwise (and the work of Rindermann & Carl, 2018 suggests that in the case of Christianity at least, group-level benefits of religion consistent with its individual-level effects *are* apparent). Pinker (2018) offers no such reasons. The ostensible "humanistic" benefits of secularization and leftist values that he mentions may well be explicable in terms of factors with which the secular and leftist cultural trends of developing and developed societies are confounded (e.g. life history speed slowing).

[42] Inglehart (2018) is in agreement with Norenzayan et al. (2016) regarding the fertility advantage of more religious societies relative to their more irreligious counterparts—see also Meisenberg (2011).

noting that fertility in highly religious parts of the world (e.g. Africa [*cf* Meisenberg, 2009] and the Muslim world) *could* decline or continue to decline.[43] Contrary to his speculations, projections for African population growth, even assuming continuing reductions of fertility rates, find enormous increases in the next century (United Nations, 2017). Strangely, in addressing this subject, Pinker (2018) chooses to critique less current data from a 2012 Pew Research report that allegedly assumed constant fertility rates over time (p. 489, n. 70).

Pinker is similarly optimistic that future generations in Western countries will sustain the trend of becoming more progressive and irreligious. Sadly for this argument, both religiousness (Bouchard Jr., 2004; Ellis, Hoskin, Dutton, & Nyborg, 2017) and political beliefs (Batrićević & Littvay, 2017; Bouchard Jr., 2004) are quite heritable. As already noted, the religious have a fertility advantage over the irreligious, and rightists appear to have more children than leftists as well (Fieder & Huber, 2018; Goldstone, Kaufmann, & Toft, 2011). The heritability of both religiousness and political beliefs does not peak until at least young adulthood (Bouchard Jr., 2004). Data from the United Kingdom indicate that Generation Z is more socially conservative than Millennials, Gen Xers, and Baby Boomers (Bacon, 2016). Twenge (2017) finds increasing irreligiosity and leftist social attitudes among young people in the United States, but there are exceptions—for example, views of gender roles may have started to become more conservative—and the data may give a misleading picture to the extent that they include people who are not at or past the age when the heritabilities of religiosity and political beliefs peak.

Still, one could argue that just as the Flynn effect has occurred despite the high heritability of IQ, there may be an analogous phenomenon driving up leftism/individualizing attitudes and irreligion. But the Flynn effect is increasingly giving way to the anti-Flynn effect, and the same sort of factors evidently promoting the anti-Flynn effect on IQ may appear in the realms of politics and religion as well. Woodley of Menie, Peñaherrera-

[43] This exemplifies a further incongruity that the perceptive reader will repeatedly notice in reading *EN*: Pinker is often insistent that one must rely on empirical data and carefully reasoned arguments in forming beliefs about the world. And yet, he is happy to base important claims on hasty, data-free speculations. This can also be seen in his poor attempt to dismiss the study of Twenge et al. (2010) discussed above. One wonders why Pinker did not bother to run any statistical analyses of his own in critiquing Twenge et al.'s (2010) use of college student data, or to show how global secularization will plausibly continue—these failures betray his alleged commitment to scientifically grounded argumentation.

Aguirre, et al. (2018), in a comprehensive review of anti-Flynn effect data, argue that the best explanation of this effect is Meisenberg's (2003) "negative cultural amplifiers model," which posits that as the genetic potential for intelligence declines, the ability to sustain conditions that generate the Flynn effect erodes, causing its reversal. Similarly, as genetic predispositions toward rightism and religiosity strengthen and become more prevalent, and as the individuals with these genotypic characteristics come to replace the more individualizing-oriented and irreligious members of earlier generations who currently occupy seats of power and promulgate modernized norms, one could expect a rapid collapse of individualizing-irreligious culture. Strikingly, Pinker observes that the Arab world was once highly "enlightened," understood in terms of his four ideals (pp. 442–443). But his culture-only view of human development cannot explain how enlightened existence, which according to him is universally preferable to alternatives, was given up in this region of the world—at any rate, he does not try to address this matter and does not appear to recognize the problem he has created for himself. The answer perhaps lies in the biological dynamics adumbrated in the foregoing.

Some of Pinker's (2018) faith in continued long-run increases is irreligiosity and "progressive" attitudes seems to lie in the fact that the world is becoming more educated, and that education appears to foster irreligion and individualizing attitudes, sometimes called tolerance (pp. 234–236). But there is a serious question as to whether this tolerance-enhancing effect of education is a consequence of actual enlightenment or politically motivated indoctrination. Pinker (2018) is clearly aware of the disproportionate influence of those with individualizing orientations in academia, who also affect the institutions of "lower" education. This influence perhaps has some adverse effect on educated persons' understanding of important subjects. For example, more educated people are less likely to believe that genetic factors play a significant role in determining individual differences in a number of traits (Shostak, Freese, Link, & Phelan, 2009).[44]

[44] Shostak et al. (2009) also found no statistically significant association between political views and belief in "genetic causation." However, "rightists" of the modern Western world are typically on the world-historical left (see Salyer, 2018, p. 91, n. 3), as noted earlier, so this result is somewhat unsurprising. When considering a broader spectrum of political orientations, leftism has been found to positively associate with environmental determinist beliefs (Furnham, Johnson, & Rawles, 1985). In any case, leftists have been overwhelmingly responsible for academic opposition to hereditarian research (see Carl & Woodley of Menie, 2019; Cofnas, 2016; Cofnas, Carl, & Woodley of Menie, 2018; Gottfredson, 1994; Rushton, 1996, 1997), perhaps

Quite apart from its likely future, Pinker also makes what one could call a pragmatic argument for progressivism. Specifically, he cites a study finding that social spending in OECD nations correlates with measures of societal well-being (Pinker, 2018, p. 110). The study in question, by Prados de la Escosura (2015), does not control for possible confounds, however, so Pinker's seemingly intended claim that social spending actually enhances societal well-being is far from confirmed. Sanandaji (2015), whom Pinker does not cite, finds that the success of Scandinavian nations, which is frequently attributed to high levels of social spending, was apparent before the establishment of their welfare states, and that the generous social spending of these countries has likely harmed their economic health. Pinker (2018) does concede that social spending is probably harmful when taken too far (p. 110), but Sanandaji (2015) emphasizes that Sweden, for example, was seeing enormous economic success before its "social democratic policies" were in place at all (pp. 15–16).

There is not space to consider Pinker's argument for atheism as such, that is, disbelief in God or gods. Suffice it to say that the effort is basically unserious, offers almost nothing beyond bald assertions to the effect that others' arguments are beyond refutation (with no mention of the many often highly persuasive replies), and merely sidesteps the considerable intricacy of the debate found in contemporary philosophy of religion—for some appreciation of this complexity, see Taliaferro (2013) and Rasmussen and Leon (2019).[45] He also seems to think that a deistic or impersonal God obviously could not be a source of morality (Pinker, 2018, p. 422), and thus is seemingly ignorant of Mulgan's (2015) coherent argument to the contrary.

largely due to their egalitarian beliefs, which are frequently shared with modern conservatives (though with weaker commitment on the part of the latter). These egalitarians propagate distorted and inaccurate views of the social world that are consistent with their ideologies and aggressively attack those who offend these views (Winegard & Winegard, 2017). It is unclear whether education would promote what Pinker calls "enlightened" attitudes if it offered a less politically warped and more scientifically accurate view of social reality to students.

[45] As will become apparent in the main text, Pinker is inclined to appeal to what he seems to think are consensus views among philosophers in determining what philosophical positions are reasonable. He should perhaps consider, then, that a recent survey of philosophers found that among those who *specialize* in philosophy of religion (the subdiscipline in which the existential status of God is studied), only about 21% accept atheism, compared to about 87% of *non-specialists* (Bourget & Chalmers, 2014). This hardly aligns with Pinker's (2018) absurd suggestion that the truth of atheism has been established beyond reasonable doubt, the only meaningful basis of which is uncritical rehash of the work of various academics (pp. 421–433; for an alternative, and vastly better-informed, perspective, readers should consider Walls & Dougherty, 2018).

Are Moral Inegalitarianism and "Romantic Heroism" Obviously Wrong?

Some of the most problematic sections of *EN* are its forays into moral philosophy. In these, Pinker completely fails to realize how racked with controversy the associated field is and how lacking it is in definitive answers. He appears to think that philosophers as diverse as Derek Parfit and Richard Boyd are moral realists for the same reasons, when in fact they represent conflicting forms of moral realism.[46]

It would seem that Pinker is less interested in understanding the state of moral philosophy than in giving readers a false impression of this sort: "All truly respectable moral philosophers have determined that there are objective standards of morality even without religion and that adherence to these standards involves egalitarianism; people who think otherwise are just foolish and misinformed." This selective reading of moral philosophers' scholarship is implicitly deployed against Nietzsche where Pinker (2018) contends that the former's inegalitarianism is somehow incoherent or self-undermining (p. 446). Certain philosophers, such as Jeremy Waldron, also maintain that at some level, at least, a normative moral-philosophical view has to be egalitarian in order to be coherent—but Steinhoff (2015a) has powerfully challenged such beliefs. Among other things, he observes that moral inegalitarianism is quite commonsensical: "If a moral principle, for example the principle of equal respect and concern, has utterly counterintuitive implications and the intuitions in question prove impervious to attempts of undermining them (like, for example, the intuition that one must not torture babies for fun or the intuition that a brother must not offer his innocent sister and her sadistic rapist the same respect and concern), then the principle must be rejected" (Steinhoff, 2015a, p. 145). Pinker (2018) seems to think that the equality of persons (or perhaps sentient beings) requires us to be morally impartial, that is, not prioritize personal interests over those of others (p. 412), but at no point does he establish that humans (or all sentient beings) are equal in any respect, or that any respect in which they might be equal could be a compelling basis for moral impartiality. Deep problems for such efforts to justify equal moral concern, regard, respect, moral impartiality, or whatever

[46] Parfit (2011) was a non-naturalist, a stance one imagines Pinker, a hard-line atheist and apparent naturalist, would disapprove of; Boyd (1988) is a so-called Cornell realist, a kind of moral naturalist.

one wishes to call it are discussed throughout the papers of Steinhoff (2015b, see especially 2015a), but Pinker is unaware of these difficulties, even though some of them should be obvious upon superficial reflection.[47]

Related to his peremptory, but philosophically unjustified, insistence on moral egalitarianism is Pinker's disdain for what he calls "romantic heroism." Rather than seeking to understand this moral-existential orientation, Pinker (2018), as mentioned earlier in this book, chooses to dismiss it with assistance from Paul Hollander and Thomas Sowell, concluding that learned men might dislike modernized societies—and appreciate Nietzschean ideals—because they are not accorded sufficient esteem within them, and (Hollander and Sowell aside) because they abhor the tastes of ordinary people and the nature of democratic societies (p. 447). One must ask why Pinker does not attempt any real investigation into the origins of these attitudes. Presumably no one purchased *EN* to learn about Pinker's unimpeachable liberal rectitude, but to see a defense of the Enlightenment worldview as superior to alternatives. In facing up to its most radical competitor ideology, however, Pinker offers the reader nothing but insipid pretentions to virtuousness.

One who is actually interested in understanding "romantic heroism" could perhaps start by consulting the work of Ernst Jünger, whose substantial direct experience with grueling combat in World War I left him, at least for a time, with the belief that war is the ultimate form of competition, in which life is most fully and profoundly experienced. Indeed, it is actually quite common for men in war to describe the experience as bracing: "Combatants in warfare often describe themselves as feeling 'alive' and invigorated by war" (MacCallum-Stewart, 2011, p. 532). Or one could consider the following from Herbert Read: "During the war I used to feel that this comradeship which had developed among us would lead to some new social order when peace came. It was a human relationship and a reality that had not existed in time of peace. It overcame (or ignored) all distinctions of class, rank and education. We did not call it love; we did not acknowledge its existence; it was sacramental and therefore sacred" (quoted in Watson, 2014, p. 191). It is easy for Pinker (2018) to dismiss

[47] Think, for example, of the practical implications of treating all sentient beings as morally equal, and how those might offend ordinary moral intuitions, and then think of the problems for intra-species moral equality that would emerge as soon as one began attempting to establish inter-species distinctions of moral worth with reference to empirical differences (e.g. of intelligence).

such views as evil (pp. 164–166), but difficult to show, whatever one might think of them, why anyone drawn to those views ought not to be—indeed, Pinker never does this, choosing instead to beg the question and preach to the choir, leaving one to wonder what exactly his point was in setting out to critique these ideas. As long as there are people who feel that modernized life is stultifying, trivial, and overly pacified, there will be some who are attracted to war as a means of experiencing real danger and challenge, things that are existentially momentous, and however misguided they might in fact be, Pinker has given them no compelling reason to change their minds. Thus he fails in his task to support his conception of the Enlightenment worldview in opposition to "romantic heroism."

Group Selection and Liberal-Individualist Ideology

An especially unpalatable characteristic of *EN* is its strange treatment of the group-selection debate, which can be found in the book's final section, wherein Pinker attempts to link group selection with fascism. The latter, he says, "grew out of the romantic notion that the individual is a myth and that people are inextricable from their culture, bloodline, and homeland" (p. 448). He goes on to state that at least one recent alleged incarnation of fascism—and (seemingly) by extension other rightist ideologies, including "neo-theo-rectionary-populist nationalism"[48] (p. 450)—that elevate the group above the individual and promote inter-group conflict as a vehicle for establishing the supremacy of the group, are based on a distortion of evolutionary psychology. This alleged distortion is rooted in the idea of group selection, which Pinker asserts "contrasts with mainstream evolutionary psychology, in which the unit of selection is the gene"[49] (p. 448).

[48] Despite Pinker's professed disdain for Communism, the construct of "neo-theo-reactionary-populist nationalism" has a rather Bolshevist ring to it, given that the Bolsheviks had a propensity for inventing cumbersome compound ideologies of this sort, for the purpose of both affirming certain intellectual positions (e.g. Marxism-Leninism-Stalinism) and deriding others (e.g. Weismannism-Mendelism-Morganism).

[49] Pinker seems to conflate the concepts of units and levels of selection; for clarification, see Okasha (2006, pp. 13–18). Pinker (2018) also disappointingly invokes his 2012 *Edge* critical commentary on group-selection theory as if he has had the final word on the matter (p. 448); and yet support for the concept, sometimes produced with explicit awareness of his criticisms (see, e.g. Smaldino, 2014), continues to appear in top journals. Pinker surely should address such criticisms if he wishes to retain his image as a figure of *any* significance in the levels of selection debate.

Contrary to Pinker's imagined scientific consensus, evolutionary theorists exhibit highly diverse views concerning the levels of selection, and a consensus is possibly emerging to the effect that selection operates simultaneously, and sometimes antagonistically, at different levels of organization, the idea that is the basis of multilevel selection theory. As Eldakar and Wilson (2011) state, "[g]roup selection…is now accepted by all who seriously study the subject" (p. 1523). They furthermore observe that the idea of group selection is zealously rejected by its naïve critics, even in instances where selection is demonstrably acting at the level of the group, in which case anti-group selectionists typically insist that kin selection is the best explanation for observed phenomena (see Chap. 2). Indeed, Eldakar and Wilson (2011) note that there are a number of illegitimate criticisms of the concept of group selection that poorly informed theorists have stridently and frequently used to dismiss the idea entirely. Relatedly, Gintis (2017) observes that "[t]here is…a certain asymmetry in the mutual criticism [between individual-level and multilevel selection theorists]. Few supporters of group selection deny the importance of inclusive fitness theory, while virtually all of its opponents regularly deny the importance of group selection theory" (Gintis, 2017, p. 192). Gintis (2017) goes on to name Pinker as one scientist guilty of this bad approach to the levels of selection debate (pp. 192–193), calling Pinker's characterization of group selection theory "disingenuous" (p. 193).

Moreover, Yaworsky, Horowitz, and Kickham (2015) find evidence that the concept of group selection is becoming increasingly accepted among evolutionary anthropologists; whereas there was little support for group selection among the *mentors* of the 175 anthropologists surveyed (only 8.2% reported mentors approving of the idea), 78.7% of the anthropologists themselves endorsed the claim that "cultural group selection is important" (p. 151). Yaworsky et al. (2015) also report that their results show that "most [of the evolutionary anthropologists surveyed] were receptive to group selection" (p. 145) and that "[t]he respondents contend that in the case of human sociality, multi-level selection is the preferred framework" (p. 150).

Perhaps more importantly, Woodley of Menie, Figueredo, et al. (2017) have found compelling evidence of multilevel selection in humans. As far as we know, their work offers the first body of empirical evidence indicating that group selection and individual selection have acted synergistically and antagonistically and with variable strengths on human populations over time; it also seemingly provides the first basis of empirical support for

the idea, hypothesized by Woodley and Figueredo (2013), that selection pressures at the group level historically promoted general intelligence in at least some Western-European populations.

It must also be stressed that Pinker's somewhat veiled attempt to smear group-selection theories as intrinsically fascistic is a clear case of ideology, that of the liberal-individualist sort, tainting science. Specifically, Pinker wants to exclude as scientifically illegitimate theories of evolution that imply the existence of biological impediments to a fully liberal-individualistic way of life. But this is probably an overreaction on his part: data indicate that liberals, not conservatives, are more likely to be attracted to multilevel selection theory (Yaworsky et al., 2015, p. 151), entirely contradicting Pinker's view on this matter. And as we have seen, the idea that the fascist right is uniquely attracted to groupish ideologies depends on embarrassingly poor intellectual history (see above section, "Bad Historical Scholarship").

* * *

Germane to Pinker's argument against group-selection theory is the issue of the degree to which individuals belonging to a particular nationality (which, setting aside recent immigration, is really little more than a partially inbred extended family, whose members share culture, history, and language) are actually biologically rather than merely culturally embedded within the traditions and folkways that define their nation. Pinker argues for individual autonomy from these cultural ties on the basis that such trappings are merely affected and were not salient features of humanity's evolutionary past as reflected by its phylogenetic legacy carried over from the Pleistocene, in which interactions between BGA groups would have been relatively rare and the concept of nationhood did not exist.

There are two problems with this argument. First, individuals from particular BGA groups by virtue of more proximate common ancestry are necessarily more strongly related to one another than they are to randomly selected individuals from other BGA groups (see Salter & Harpending, 2013). This higher relative genetic similarity implies the existence of significant fitness payoffs at both the genetic and cultural-group level for any kind of cooperative endeavor in which a particular genetically discriminable national grouping gains fitness advantages over another as an outcome of inter-group conflict (or warfare), thus providing a solid theoretical framework for ethnocentric nationalism as an evolutionarily successful

strategy in inter-group conflict (Rushton, 2005; Salter & Harpending, 2013; see Harpending's appendix in Salter, 2008).

Furthermore, Pinker's argument presupposes that biological evolution among the populations that radiated into various niches outside of Africa prior to the Holocene ceased with the advent of that epoch, and thereafter evolution was purely of a cultural nature. This notion, however, contradicts research indicating that the rate of adaptive evolution among populations living in the Holocene, especially in Eurasia, was on the order of 100 times greater than in the preceding Pleistocene epoch (Hawks, Wang, Cochran, Harpending, & Moyzis, 2007; see Woodley of Menie, Younuskunja et al., 2017). A major driving force in this process was likely culture-gene coevolution (Cavalli-Sforza & Feldman, 1981; Woodley of Menie, Younuskunja et al., 2017). Such coevolution was likely characterized by cultural changes generating massively amplified selective pressures on the populations undergoing those changes, which would in turn have led to further cultural development and concomitant further adaptive evolution via a positive feedback loop. An implication of this model is that rather than emerging from a process of arbitrary cultural partitioning and division of geographic boundaries as Pinker alleges, the oldest forerunners of nations in the West and in East Asia instead arose as a consequence of biocultural partitioning, isolation, and divergent selection. It furthermore implies that much of the cultural heterogeneity even just between the nations of Western Europe likely reflects real genetic variation that arose relatively recently among the historical populations occupying those ancient territories.[50]

Second, Pinker's argument that encounters among people of different BGA groups were rare for most of the adaptively relevant period of human history, and that humans have no inherent tendency toward intra-BGA-group nepotism and particularism, is by no means obviously correct.

[50] Clark (2007) offers evidence for this possibility through his observation that the Industrial Revolution started in England because of the "survival of the richest," whereby the wealthy had more surviving offspring than the poor in the Medieval and Early Modern Eras. The resultant selection-driven embourgeoisement of the English was simply more aggressive than that of any other population (with the possible exception of Ashkenazim; Dunkel, Woodley of Menie, Pallesen, & Kirkegaard, 2019), hence early industrialization. Consequently, and in keeping with evidence and theory considered earlier in the current book (see also Chap. 8), the English would have undergone dysgenic selection earlier than any other group by virtue of industrializing first, potentially eliminating their advantage in intelligence relative to many other Western populations.

During the Pleistocene, and even more so in the succeeding Holocene epoch, encounters among relatively reproductively isolated and genetic-evolutionarily differentiated human populations were likely more frequent than Pinker alleges. An alternative to Pinker's account is the *starburst model* of Henry Harpending (as discussed in Harpending & Harris, 2016 and MacDonald, 2001), in which encounters and conflict among different human populations may have been common owing to the expansionistic nature of humans, bringing groups into conflict with one another.[51]

Thus, some degree of innate BGA group nepotism focused on alliance-building using hard-to-fake tokens of in-group identity, for example, skin tone, skull shape, and so on, could have easily evolved in part to solve adaptive problems that these conflicts posed. We do not argue that BGA group status is the only locus of coalition formation. As Pinker observes, experimental work has noted that in certain contexts, such as modern Western universities, the salience of BGA to coalition formation can be downregulated via manipulation of relevant variables (Kurzban, Tooby, & Cosmides, 2001). However, care must be taken to avoid overgeneralizing this effect beyond the narrow context of individuals in Western nations, for whom BGA often may be minimally salient relative to the broader context of the past several thousand human evolutionary history. In one study, reducing the salience of BGA was more difficult in Brazilian populations from regions where inter-BGA-group contact is quite frequent (Cosmides, Yamamoto, & Pietraszerski, 2012)—under these conditions, BGA may be a prominent factor in coalition formation, consistent with predictions from Harpending's model (Harpending & Harris, 2016; MacDonald, 2001; Salter & Harpending, 2013; Woodley of Menie, Heeney, Peñaherrera-Aguirre, Sarraf, & Banner, in preparation).

Conclusion

We found ourselves overwhelmed by the sheer enormity of the problems in *EN*, which is quite telling given the great many intellectual progressivists who seemingly take it to offer the best case against pessimism about the future of Western civilization to date. This chapter has provided a

[51] Consistent with this possibility, Kanazawa (2004) suggests that high levels of g in humans indicate an evolutionary history as an invasive species, since g underlies complex novel problem-solving, which would be highly useful, even necessary, for species frequently entering unfamiliar environments.

survey of what we consider to be the most serious shortcomings of the work, along with appropriate counters; in our judgment, these weaknesses, especially involving omission of facts that create difficulties for modernist optimism, are representative of the pro-modern literature more generally (e.g. Inglehart, 2018; Welzel, 2014). Moreover, the fuller consideration of the modernization phenomenon and its effects offered above reveals a broad set of reasons to take a rather sober view of modernity.

Pinker seemingly has to believe that there are no serious biological obstacles to realizing a universalistic and prosperous global society, that there is virtually nothing bad about modernity as such (rather, it simply has some minor and inevitable "problems" like anything else), and that those who differ from these conclusions are probably dangerous and irrational neo-fascists. One detects a theme redolent of the work of Stephen Jay Gould (see Chap. 2) in *EN*, which is the tendency to insist on the need for cognizance of bias and irrationality to end the corruption of research seen in one's critical targets, while at the same time falling prey to those sources of error no less, or even more so.

It could be argued that the biases of another sort of ideology are apparent in the very book at hand, namely declinism. But we have clearly acknowledged, and accepted, the solidly evidenced components of the declinist *and* progressivist views of history, not to mention presented copious empirical and theoretical support for related long-run historical processes. Readers are encouraged to scrutinize arguments on all sides for themselves.

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CHAPTER 6

Making the Case for Mutation Accumulation

Introduction

Previous chapters have examined relevant aspects of the pre-industrial (specifically medieval) and modern Western worlds, along with factors likely responsible for the transition between them. We have placed special emphasis on selective processes that apparently enhanced the levels of g and K in Western populations over time, such that these groups became (in historical context) unusually cooperative, hardworking, future-oriented, and innovative. A large body of convergent evidence suggests that these characteristics have been essential to the unparalleled standards of living that Westerners have achieved (Clark, 2007; Rindermann, 2018; Woodley of Menie, Figueredo et al., 2017).

But we have also indicated that the effects of this biological modernization have not been exclusively good, especially in the immediately preceding chapters. Notably, the group-level fitness of Western peoples has been declining precipitously for around a century and shows no signs of recovering (Inglehart, 2018; Meisenberg, 2007). Moreover, and to partially reiterate, a number of dimensions of phenotypic quality in these groups have been degrading: their mental health (Twenge et al., 2010; Twenge, 2013), developmental stability[1] (Woodley of Menie & Fernandes, 2016; Woodley of Menie, Fernandes, Kanazawa & Dutton, 2018), and (in

[1] Developmental stability refers to an organism's resilience to insults (genetic and environmental) that occur in the process of biological development.

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certain respects) physical well-being (Levine et al., 2017[2]; Staub et al., 2018; You & Henneberg, 2016, 2017, 2018) potentially have been worsening, as have correlates of dominance in males (e.g. testosterone levels [Travison et al., 2007] and strength [Fain & Weatherford, 2016]). There are various distinct proximate-level explanations of these phenomena, which invoke, for example, xenoestrogens and other pollutants to explain testosterone and fecundity[3] declines in males (Levine et al., 2017; Toppari et al., 1996), or rapid social change and attendant stress to explain increasing rates of mental health problems (Rosa, 2013), but the possibility of a common factor underlying all of these trends has not been adequately explored.

One candidate factor is *deleterious mutation accumulation*, or the buildup of fitness-depressing mutations in the Western gene pool. Accumulation of such mutations could be reasonably expected as a consequence of the probable relaxation of negative selection in Western populations, that is, selection that removes deleterious genetic variants (which occur due to imperfections in the process of DNA replication and environmental factors that induce genetic damage). Since the opportunity for such negative selection to act, at least through mortality, has been massively diminished following industrialization, insofar as the subsequent improved standards of living have all but eliminated reproductively relevant human mortality (i.e. mortality that prevents an individual from having the opportunity to participate or fully participate in reproduction) from the period of infancy on, mutation accumulation is a serious concern: Given that every human trait is under some degree of genetic control, progressively larger burdens of harmful mutations threaten to impair the quality of every human trait. Unsurprisingly, over the last 80 years, a number of prominent biologists have called attention to the potential problem of deleterious mutation accumulation. These include Muller (1950), Haldane (1937), Hamilton (2001), Crow (1997), Kondrashov (2017), and Lynch (2016). The average estimated impact of these mutations on human "fitness" is on the order of a 1% loss per generation, which over the course of a century (approximately four generations) would be fairly substantial, potentially rendering mutation accumulation an existential risk (Lynch, 2016).

[2] Given the association between sperm count and general health (Levine et al., 2017), the massive declines in sperm count that Levine et al. (2017) find are especially troubling.

[3] But as it happens, "there is currently very little epidemiologic evidence linking prenatal and postnatal exposure to endocrine disrupting chemicals with male reproductive disorders (including reduced sperm counts)" (Pacey, 2017; see Bonde et al., 2017).

Importantly, not all relevant academics are in agreement about the threat of mutation accumulation. Arslan et al. (2018) suggest[4] that negative selection has not relaxed in the shift from pre-industrial to industrialized, or modernized, life. They draw this conclusion from the fact that paternal age effects on fitness-relevant outcomes are comparable across one industrialized and three pre-industrial populations. Paternal age effects are germane in that older fathers are thought to bequeath larger burdens of *de novo* (newly acquired, i.e. not present in the genome of either parent) deleterious mutations to their offspring than younger ones on average (Moorjani, Gao & Przeworski, 2016). Older mothers also bequeath larger burdens of *de novo* mutations to their offspring than younger ones on average, but the effect is much smaller compared to that of paternal age (Wong et al., 2016).

A recent exchange of papers in *Proceedings of the Royal Society B* (Arslan et al., 2018a, 2018b, 2018c; Woodley of Menie, Sarraf, & Fernandes, 2018), in which two of the current authors were involved, in part concerns the adequacy of paternal age effects on fitness-relevant outcomes as a proxy for negative selection, allowing comparison of the strengths of negative selection across populations and over historical time. Arslan et al. (2018a) find differential fitness-relevant outcomes among the children of fathers[5] of different ages in three historical populations and one modernized population (controlled for multiple covariates). This is taken to support the hypothesis that older fathers bequeath greater burdens of deleterious *de novo* mutations to their offspring on average compared to younger fathers. Arslan et al. (2018a) furthermore report evidence of slight declines in average paternal age over time. Given seeming implicit assumptions about the operation of negative selection acting on the *relative* fitness differences of genomes exhibiting different loads of deleterious mutations (e.g. the fitness of a given genome relative to the average genome of the population), and apparent minimal change in average age at paternity over time, Arslan et al. (2018a) reject claims of serious mutation accumulation in human populations (though Arslan et al., 2018b deny that they rejected these, an issue to which we will return):

[4] In subsequent relevant publications, they have denied that they made any such suggestion. In the course of this chapter, we explain why we disagree.

[5] Arslan et al. (2018a) also find evidence of grandpaternal age effects in one historical population.

> While advanced parental ages at first birth may entail smaller families, pre-industrial populations had similar average ages at birth and were not overwhelmed by mutational stress. So, we do not predict that contemporary reproductive timing will lead to unprecedented or unbearable de novo mutational loads and concomitant changes in the prevalence of genetic disorders. The decline in fitness with paternal age suggests that purifying selection is still effective in a modern population with hormonal contraception, social transfers and modern medicine. This runs counter to oft-repeated predictions of mutational doom by relaxed selection. (p. 8)

In response, Woodley of Menie, Sarraf, et al. (2018) observe that fitness variation as a function of paternal age is not sufficient to rid populations of deleterious mutations if the personal fitness costs of those variants are becoming increasingly attenuated via general reduction of environmental harshness through, for example, industrialization; simply put, the *relative* intra-population costs of larger burdens of *de novo* mutations could remain similar over time but change in the "absolute" costs could be great enough to allow accumulation of increasingly mildly deleterious mutations "across the board" (where the increase in mildness is driven by decreases in environmental harshness). Woodley of Menie, Sarraf, et al. (2018) point to research on the biological state index (I_{bs}; Henneberg, 1976), which operationalizes opportunity for mortality selection (i.e. selection which acts through differential mortality) in a population via the computation of a probabilistic index capturing the likelihood of a randomly selected individual within a given population having the opportunity to fully participate in the reproduction of the next generation. Essentially as the opportunity for selection decreases (as captured by factors such as diminishing infant mortality), an individual's likelihood of having the opportunity to fully participate in reproduction approaches unity. Thus, I_{bs} values are scaled from 0 to 1, with some contemporary countries having I_{bs} values around 0.99 (meaning that almost everyone born has the opportunity to fully participate in the reproduction of the next generation; Henneberg, 1976; Rühli & Henneberg, 2013).

If increases in I_{bs} generally correspond to attenuation of negative selection through differential mortality, then, in the absence of some countervailing negative-selective factor(s), as I_{bs} rises, a larger proportion of *de novo* deleterious variants will tend to persist across generations as *legacy load*, which will contribute to mutation accumulation. This phenomenon allows the average genome's burden of deleterious mutations to increase,

even though fitness variation among individuals as a function of, for example, paternal age effects will continue to be observed. What is preserved in this instance is the *rank order* of the paternal age effect on relative fitness (specifically, older fathers' children remain on average less fit than those of younger fathers, all else equal[6]).

Another crucial issue concerns the adequacy of I_{bs} as a proxy for negative selection in populations. There is no contemporary, modernized national population in which 99% of people who are born reproduce, despite the ~0.99 I_{bs} values in some of these populations; however, the index simply indicates the percentage of people who have the opportunity for full participation in reproduction by virtue of survival through all reproductively relevant years. The index is derived from mortality and fertility schedules, with the effect of mortality at different ages weighted according to the fertility rate in the population associated with each age. Mortality, especially child and infant mortality, may be a highly significant source of negative selection in historical and also certain contemporary populations—indeed childhood has been termed the *crucible of human evolution*, owing to the historically extremely high rates of child mortality (in particular) in certain regions and times (Volk & Atkinson, 2008, 2013). Woodley of Menie, Sarraf, et al. (2018) make the key claim that this mortality likely *has not been random* with respect to mutation load, especially if mutations have pleiotropic effects on multiple fitness-critical domains (pleiotropy is the phenomenon of one gene affecting more than one phenotypic trait), which is the basis for the existence of the *f* or "general fitness" factor among different sources of individual differences, such as cognitive ability, body symmetry, health, height, and so on, first proposed independently by David Houle (2000) and Geoffrey Miller (2000):

[6] For the purpose of illustration, suppose that those born in Population A to 30-year-old fathers have a 20% chance of dying in infancy due to the effects of *de novo* deleterious mutations and those born to 40-year-old fathers have a 40% chance of this outcome (and so the higher mortality risk for the offspring of the older fathers is due entirely to the tendency for the *de novo* burdens of harmful mutations that fathers bequeath to their offspring to increase with paternal age); the respective figures for Population B are 0.5% and 1% (assume that all else is equal between Population A and B, apart from differences in environmental conditions that render the same deleterious *de novo* variants more harmful in A compared to B). In both cases, the effect of ten additional years of paternal age is a doubling of the risk of infant death, but the overall strength of mortality selection in infancy against deleterious variants is clearly lower in B compared to A.

> If child and infant mortality were random with respect to deleterious variants, then they could not have been major sources of negative selection. There are reasons to doubt this possibility, however…the presence of the general fitness factor…suggests that in very competitive ecologies and in the absence of factors that would attenuate the fitness costs of mutations… pleiotropic mutations may have been especially lethal due to their potential to impair functionality across a number of fitness-critical domains. (Woodley of Menie, Sarraf, et al., 2018, pp. 1–2)

The *f* factor therefore serves to unite multiple vulnerabilities in historical populations (e.g. poor health should correlate with poor impulse control, which should in turn correlate with low cognitive ability and thus relatively high vulnerability to selection via "evolutionarily novel hazards," etc.); this might explain why, historically, infant and child mortality were highest among those with low socioeconomic status, who had concomitantly lower relative lifetime reproductive success as compared with those of higher status (Clark, 2007), reflecting the potential action of efficient negative selection (this model assumes that increasing mutation load puts descendants at risk of downward social mobility and reproductive failure).

Woodley of Menie, Sarraf, et al. (2018) further argue that the *f* factor is a plausible explanation for the so-called mutation load paradox—or the fact that premature death and reproductive failure are quite uncommon in modernized populations despite the high human deleterious mutation rate, which seems to entail that modernized populations should be in mutational meltdown, with very high reproductive failure (88%) and concomitantly very high compensatory reproduction (16 children per viable woman) needed to prevent this outcome (Kondrashov & Crow, 1993). Historical infant and child mortality might have approached the levels needed to remove deleterious mutations *if* the death was non-random with respect to mutations targeting *f* (in some countries historical child mortality was as high as 50%; Volk & Atkinson, 2013). This observation could substantially reduce the paradoxical quality of the discrepancy between theoretical predictions of mutational meltdown in modernized societies and their actual relevant conditions, in that it highlights that a substantially weaker "mutation load paradox" may well have been observed throughout most of human history (with selection on the relative fitness differences of genomes perhaps accounting for whatever disconnect would remain; Lesecque, Keightley & Eyre-Walker, 2012). The departure of modernized societies from high rates of premature death and reproductive

failure may in part be due to the mitigation of environmental harshness and its negative selective effects on mutation load through industrialization and its *sequelae*, and thus the average human genome historically may have been much closer to freedom from deleterious mutations than the contemporary genome (Woodley of Menie et al., 2017; Woodley of Menie, Sarraf, et al., 2018).

In a response to these and other arguments, Arslan et al. (2018b) make the following claim: "Woodley of Menie, Sarraf, et al. [2018] argue that opportunity for selection strongly corresponds to strength of purifying selection. However, there is no necessary correspondence between the two" (p. 2). Strictly speaking, this is incorrect, since opportunity for selection sets a limit on the strength of negative selection, as Arslan et al. (2018b) go on to acknowledge: "Selection strength cannot exceed opportunity, but it can be smaller and can vary independently" (p. 2). That aside, the lack of *necessary* correspondence does nothing to contradict the claim that there *likely is* meaningful correspondence (as a matter of empirical fact), and Arslan et al. (2018b) fail to provide any compelling basis to doubt this idea (their arguments are considered more fully in the Discussion). They refer to the role of "non-genetic social factors and random chance" (Arslan et al., 2018b, p. 2) in determining variation in fitness, but they do not mention the role that genetic factors would play in mediating the effects of many "non-genetic" environmental influences on fitness outcomes in humans. For example, one of the greatest causes, if not *the* greatest cause, of historical infant and child mortality, namely infectious disease (Caldwell, Caldwell, Caldwell, McDonald & Schindlmayr, 2006), would vary substantially in its effects on individual fitness as a function of the immunological integrity of children and infants. Arslan et al. (2018b) do not discuss the *f* factor or the challenge it implicitly poses to claims of high randomness with respect to genotype of historical infant and child mortality. Moreover, given that reproductively relevant mortality *from infancy on* (i.e. not including subinfant mortality, although as we will see this also seems to have decreased) has been nearly eliminated in many modernized societies, the point Arslan et al. (2018b) raise has limited importance: in periods of life where there is hardly any mortality, there can be hardly any negative mortality selection (consider Kondrashov, 2017: "An almost complete elimination of pre-reproductive mortality abolished the opportunity for selection through differential viability and, thus, definitely reduced its strength" [p. 193]). Unless one assumes that all or nearly all of the mortality from infancy through the subsequent reproductively relevant periods of life has been random with respect to del-

eterious mutations throughout human evolutionary history, and thus that the negative-selective fraction of this mortality has been at most minuscule, it is difficult to believe that modernization has not substantially relaxed negative *mortality* selection in these periods of life. Elective abortions, a source of subinfant mortality, are quite common in modernized populations, but the vast majority of these abortions are non-therapeutic, that is, not prompted by known medical problems with the aborted child, which lowers the likelihood that they have negative-selective effects (Woodley of Menie, Sarraf, et al., 2018; Arslan et al., 2018b offer a response on this score, which we consider in the Discussion of this chapter).

Woodley of Menie, Sarraf, et al. (2018) also offer a quasi-empirical simulation to illustrate their point about the possibility of mutation accumulation occurring despite persistent (and even declining) paternal age effects on *de novo* burdens of harmful mutations, using data on paternal age and imputed *de novo* mutation loads sourced from a study of the Icelandic population by Kong et al. (2012). The model was based on a simplifying assumption, namely that for birth cohorts separated by intervals of 20 years (as available from Kong et al., 2012), the *de novo* load of a particular cohort would persist to the next as legacy load in proportion to the historical I_{bs} value associated with that cohort. I_{bs} was modeled as increasing linearly from a value of 0.35 for the cohort with mid-year 1654.5 to 0.99 (equal to the observed contemporary value for Iceland, 0.99; Budnik & Henneberg, 2017) for the cohort with mid-year 2014.5, using data from Rühli and Henneberg (2013). The model indicated that mutation load should have increased linearly across cohorts (temporal $r = 0.987$), *despite* a significant decrease in paternal age across the cohorts (temporal $r = -0.714$). When the simulation was re-run fixing the I_{bs} value to 0.35 (approximately equal to the value for most of human history; Rühli & Henneberg, 2013), no significant change in cohort-by-cohort load was detected (temporal $r = -0.003$). Nonetheless, it must be emphasized that this model was not intended to give an estimate of the extent of mutation accumulation, or deleterious mutation accumulation, in the Icelandic population. Its purpose was to show that variation in (a proxy for) the strength of negative selection through mortality can vary rates of mutation accumulation even assuming positive paternal age effects on *de novo* load and declining paternal age. While it could be objected that the model cannot differentiate between neutral and deleterious mutation accumulation, the results of the condition in which I_{bs} was fixed to 0.35 for the full range of years indicate that the level of opportunity for mortal-

ity selection typical of human evolutionary history (at least in the period from infancy on) renders the probability of deleterious mutation accumulation extremely low (though there are further possible objections to our claims here that will be considered later).

Arslan et al. (2018b) critique the realism of this model on a number of grounds (see Discussion; Arslan et al., 2018b offer some irrelevant criticisms only because of an error on the part of the journal in which the critical exchange occurred—specifically, they were not provided with the final version of Woodley of Menie, Sarraf et al., 2018 before Arslan et al., 2018b was published). Most saliently, they assert that Woodley of Menie, Sarraf, et al. (2018) assume 10-year generations, but in a corrigendum (Arslan et al., 2018c) correctly note that 20-year generations were assumed (although the data used in Woodley of Menie, Sarraf, et al., 2018 are on cohorts, consistent with Kong et al.'s 2012 analysis); they (2018c) deem 20-year "generation" lengths to be unrealistic and inconsistent in the context of the model itself, given the variation in "generation" lengths implied by the variability of paternal ages. As it happens, the data that Woodley of Menie, Sarraf et al. (2018) sourced from Kong et al. (2012) concern birth cohorts, not generations, separated by 20-year intervals, and these birth cohorts are associated with variable average paternal ages simply because the paternal age at conception associated with those born in a year varies across years.[7]

What could be thought problematic, although we are unsure if this is what Arslan et al. (2018b, 2018c) had in mind, is Woodley of Menie, Sarraf, et al.'s (2018) use of data on each preceding cohort to approximate the legacy load bequeathed to each subsequent cohort in their model. Given that this model was intended only for the purposes of illustration and was explicitly a simplified representation of the relevant evolutionary dynamics, this choice of proxy was reasonable. The 20-year spacing between cohorts was the distance between mid-years, with each cohort spanning 10 years, thus the 1954.5 mid-year cohort contains those born from 1950 to 1959. At minimum, those born in the earlier part of the span of years likely contributed non-negligibly to the procreation of the

[7] Some confusion here perhaps results from a claim by Woodley of Menie, Sarraf, et al. (2018) that was mistakenly not removed from their text, namely that their analysis assumes "unchanging" "generation lengths" (p. 2). In fact, the analysis does not depend on this assumption, and the claim that it does was, again, not supposed to be published. This is reflected in the use of the term "cohort" rather than "generation" in all relevant places elsewhere in the article.

subsequent cohort. In light of the immediately foregoing, the simplified nature of the model, and the fact that no finer breakdown of the data is available from Kong et al. (2012), the 20-year spacing Woodley of Menie, Sarraf, et al. (2018) assume is acceptable for the purpose of roughly modeling the basic pattern of changes in mutation load across cohorts. Nevertheless, Arslan et al. (2018c) make a valid point concerning model realism—one that can be profitably addressed by re-examining the assumptions that went into the "legacy load" simulation, and re-estimating parameters on the basis of the addition of more realistic assumptions. To that end we will reanalyze the data from Kong et al. (2012) in an effort to test the robustness of the quasi-empirical simulation from Woodley of Menie, Sarraf, et al. (2018). We will also examine the pattern of temporal correlations between simulated changes in mutation load and one proposed driver of mutation accumulation—climatic mildness (Woodley of Menie, Figueredo et al., 2017). If the results of the new simulation correlate with this proposed driver, it will augment the finding via external validity.

Methods

Data

Mean Paternal Age at Cohort Birthyear

Icelandic data on mean paternal age at conception by cohort's birth year are displayed in Kong et al.'s (2012) figure 4 (p. 474), for ten-year spans with mid-year spacings between cohorts of two decades—starting with mid-year 1654.5 (for the span 1650 to 1659) to "2010+" (which if made equivalent to the spacing for the previous cohorts would correspond to a mid-year of 2014.5; Kong et al.'s data of course do not extend this far, indeed their paper was published in 2012, so simulated data corresponding to this mid-year must be considered a projection). These data were harvested using the *WebPlotDigitizer* (Rohatgi, 2017), which allows data to be extracted directly from figures with high accuracy. This yielded a total of 37 data points, spanning mid-years (rounded to nearest year) 1655 to 2015.

Estimating De Novo Mutation Load

Kong et al. (2012) convert the mean paternal age at conception into an equivalent burden of *de novo* mutations by simply multiplying paternal age

at conception by about two. Thus, a cohort born to fathers at a mean age of 35 would have an average of ~70 *de novo* mutations. (This is not to suggest that, for instance, mutations accumulate in the sperm from birth—of course, that would be impossible since males do not begin to produce sperm until puberty; rather, we are simply describing the operation used to derive the approximate average number of *de novo* mutations that males will bequeath to their offspring at different ages in light of Kong et al.'s [2012] study.) Since the publication of Kong et al. (2012), there have been several additional estimates of the paternal age effect on offspring *de novo* mutation counts. The results of seven of these studies are summarized in Moorjani, Gao, and Przeworski (2016), and the values for the mean numbers of *de novo* mutations bequeathed to offspring at the age of 30 range from 30 to 86.1. The weighted average across the seven studies is 1.38 per year of father's age (combined $N = 532$); thus mean *de novo* mutation values are assigned to each cohort by multiplying the mean paternal age at conception associated with each cohort by 1.38.

Estimating Legacy Load

It is a potentially important problem that the mid-year gap between cohorts (20 years) is unrealistic in a model of the transmission of legacy load, especially given that variable average paternal ages imply variable legacy loads. A new protocol was devised to compute generational (as opposed to cohort) changes in mutation load. This involved using the mean cohort paternal age, rounded to the nearest decade, to estimate generation length, which was used to assign a cohort's legacy load to a subsequent *generation's de novo* load. Thus, for example, the legacy load from the 1755 cohort is estimated by multiplying the estimated I_{bs} for 1755 in Iceland by that cohort's average received *de novo* load (as in Woodley of Menie, Sarraf, et al., 2018 I_{bs} was allowed to rise linearly from 0.35 in 1655 to 0.99 in 2015); this result is added (as legacy load) to the *de novo* load estimated for the 1795 cohort—this cohort being separated from the last by approximately one whole generation, on the basis that the mean paternal age for the 1795 cohort rounds up to 40 years. Owing to inconstant generational lengths over time, this led to a small number of decades for which there were no estimates of mutation load, which were left blank. In total, this yielded *generational* changes in mutation load spanning 28 decades. As with Woodley of Menie, Sarraf, et al. (2018), the decadal values were rescored as increases relative to a reference year (1695), which was assigned a reference value of zero mutations. *Contra*

Arslan et al.'s (2018b) *claim*, *this does not mean that the 1695 cohort had "mutation-free" genomes*—it is simply that this cohort serves as an anchor cohort against which the loads of subsequent decades are computed (Carter & Sanford, 2012 use effectively the same approach).

A second analysis was conducted in which the value of I_{bs} was set to 0.35 (the value for most of human history [Rühli & Henneberg, 2013]), as in Woodley of Menie, Sarraf, et al. (2018), in order to examine the effect on mutation accumulation of (probable) strong negative selection.

Icelandic Decadal Temperature Anomaly Estimates

Decadal running averages on temperature anomaly for Iceland (i.e. the degree to which that decade's temperature is higher or lower in degrees Celcius relative to a reference temperature) were extracted from data made publicly available via the Berkeley Earth Observatory (2017). It was assumed that it would take one generation for the effects of climatological mildness and its selective consequences (e.g. the impact on crop productivity, disease prevalence, and both intra- and inter-group violence; Woodley of Menie et al., 2017; Zhang et al., 2011) to impact mutation load, therefore the temperature means were lagged by one generation (e.g. the 1765 mean was correlated with the total load [expressed as a difference score relative to the reference cohort] of the 1805 cohort, etc.). This yielded 16 cohorts for which data on both were available. The running decadal means are only available going back to 1760.

Analyses

The first analysis involves correlating both sets of decadal mutation accumulation values with year in order to determine whether there is a temporal trend. The second analysis involves correlating the decadal mutation accumulation values derived from the first analysis (the values derived from the relaxing negative selection condition) with the Icelandic decadal temperature anomaly values, lagged by one generation.

Results

Analysis 1

In the first analysis, two separate temporal correlations are computed between the decadal change in mutation values and year, one for the

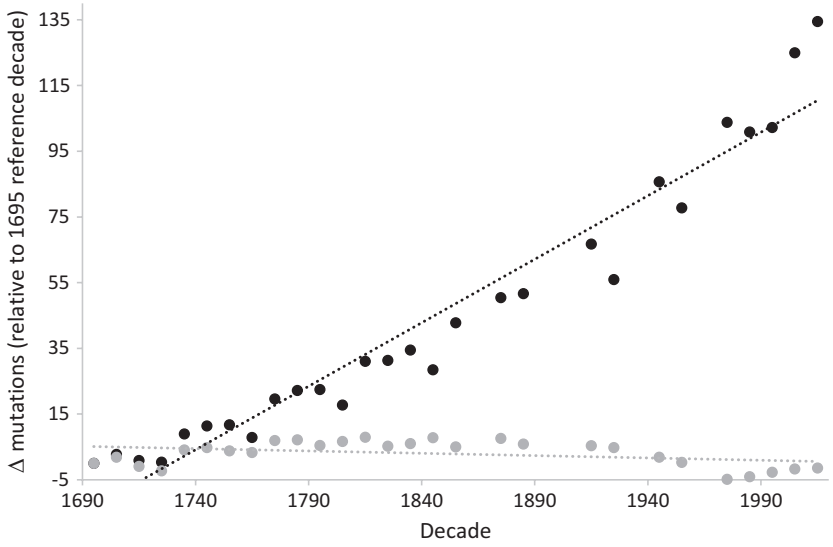

Fig. 6.1 The decadal change in mutation load (estimated relative to the 1695 reference cohort) under increasing I_{bs} (0.35 to 0.99, black points) and fixed I_{bs} (0.35, gray points), 1695 to 2015

relaxed negative selection condition (where I_{bs} is allowed to rise from 0.35 to 0.99) and one for the strong negative selection condition (where I_{bs} is fixed to a value of 0.35). The first correlation was 0.97 ($p < 0.05$, $N = 28$ decades), indicating mutation accumulation with time at a rate of 3.87 per decade. The second correlation was −0.37 (*ns*, $N = 28$ decades) indicating no significant change in mutation load. These temporal correlations are graphed in Fig. 6.1.

Analysis 2

In the second analysis (Fig. 6.2), the decadal change in mutation load (from the relaxing negative selection condition) is correlated with the generation-lagged Icelandic decadal temperature means. The two are correlated at 0.5 ($p < 0.05$, $N = 16$ decades), indicating, consistent with predictions, that increasing climatic mildness might have some role in mutation accumulation in Iceland. All analyses and computations were conducted using Excel.

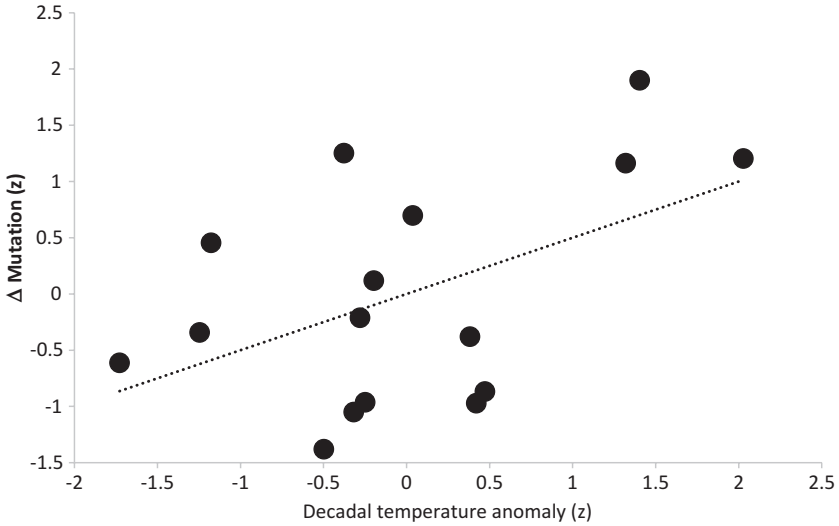

Fig. 6.2 The association between the decadal change in mutation load and the Icelandic decadal mean temperature anomaly, lagged by one generation, 1805 to 2005

Discussion

The results of our simulation, despite increased model realism, align well with those of Woodley of Menie, Sarraf, et al. (2018). The latter model estimated a yearly increase in mutation load of 0.8 mutations per year whereas the current model's estimate is 0.4, and the linear correlation of mutation load with time is 0.99 in the former and 0.97 in the latter, reflecting a high level of convergence between the simulations and that Woodley of Menie, Sarraf, et al.'s (2018) model is robust to increased realism of at least some assumptions (the discrepancy in the mutation accumulation rate is perhaps largely driven by the lower *de novo* mutation rate assumed in the current analysis compared to the earlier one; but in any case, neither analysis was or is intended to precisely estimate the count of accumulated mutations). Furthermore, the trend in mutation accumulation is consistent with predictions of Woodley of Menie, Figueredo et al. (2017), namely that increasing climatic mildness relaxes selection against deleterious mutations. Nevertheless, it must be understood that the use-

fulness of these quantitative estimates is in the fact that they allow evaluation of the importance of certain simplifying assumptions on the part of Woodley of Menie, Sarraf, et al. (2018). To reiterate, the original model was not intended to estimate the extent of mutation accumulation in the Icelandic population; instead, the point was to show that it may well be unwise to ignore legacy load in analyses of negative selection, and to instead pay attention only to paternal age and associated *de novo* mutation loads, insofar as the model illustrates the possibility of variable levels of mutation accumulation as a function of variation in (a proxy for) the strength of negative selection through mortality *even in a population with declining mean paternal age*. The primary purpose of the current model is the same. But since it is more realistic, the current model may somewhat approximate the rate of change in mutation load in the Icelandic population (on the assumption that mortality selection is the major source of negative selection and that a substantial proportion of the opportunity for selection historically corresponded to negative selection, about which more in what follows). Analysis 2, conducted above, provides some support for this possibility, and so adds robustness to Analysis 1, insofar as its results align with one prior prediction concerning a driver of relaxed selection against deleterious mutations (i.e. increasing climatic mildness).

Several criticisms of our model are possible. First, given the rounding that we had to use because of the nature of Kong et al.'s (2012) data, and the fact that the paternal age values concern age at conception and not at birth, our generation length estimates are not ideally precise. Second, one could observe that through our simulation we effectively do not consider fertility variance as a potential source of negative selection. Understanding the force of this possible criticism requires several considerations. The maximum possible intensity of negative selection equals the sum of fertility and (reproductively relevant) mortality variance multiplied by the heritability of this variance (Rühli & Henneberg, 2017). Estimates of the genetic variance of fertility generally range from around 0.10 to 0.20, when high-quality data are used (Bolund, Hayward, Pettay & Lummaa, 2015; Kondrashov, 2017). But in perhaps the most extensive analysis of the heritability of human fertility to date, including 80 samples, Henneberg (1980) estimated that genetic fertility variance may be less than 0.01 (see also Staub et al., 2018; if non-additive effects are involved, one can expect the broad-sense heritability of fertility to be higher—however, most estimates of the heritability of fertility depend on genealogical data, from

which the effects of dominance and epistasis are notoriously difficult to measure).

Unfortunately, high-quality estimates of the heritability of early-life mortality do not seem to be available. The earliest period for which estimates of this sort have been offered seems to be infancy, and even these are limited. Philippe (1977) finds a heritability of infant mortality of about 0.27, although in the absence of sophisticated variance partitioning he speculates that this estimate may reflect non-additive and shared environmental variance. A large genealogical study yields estimates of the additive heritability of infant and child mortality from 0.15 to 0.19 (Hanson, Smith & Hasstedt, 2014). Cavalli-Sforza and Bodmer (1971) use twin data to estimate a broad-sense heritability of mortality of 0.29, but this only pertains to individuals who survived at least to the age of five (p. 611). Ulizzi, San Martini, and Terrenato (1979) maintain that "perinatal mortality…early fetal losses apart, is universally considered as the most 'genetically' determined fraction of pre-adult deaths" (p. 140), making the absence of heritability estimates for pre-infant mortality, which is very difficult to measure (M. Henneberg, personal communication), especially challenging for those trying to ascertain the role of mortality in negative selection.[8] Moreover, the heritability of neither mortality (Philippe, 1977) nor fertility (Bolund et al., 2015; Briley, Harden & Tucker-Drob, 2015) has been stable over time. Crucially, it is a distinct possibility that attempts to establish genetic influences on mortality using classic heritability analyses will substantially underestimate those influences (to a more limited extent, this may apply to such analyses of genetic effects on fertility variance). The reason is that deleterious mutations idiosyncratic to individuals, occurring as a result of developmental noise and tending to cause subinfant and infant death in sufficiently harsh environments, may have had a greater role in early-life mortality before industrialization. (Note that even monozygotic twins typically are *not* genetically identical; see Liu, Molenaar & Neiderhiser, 2018.)

These results on the whole *might* indicate that mortality variance is much more heritable than fertility variance, indeed that fertility variance may have negligible heritability, and thus that failing to model the impact of fertility

[8] Nevertheless, Ulizzi et al.'s (1979) observation makes substantial declines in the perinatal mortality rate over time especially noteworthy (see Rahman et al., 2013; Sugai, Gilmour, Ota, & Shibuya, 2017; Woods, 2008).

variance potentially does little to bias our simulation. But the aforementioned temporal instability in the heritability of both parameters, and the high variability of estimates and limited set of studies to consider, weakens this argument. Therefore, future work simulating changes in mutation load ideally would account for changes in fertility variance, which we were not able to do in the current work; still, we do think that evidence indicates that, for probably most of human evolutionary history, mortality selection has had a substantially greater role in negative selection than sexual selection and variation in fecundity (which account for variance in reproductive success not explained by mortality variance, along with, e.g., non-fatal differences in organismal condition due to morbidity differences that do not affect fecundity and do not affect reproductive success exclusively through sexual selection). Setting aside for a moment the issue of which variance component bearing on reproductive success has been most determinative of negative selection throughout most of human evolutionary history, we can inquire into what trends these variance components have likely taken over time. Evidence generally indicates that just as opportunity for mortality selection has been profoundly diminished over the long run of human evolutionary history (Rühli & Henneberg, 2017), so has opportunity for sexual selection (Lippold et al., 2014). Janicke, Ritchie, Morrow, and Marie-Orleach (2018), in a study of many animal species, claim that an index that "sums up all variance in reproductive success arising from viability, fecundity and sexual selection … can be considered a proxy for net selection" (p. 6), and report evidence consistent with its being such a proxy. Since in humans it appears that opportunity for mortality selection and sexual selection have substantially declined, and that the impact of genetic differences in fecundity probably has been somewhat reduced through reproductive technologies (e.g. in vitro fertilization; Rühli & Henneberg, 2017), one can claim with confidence that the overall opportunity for selection has declined (see also Kondrashov, 2017, on apparent decreases following industrialization of Crow's index of opportunity for selection in human populations), which, if Janicke et al. (2018) are right, approximates changes in actual selection strength; this certainly gives some reason to predict that the strength of negative selection acting on human populations has fallen over time. Interestingly, Arslan et al.'s (2018a) model of paternal age effects indicates that in Sweden, negative selection on relative fitness differences may have relaxed slightly (for the other two historical populations considered, Arslan et al., 2018a lack corresponding data for these populations in modernized conditions, a point to which we return below). Briley et al. (2015) do note increases in the heritability of fertility in

recent decades in the United States, but this was followed by a decline. Additionally, and perhaps most importantly, Arslan (2017) notes, in a different publication concerning the paternal age effect data presented in Arslan et al. (2018a) and a separate analysis of sexual desire over the course of the menstrual cycle, that "[b]oth of my approaches' results were consistent with sexual selection not playing a major role in the selection against deleterious mutations…. Quantitatively, it seems likely that survival selection plays a bigger role in selection against mutations than sexual selection" (p. 29). With respect to his paternal age effect data specifically, the basis for this conclusion of Arslan's (2017) was the absence of clear paternal age effects on marriage success, which Arslan et al. (2018a) also report: "We found no robust pattern of effects on survival to age 15 and the odds of getting married" (p. 6; exactly the same sentence is found in Arslan, 2017, p. 95). These empirical results, although most germane to selection on relative fitness differences, align with theoretical claims to the effect that differential mortality is a greater (perhaps much greater) contributor to negative selection than differential fertility, at least in the case of differential fertility due to sexual selection—although these theoretical claims, as already indicated, have been based on estimates suggesting that genetic influences on mortality variance are larger than those on fertility variance (e.g. Henneberg, 1980; Rühli & Henneberg, 2017).

Moreover, recent changes in fertility behavior resulting from the availability of contraceptives may mostly have had the effect of promoting certain patterns of selection, such as those reducing genotypic intelligence (Woodley of Menie, Figueredo et al., 2017), which could relate to indications of relaxed negative selection on fitness differentials in the course of recent decades alone (to the extent that these are present). Pflüger, Oberzaucher, Katina, Holzleitner, and Grammer (2012) find that among women *not* using hormonal contraception, attractiveness (a potential signal of low mutation load) positively predicts reproductive success, whereas this association was not found in women *using* such contraception (their sample, however, was small). In a similar vein, Kanazawa (2003) replicates another researcher's (Pérusse, 1993) finding that higher status does not tend to advantage the reproductive success of men in modernized societies (Kanazawa operationalizes status using income, whereas Pérusse uses a composite measure), but does positively associate with their number of sexual partners and frequency of intercourse (*cf* Hopcroft, 2015); this indicates that were it not for the availability of contraception, wealth would tend to positively associate with male fertility in modernized popu-

lations (but if Hopcroft, 2015 is right that those variables *do* tend to positively correlate in men of modernized populations, there is a further question of whether the strength of the association has relaxed over time; evidence of severe lopsidedness in reproductive participation ratios in most of human evolutionary history, favoring women over men and suggesting strong sexual selection acting on men, selection that was likely in large part for status given standard evolutionary theory, certainly suggests such relaxation—see Brown, Laland, and Mulder, 2009; Lippold et al., 2014).

Third, one could argue that our model's results are implausible, given that molecular genetic studies have failed to find substantial variation in the frequency of at least certain kinds of mutations across populations (e.g. Simons & Sella, 2016; see Arslan et al., 2018b), which seem to have been subjected to widely variable legacies of mortality selection. This would appear to indicate that mortality has been highly random with respect to deleterious mutations and thus is of limited relevance to our understanding of negative selection in humans. Controversy in this area of molecular genetic inquiry is very high, however[9] (Gravel, 2016); moreover, comparing the mutation load of different geographical populations may not be the optimal approach (a point on which Arslan et al., 2018b *might* agree). One study restricted to European populations found substantial increases in burdens of disease-related mutations over many thousands of years, especially mutations related to common diseases such as obesity and diabetes (Aris-Brosou, 2019). In any case, the molecular genetic analyses currently possible are unlikely to fully register the effects of relaxed negative selection stemming specifically from industrialization and its *sequelae*: "[Molecular genetic comparisons of human and related populations] cannot rule out relaxation of selection after the Industrial Revolution, because even a free accumulation of *de novo* mutations in the course of a few generations would be hard to detect by studying genotypes alone" (Kondrashov, 2017, p. 192; see also Woodley of Menie, Sarraf, et al., 2018). Arslan (2017) offers a related observation—"similar molecular genetic indices [to those of Simons and Sella (2016)] have not yet been used to test for changes in mutation load over recent periods in the same populations, but molecular genetic methods are probably not sufficiently

[9] Arslan et al. (2018b) do not adequately acknowledge the depth of this controversy.

powerful at present genome sequence sample sizes to detect the small expected changes over short periods" (p. 33).

Fourth, one could maintain, in spite of the arguments already offered, that there is not enough evidence that I_{bs}, or opportunity for mortality selection, substantially corresponds to the strength of negative selection. Against this possible counter, we note that I_{bs} has been shown to significantly positively associate with the prevalence and incidence of certain diseases and medical conditions across populations, even after controlling for salient covariates; these include the prevalence of obesity (Budnik & Henneberg, 2017; You & Henneberg, 2018; see also Voss, Goodson & Leon, 2018; Zheng & Tumin, 2015), the prevalence of type-1 diabetes[10] (You & Henneberg, 2016) and the incidence of many cancers (You & Henneberg, 2017). The findings of robust and significant positive associations between I_{bs} and obesity and diabetes prevalence, controlled for several possible confounds such as indicators of economic development, should be considered alongside the molecular genetic evidence of mutation accumulation that Aris-Brosou (2019) reports; Aris-Brosou notes that variants predictive of obesity and diabetes have increased in frequency even into the twenty-first century, and if in recent centuries this mutation accumulation is due at least in part to relaxed negative selection, the positive association between I_{bs} and obesity and diabetes prevalence may indicate that I_{bs} tracks the strength of negative selection against these variants to at least some extent (though note that Aris-Brosou does not provide any evidence that the mutation accumulation he reports is due to relaxed negative selection; it is merely possible that the mutation accumulation in the more recent centuries for which he presents evidence is to some extent a consequence of relaxed negative selection, a possibility that he seems to hint at via a citation of Lynch, 2016). Moreover, the idea that rising I_{bs} over time reflects relaxation of negative selection aligns with concurrent trends in the increasing prevalence of various medical abnormalities (Rühli & Henneberg, 2013), as well as indications of progressively greater developmental instability (such as sinistrality [Woodley of Menie, Fernandes, Kanazawa, & Dutton, 2018] and craniofacial fluctuating asymmetry [Woodley of Menie & Fernandes, 2016]). The possibly very recent origins of certain diseases, such as schizophrenia (Hare, 1988; Turner, 1985),

[10] Type-2 diabetes prevalence has been shown to associate in the expected direction with opportunity for selection through differential mortality (Rühli, van Schaik, & Henneberg, 2016), but it is unclear if this correlation would survive relevant controls.

which is highly heritable (Keller & Miller, 2006), in addition to those related to instability of the 11p15.5 chromosomal region (Shterenshis, Roitblat, Ilani, Lumbroso & Padilla-Raygoza, 2018), are also consistent with relaxation of negative selection around the time of industrialization. In the absence of adequate genomic data, information on phenotypes should be considered in examining possible changes in negative selection over time (Kondrashov, 2017, p. 192). Moreover, historically mortality selection was clearly non-random with respect to social class (Woodley of Menie, Sarraf, et al., 2018), which is under substantial genetic control (Clark, 2014; Clark & Cummins, 2018) and is thus plausibly open to being adversely impacted via the action of pleiotropic mutations reducing *f* and thus impairing relevant cognitive and conative phenotypes (Houle, 2000; Miller, 2000).

Arslan et al. (2018b, 2018c) strongly criticize a simplified version of the model presented here (Woodley of Menie, Sarraf, et al., 2018), and we now turn to the points that they raise.

Arslan et al.'s (2018b) main response contains errors due ultimately to a publisher mistake (see above), which were corrected in a corrigendum (Arslan et al., 2018c); so here we will only deal with the parts of Arslan et al.'s (2018b) critique that were not corrected by Arslan et al. (2018c). At the outset, Arslan et al. (2018b) assert that their "data did not permit conclusions about *accumulated* genetic load" (p. 1, emphasis in original), indicating that Woodley of Menie, Sarraf, et al.'s (2018) arguments concerning mutation accumulation are irrelevant to the original article of Arslan et al. (2018a). But their original piece presents its findings as "run[ning] counter to oft-repeated predictions of mutational doom by relaxed selection" (Arslan et al., 2018a, p. 8) from, among others cited, Lynch (2016), whose major basis for expecting "mutational doom" (as Arslan et al. put it) *is* mutation accumulation, which cannot be dismissed with the mere finding that paternal age effects on fitness across three pre-industrial and one industrialized populations are comparable, per Arslan et al.'s own admission (to recapitulate, such paternal age effects in three historical populations and one modernized population were the key findings of Arslan et al., 2018a). At least for that reason, Woodley of Menie, Sarraf, et al. (2018) reasonably took mutation accumulation to be relevant. (Elsewhere, Arslan et al. [2018b] interpret the claim of Simons and Sella [2016, p. 150] concerning evidence that there is "little or no difference in the load of non-synonymous mutations among human populations" as "[i]n line with our own conclusions" [p. 2]. But how can this

result of Simons and Sella's [2016] be "[i]n line" with the conclusions of Arslan et al. if the latter's data do not allow conclusions about "*accumulated* genetic load"? Arslan et al. [2018b] indicate that they take the "opportunity to clarify and expand on the conclusions that can potentially be drawn from our data [from Arslan et al., 2018a] with respect to mutation load" [p. 1]. But what they offer in light of further consideration of their data does not meaningfully differ from what Arslan et al. [2018a, including the supplement] present, and in any case Arslan et al. [2018b] contend that it was their "data" that did not allow "conclusions about *accumulated* genetic load"; yet it is that data that they use to reach "conclusions" that they believe to be "[i]n line" with the findings of Simons and Sella [2016], whose work they say "address[es] the issue of accumulated mutation load more directly" [Arslan et al., 2018b, p. 2].)

Arslan et al. (2018b) further argue that Woodley of Menie, Sarraf, et al. (2018) "muddle," "[occlude]," and "confus[e]" the distinction between opportunity for selection and negative selection. This is incorrect, as Woodley of Menie, Sarraf, et al. (2018) indicate that mortality and negative mortality selection theoretically could be independent: "If child and infant mortality were *random with respect to deleterious variants*, then they *could not have been major sources of negative selection*" (p. 1, emphasis added). They then go on to argue at length for the view that mortality selection is unlikely to have been random with respect to deleterious mutations historically. Furthermore, at no point do Woodley of Menie, Sarraf, et al. (2018) state or suggest that opportunity for selection and negative selection in fact fully overlap—it would be incorrect to posit this total correspondence given what we do know about the heritability of reproductively relevant mortality.[11]

[11] Arslan et al. (2018b) write the following in an endnote to their discussion of the opportunity for selection/negative selection distinction: "This confusion between opportunity (variation) and actual selection strength is also at the heart of the [sic] [Woodley of Menie, Sarraf, et al.'s] reiterated concern about a potential selective role of abortions that may compensate for selection that no longer occurs through infant mortality. Yes, the majority of abortions are elective, but in England and Wales 1–2% are therapeutic. Likewise, our estimate of the regression coefficient of paternal age on infant survival in the preindustrial populations is also only a few per cent and thus a fraction of the 12–20% infant mortality. According to our estimates, the majority of the variance in mortality and fertility is not explained by paternal age" (2018b, p. 3, n. 1). In observing that "most…abortions [in modernized populations] are elective rather than therapeutic" (p. 2), Woodley of Menie, Fernandes, et al. (2018) already conceded that some abortions are therapeutic. Furthermore, if Arslan et al.'s (2018b) point is that only the infant mortality variance "explained by paternal age" should

In criticizing the simulation of mutation accumulation from Woodley of Menie, Sarraf, et al. (2018), Arslan et al. (2018b) make several claims. First, they assert that the model assumes that "Icelanders" in "1654" were free of mutations. This is false: the birth cohort (not the total population of Iceland) assigned 1654.5 as a mid-year was taken to be a *reference sample* relative to which the accumulation of mutations could be tracked for the purpose of illustrating mutation accumulation—no assumption of freedom from mutations was involved. Second, they assert that the simulation "assum[ed]" that mutations are "incurred" at a rate of 70 on average per generation (Arslan et al., 2018b, p. 2); we assume that Arslan et al. are objecting to our use of Kong et al.'s (2012) estimate of the rate at which *de novo* mutations occur in sperm with age (which entails that at age 35 males will on average bequeath ~70 *de novo* mutations to their offspring)—in the current analysis, a lower rate was assumed, as explained above. Further, they argue that the model entails the objectionable assumption that these are "70 *equally deleterious* mutations" (p. 2; emphasis in original); but it is obvious that, all else equal, as negative selection (approximated using I_{bs}) relaxes, any harmful variant that varies in its harmfulness as a function of environmental and genomic conditions (and so, for instance, does not eliminate carrier fitness in all environments) will have a lower probability of being selected against, even though this probability will vary from allele to allele as a function of deleteriousness. A similar point could be raised against Arslan et al.'s (2018b) objection to the model's implicit assumption that all accumulated mutations are additive. Again, it is reasonable to assume that even non-additive deleterious mutations are *generally more likely* to be selected against the stronger negative selection is. Arslan et al. (2018b) of course are correct that the fact that our simulation does not model various differences among mutations renders it less precise than it would be if it did, but for the reasons we have just given we doubt that accounting for these factors would undo the basic finding of mutation accumulation.

Arslan et al. (2018b) also claim that the model assumes that only viability selection is relevant to negative selection and that "all" pre-reproductive mortality is due to mutations. But as even Arslan (2017) observes, there is evidence that "sexual selection [does] not [play] a major role in

be thought to track negative selection through infant mortality, we think that they are mistaken, for reasons given in the main text about the probable inadequacy of paternal age effects to capture the full extent of negative selection.

the selection against deleterious mutations" (p. 29); so while modeling the effect of fertility variance would be ideal, especially fertility variance not related to sexual selection (negative selection related to which we expect has declined due to the use of reproductive therapies), we do not suspect that this is a source of large bias in our simulation. Moreover, that deleterious mutations cannot account for all pre-reproductive deaths does not change the probable fact that such mutations tend to be removed *in proportion to* the opportunity for selection through differential mortality, if one accepts the evidence that there is some substantial correspondence between opportunity for and strength of negative mortality selection (given above); it could be that even if negative selection through mortality, from infancy on, has decreased, increased negative selection through fertility differences or through subinfant mortality could offset this decline, although for reasons already given we doubt that this has happened to the extent needed to prevent deleterious mutation accumulation.

The alleged assumption of short generation lengths—and the supposed assumption that "every 10 years everybody dies after reproducing and is replaced by their children"—also draws the critical attention of Arslan et al. (2018b, p. 2; see also 2018c). As noted earlier, Woodley of Menie, Sarraf, et al.'s (2018) model merely employs the estimated *de novo* load and I_{bs} of the birth cohort preceding any given one to *approximate* the *average* legacy load that the latter cohort received. Even after adjusting the model here by adding dynamical generation lengths and more realistic assumptions concerning *de novo* load, the results remain consistent with our earlier claims, indicating that the proxies assumed in the prior model were reasonable.

Arslan et al. (2018b) conclude their direct critique of Woodley of Menie, Sarraf, et al.'s (2018) model with the following: "Merely by discarding the incorrect assumption that Icelanders in 1654 were mutation-free or by doing away with the false equivalence between I_{bs} and strength of purifying selection, their results would change completely, no longer showing an increase in mutation load. We argue, therefore, that these simulations do not demonstrate anything relevant to the question of whether *deleterious* genetic load has risen and what role relaxed selection may play in this rise. We already knew that neutral mutations accumulate: this is the basis of the evolutionary clock" (p. 2).

We reject Arslan et al.'s (2018b) confident predictions about the adjustments that would nullify the results of the analysis. Again, since the 1654.5 birth cohort is an anchor, the "assumption" of mutation-free Icelanders

was never made—and clearly altering the values associated with the first cohort in our time series would not affect the *relative* simulated increase in mutation load. Since we have already addressed the issue of the correspondence between I_{bs} and strength of negative selection, we will not repeat ourselves in response to one of Arslan et al.'s (2018b) objections quoted just above; moreover, our argument is compatible with most mutations being essentially neutral—it need only be the case that there is a tendency for deleterious mutations to accumulate the smaller the opportunity for mortality selection is, as the research of Henneberg and colleagues suggests. Certainly Aris-Brosou's (2019) findings give some reason to believe that the mutation accumulation that has occurred for many thousands of years, in some European populations, has not been irrelevant with respect to at least one fitness-salient aspect of human phenotypic condition, namely health.

There are aspects of Arslan et al.'s research that should be mentioned. A peculiar choice of Arslan's (2017) is to highlight the fact that "the effect on overall offspring fitness was descriptively smaller in Québec than in 20th-century Sweden" (p. 32). It is unclear why this was done given that the paternal age effect analysis lacks data on modernized Québec. On the other hand, data for both pre-industrial and modernized Sweden are available and indicate that the paternal age effect on offspring fitness is "descriptively" greater in historical than in modernized Sweden (a decade of advanced paternal age predicts a 3.4% reduction in reproductive success in twentieth-century Sweden but a 7.3% reduction in pre-industrial Sweden; Arslan, 2017, p. 89; Arslan et al., 2018a, p. 4).

A critical point that Woodley of Menie, Sarraf, et al. (2018) offer, but which Arslan et al. (2018b, 2018c) leave unanswered, is that paternal age effects may poorly track the overall strength of negative selection, given that these effects, which are relative by nature, could remain comparable (at least across a certain range of negative-selective regimes) even as, for example, absolute death rates due to deleterious mutations differ. That is, the relative fitness costs of a given increase in deleterious *de novo* mutation load across different regimes of negative selection could remain similar—so long as there is non-negligible negative selection in all cases. The persistence of these *relative* fitness costs, as indexed by, for example, paternal age effects, would indicate that negative selection is present in all cases, but not that the overall strength of negative selection is equivalent in all cases. In some places, it seems that Arslan recognizes this—for example, where he claims that his findings of paternal age effects in a modernized

population permit the modest conclusion that "purifying selection is still effective in a modern population with hormonal contraception, social transfers, and modern medicine" (2017, p. 101; same passage, with the exception of one comma, in Arslan et al., 2018a, p. 8). He is correct about this. But it does not clearly follow where he goes on to argue in the very next sentence that "[t]his runs counter to oft-repeated predictions of mutational doom by relaxed selection" (Arslan, 2017, p. 101; exactly the same sentence in Arslan et al., 2018a, p. 8). The mere fact that negative selection has not been fully eliminated is compatible with its having been relaxed compared to some prior point in time. Therefore, Arslan has not offered evidence that is definitely inconsistent with predictions of relaxed selection and adverse consequences from it.

Nevertheless, Arslan et al. (2018a, 2018b) seem to lean heavily on the possibility that a great deal of negative selection may occur on relative fitness differences, but ignore Lynch's (2016) point that "soft" selection, "in the sense that individual performance is simply measured against the moving mean" is compatible with "decline in the baseline performance of physical and mental attributes in populations with the resources and inclination toward minimizing the fitness consequences of mutations with minor effects": "physical defects involving cancer, metabolic disease, and psychiatric disorders have very real costs regardless of the average population state" (p. 873). And again, even if negative selection on relative fitness differences has not much changed, this together with relaxation of negative selection on absolute fitness differences would have the net effect of reducing negative selection. Arslan et al. (2018a, 2018b, 2018c) ignore the evidence that this has in fact occurred in the voluminous germane research of Maciej Henneberg and colleagues, which Woodley of Menie, Sarraf, et al. (2018) discuss.

Finally, it should be noted that certain important classes of deleterious mutations may be unrelated to paternal age (see Girard et al., 2016; Gratten et al., 2016).

It is important to establish the plausibility of the basic mutation accumulation scenario, since in the next chapter the effects of the accumulation of deleterious mutations of a specific kind, which impose fitness costs not just on their carriers, but also on those with whom they transact within a social-epistatic context, will be discussed and explored empirically. The mutation accumulation phenomenon will be shown to be potentially far more central to understanding the decline of modernized civilizations than has previously been thought, although the mechanisms for this process have been only recently elucidated.

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CHAPTER 7

The Social Epistasis Amplification Model: A Diachronic Test and Expansion of Theoretical Foundations

Introduction

Assuming that deleterious mutations have been accumulating in Western populations following industrialization, it remains to be established whether this is a serious problem. The eminent geneticist James Crow (1997) did not seem to think it is: "[Deleterious mutation accumulation] is a problem with a long time scale; the characteristic time is some 50–100 generations, which cautions us against advocating any precipitate action. We can take time to learn more. Meanwhile, we have more immediate problems: global warming, loss of habitat, water depletion, food shortages, war, terrorism, and especially increase of the world population" (p. 8385). As we have seen, other geneticists do not agree: "[T]he recurrent load of mutations imposed on the human population [may drag] fitness down by … 1% per generation"; "A fitness decline of a few percent on the timescale of a century is on the order of the rate of global warming, and that is part of the problem" (Lynch, 2016, pp. 872, 874). In any event, both the optimists *and* pessimists in this debate may be vastly underestimating the extent of the problem.

Virtually all attempts to model the fitness costs of deleterious mutation accumulation assume that the harmful effects of mutations are limited to the organisms that carry them. Therefore, it would be expected from these models that in a population accumulating deleterious mutations, fitness losses are merely a function of the proportion of the population carrying these mutations and the mutational burdens of the carriers. But Sarraf and

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Woodley of Menie (2017) and Woodley of Menie, Sarraf, Pestow, and Fernandes (2017) observe that this is not necessarily the case. Large experimental literatures document a phenomenon known as *social epistasis*, or genomic transactions that occur between or among organisms, such that the genome of one organism, or the genomes of two or more organisms, influences the gene expression of another organism or other organisms (see, e.g., Domingue & Belsky, 2017; Linksvayer, 2007). It has been experimentally demonstrated that social-epistatic transactions regulate the expression of genetic variants underlying fitness-salient traits in at least some social species (e.g. Baud et al., 2017; Teseo, Châline, Jaisson, & Kronauer, 2014). The optimum expression of genes associated with a given trait in members of at least some social species is contingent upon social exposure to individuals within the population exhibiting different levels of expression of the same or other genetic variants (Linksvayer, 2007 gives the example from an experiment involving three ant species of "adult worker size [being] determined by an interaction between the genotypes of developing brood and care-giving workers" [p. 1]. Such social-epistatic effects can arise via *coevolution* of "socially interacting genes" (Linksvayer, 2007, p. 1), which may give rise to correlations between the frequencies and/or expression levels of genetic variants among individuals within a population.

Social-epistatic effects can bias heritability estimates for at least some traits in certain social species, where the genetic effects on trait development or expression are partly due to *indirect genetic influences* arising from the *social genome* (Domingue & Belsky, 2017). Experimental evidence involving mice reveals that social genetic variation may account for up to 29% of the variance in particular phenotypes, such as anxiety and immune function; moreover, effects of social genetic variation were found to associate with changes in mouse gene expression, consistent with the presence of social-epistatic effects (Baud et al., 2017). In human populations, recent research indicates the presence of social-epistatic effects on educational attainment, though this research did not involve direct testing for molecular intermediaries causing changes in gene expression, which is necessary to confirm the presence of social-epistatic effects (Domingue et al., 2018).

An apparently little-appreciated consequence of social-epistatic effects is that they present deleterious mutations with a potentially very large fitness target—one that reaches beyond the individual organism and into the *extended phenotype* (Dawkins, 1982) of that organism's population (in humans, we can safely say that culture makes up at least part of a

population's extended phenotype). The potential for mutations present in one organism to affect patterns of gene expression, and thus phenotypic traits, in (multiple) other organisms has something of a parallel in the fact that mutations have *pleiotropic effects* within organisms. As mentioned in the last chapter, a gene exhibits pleiotropy if it influences more than one phenotypic trait. This has been posited as an explanation for the existence of the *f* factor of general fitness, discussed in the previous chapter (Houle, 2000; Miller, 2000).

The extension of the *f* factor to the multiple domains of group functioning that characterize the human population-level extended phenotype suggests that the costs of deleterious mutation accumulation may be far more severe than ordinarily thought. Woodley of Menie, Sarraf, et al. (2017) termed mutations with negative fitness effects on both carriers and, through social epistasis, other organisms, "spiteful mutations," as such variants are globally costly to fitness. Their *social epistasis amplification model* (SEAM) posits that social-epistatic amplification of spiteful mutations' effects has the potential to rapidly and profoundly reduce the fitness of entire populations. Indeed, the SEAM was originally proposed as a partial explanation of the demographic transition,[1] a process that has reduced proxies of group-level fitness far more precipitously than standard mutation-accumulation models would predict: "Total fertility rates in the USA for example fell from 3.7 between 1955 and 1959 to 1.8 between 1975 and 1979"[2] (Woodley of Menie, Sarraf, et al., 2017, p. 183). Moreover, it was argued that the SEAM predicts that certain non- and anti-normative ideologies (in traditional perspective) that negatively associate with fitness, especially for those of high intelligence, such as atheism and certain contemporary Western manifestations of individualizing moral psychologies (see Faria, 2017; Meisenberg, 2019), potentially have their ultimate origin in spiteful mutations, and

[1] The demographic transition (DT) is a consequence of industrialization, and refers to the movement of populations from high fertility and mortality rates to low fertility and mortality rates. In pre-DT populations, mortality is concentrated in infancy and childhood, and is mostly caused by infectious disease. In post-DT populations, mortality is concentrated in the elderly and is mostly caused by chronic and degenerative diseases (Caldwell, Caldwell, Caldwell, McDonald, & Schindlmayr, 2006).

[2] Hopcroft (2019) objects to certain claims to the effect that low fertility following the DT is maladaptive, but not to claims of the sort that we make in this context: "while below-replacement fertility *is clearly maladaptive for the group*, it is not necessarily maladaptive for individuals" (2019, p. 158; emphasis added).

that the spread of these ideologies may be facilitated through negative social epistasis. Consistent with the predictions of the SEAM, experimental evidence indicates that there are "tipping points" in social convention, such that only ~25% of a group must be committed to some convention to very quickly bring the majority of that group's non-adopters to take on that same convention (Centola, Becker, & Baronchelli, 2018). While this result needs replication, especially since it is based on analysis of a relatively small sample, it evidences the potentially very rapid rate of cultural change, which suggests a pathway for the effects of deleterious mutations to influence groups in surprisingly little time once such mutations have reached a certain critical frequency in a population.

Thus far, there have only been two attempts to empirically test the SEAM in humans. The first, by Dutton, Madison, and Dunkel (2018), tested the SEAM's prediction that irreligiosity positively associates with indications of increased mutation load as reflected in markers of developmental instability. Utilizing one such marker (left-handedness; Markow, 1992), these researchers found positive associations with irreligiosity, in line with the predictions of the theory. A second test of the SEAM from Woodley of Menie, Kanazawa, Pallesen, and Sarraf (in preparation) tried to determine if a behavioral correlate of irreligion (operationalized as the opposite of church attendance, or "church absenteeism") is positively associated with burdens of deleterious mutations using another method. Specifically, it examined two large data sets, each sampled from a different US cohort, for paternal age effects on "church absenteeism" after statistically controlling for a large number of covariates. Paternal age was positively associated with this behavioral correlate of irreligion in the more recent of the two cohorts (born in the 1970s and 1980s) but not the older one (born in the 1930s and 1940s). These findings were interpreted as potentially consistent with the SEAM, since in older cohorts (exhibiting a presumably lower mutation load overall), fitness-enhancing (positive) patterns of social epistasis may have enforced adaptive behaviors even among those born to older parents, who exhibit relatively higher burdens of deleterious mutations. Conversely, in more recent cohorts with higher aggregate loads of harmful mutations and resultantly degraded (and thus negative) patterns of social epistasis, spiteful

mutations may be freer to express in the form of maladaptive behavior. Dunne et al. (1997) found a similar effect related to sexual behavior, specifically that the heritability of age at sexual debut rose in the wake of the sexual revolution, that is, the relaxation of traditional norms governing sociosexuality, typically thought to have started in the West around the 1960s–1970s (Inglehart, 1977). Again, this finding may reflect the expression of genetic predispositions toward non-normative behavior upon release from cultural or social-epistatic controls, or the epigenetic activation of such predispositions through negative social epistasis. Nonetheless, with regard to the SEAM, this potential cohort effect should be treated as a prediction, which requires further investigation.

So while preliminary tests of the SEAM in human populations offer some support for the model, they are small in number and have only concerned one of its predictions. More substantial work relevant to the SEAM has been conducted on mice, with results that strongly support its predictions. For example, Crews, Fuller, Mirasol, Pfaff, and Ogawa (2004) found that the distribution of genotypes in the social environment of mice "influence[d] the development of sociosexual behaviors" in the mice (p. 935). The subsequent research of Crews, Rushworth, Gonzalez-Lima, and Ogawa (2009) offers evidence that mouse litter composition has long-term developmental effects on the expression of "aggressive behaviors" in adult mice. More recently, Kalbassi, Bachmann, Cross, Roberton, and Baudouin (2017) found that mice with a mutation related to autistic-like behaviors (deletion of the gene *Nlgn3*) modify the behavior of mice without this mutation, such that the latter act in autistic-like ways. Strikingly, housings of male mice containing carriers of the *Nlgn3* deletion mutation were unable to form normal social hierarchies and exhibited depressed levels of testosterone compared to housings without these carriers; even more interestingly, the behavior of non-carrier mice exposed to carriers normalized after the carrier mice re-expressed *Nlgn3* in relevant brain cells. Sarraf and Woodley of Menie (2017) maintain that these findings are best explained by the SEAM. Furthermore, and as noted in Woodley of Menie, Sarraf, et al. (2017), effects such as these might account for the dynamics that Calhoun (1973) noted in one of his *mouse utopia* experiments (known as "Universe 25"). This experiment involved housing mice in cornucopian conditions to induce substantial population growth and overcrowding,

which had the (unintended[3]) effect of minimizing the opportunity for selection to act, necessarily minimizing the opportunity for negative selection specifically. Consistent with the SEAM, complete collapse of the colony, that is, complete loss of group fitness, was preceded by the rise of abnormal mouse phenotypes, which Calhoun termed "the beautiful ones," or

> [a]utistic-like creatures, capable only of the most simple behaviors compatible with physiological survival, emerge out of this process. Their spirit has died ("the first death"). They are no longer capable of executing the more complex behaviors compatible with species survival. The species in such settings dies.[4] (p. 86)

Subsequent experimental work on mice, explicitly informed by the SEAM, has elucidated the specific vector by which carriers of the *Nlgn3* deletion impair the behavior of healthy mice: Mice carrying this mutation secrete a major urinary protein pheromone called Darcin, which induces in non-carriers a socially avoidant phenotype characterized by lack of interest in socially salient olfactory cues and diminished social learning ability (non-carrier mice exposed to carrier mice became far less efficient in marking

[3] Calhoun's experiments were not informed by evolutionary genetics. Moreover, Calhoun (1973) denied any role for mutations in the social/behavioral disturbances observed in the Universe 25 experiment.

[4] It appears that Calhoun, and other experimenters, had difficulty replicating the colony collapse finding (see Hammock, 1971; Kessler, 1966, while failing to fully replicate Calhoun's Universe 25 findings, documents deviant mouse behavior potentially consistent with negative social-epistatic effects). Calhoun only noticed behavioral abnormalities in mice in his Universe 25 experiment. Similarly, Hammock (1971) found effects consistent with Calhoun's Universe 25 results in a pilot study, but failed to replicate those results in his more involved further experimental work. We surmise that the lack of sophisticated genetic controls in these experiments might have made them insufficiently sensitive to differences in initial conditions—for example, there may have been different levels of homozygosity (inbreeding) and different mouse strains across experiments—which may vary the time needed for spiteful mutations to arise in populations. This could explain the "hit-and-miss" quality of attempts to replicate Calhoun's findings, as well as Calhoun's own trouble achieving the effect.

In experiments that realized or partly realized the "collapse phase" conditions of Calhoun's Universe 25 study, high rates of mortality were noted (Hammock, 1971). One might expect that high levels of mortality would have had the effect of removing deleterious mutations from mouse colonies, allowing them to recover. But if the high mortality was due to spiteful mutational meltdown, as we posit, such mortality, owing to its likely selectively indiscriminate nature, would not enable a recovery (Woodley of Menie, Sarraf, et al., 2017).

territory to facilitate navigation of it) (Bachmann et al., 2018). Even more recently, Cross (2019) presented data indicating that changes in RNA expression in the brain cells of mice seem to result from exposure to mice carrying the *Nlgn3* deletion mutation. This finding offers quite direct evidence of a social-epistatic effect. If Calhoun's "autistic-like creatures" also carried the *Nlgn3* deletion, and this involved negative effects on fitness (as the findings of Kalbassi et al., 2017, indicate it would, given the adverse effects on mouse behavior and physiology that they observed), then this could in part explain the basis of the colony collapse that he observed (Sarraf & Woodley of Menie, 2017; Woodley of Menie, Sarraf, et al., 2017).

In the following, we aim to improve the state of the literature concerning the SEAM applied to humans and to determine if intuitions about Western decline have a substantial and unitary empirical basis. Using temporal data sourced from the US population indicating opportunity for negative selection (through mortality), developmental instability, negative social epistasis, and population fitness, we will test predictions derived from the SEAM. We anticipate that reduction of the opportunity for selection through mortality positively predicts levels of developmental instability (a proxy for mutation load), which in turn positively predict indicators of negative social epistasis, which ultimately negatively predict indicators of the global fitness of the US population. Importantly, we expect that the negative effect of developmental instability on global fitness should be mediated by social-epistatically salient indicators, in that the fitness-depressing effects of deleterious mutations should primarily occur *through* negative social epistasis. Consistent with the broader thesis of this monograph, mental illness and irreligiosity (the latter of which significantly associates with rates of subjective existential nihilism at the national level; Oishi & Diener, 2014) are used as indicators of negative social epistasis. If these predictions are successful, then we would have evidence that the SEAM offers a unified explanation of the major aspects of the apparent crisis of the Western world, from its existential malaise to its anemic fertility rates.

Methods

Analysis

In order to test the SEAM in human populations, we examine the diachronic associations between various indicators that are expected to sequentially predict declining fitness. Four latent chronometric factors will be modeled in this analysis. These include (1) a (proxy) measure of the

opportunity for selection through mortality, (2) a measure of phenotypic trends that are hypothesized to at least partly capture the effects of mutation accumulation on developmental stability, (3) a measure of psychobehavioral trends that are hypothesized to at least partly result from negative social epistasis, and (4) a measure hypothesized to at least partly capture changes in the global fitness of the United States population. Data for each of these four categories is used to construct four chronometric factors; each of the four factors involves data from three manifest indicators in order to ensure that the level of aggregation is equivalent across the four factors (see Brunswik, 1952). The composition of these factors will be described in more detail in the succeeding sections.

The factors are computed using unit-weighted factor analysis, which allows for the recovery of highly generalizable factors when either case or variable numbers are low (Gorsuch, 1983). Unit-weighted factors (UWFs) are computed by standardizing the indicator scores and then averaging across the scores, the average becoming the UWF score. UWF loadings are computed by simply correlating the indicator score with the UWF score. Averaging across the standardized scores for each set of time-points furthermore allows for missing data to be multivariately imputed (the average of the non-missing values can be used to impute the missing score in the UWF; Figueredo, McKnight, McKnight, & Sidani, 2000). A form of exploratory path modeling known as Sequential Canonical Analysis (SEQCA; Figueredo & Gorsuch, 2007) is used to examine the sequencing among the predictors, and alternative sequences that can be used to test alternative plausible models. This technique also allows each step of the SEQCA to be statistically controlled for the effects of the natural logarithm of time—thus temporal autocorrelation can be directly controlled and the unique (time-independent) effects among the variables can be examined directly in these models.

Two alternative hypotheses are tested. The preferred hypothesis is that the opportunity for mortality selection chronometric factor (lagged by 25 years, or one "standard" generation) predicts the increase in developmental instability, which predicts the increase in negative social-epistatic psychobehavioral changes, which in turn predicts the decline in global fitness. We furthermore predict direct effects of reduced opportunity for mortality selection on the social epistasis factor (which should reflect the direct contribution of the accumulation of deleterious mutations on these psychobehavioral changes) and also direct effects of the reduced opportunity for mortality selection on decreasing global fitness—this path corresponds

to predicted effects of the "rational tradeoff" models favored by certain economists as explanations for the demographic transition.[5] Demonstrating that the sequence opportunity for mortality selection → developmental instability → social epistasis → global fitness is independent of the path from opportunity for mortality selection to global fitness will yield evidence that accumulating mutations, and negative social epistasis in particular, independently contribute to the fertility decline of the demographic transition, as predicted by Woodley of Menie, Sarraf, et al. (2017).

A second potentially plausible causal sequence will also be tested. In this model the ordering of the developmental instability and social epistasis chronometric factors will be reversed, such that the latter goes before the former in the sequence. The rationale for this is that relaxed negative selection (which the opportunity for mortality selection factor should reflect) may be indirectly promoting decreased developmental stability through a condition-dependent, social-epistatic pathway, which might in turn be directly, rather than indirectly, reducing global fitness. The main criterion used to judge model goodness-of-fit in SEQCA is model parsimony—with the model exhibiting the fewest significant paths having higher parsimony (this assumes that the number of paths in all models compared is the same). All analyses are conducted using UniMult 2.

Data

Prior Negative Selection Factor (Opportunity for Selection Through Mortality)

Three variables were selected on the basis that they had broad mortality coverage from the US population. To that end we selected infant (i.e. <5 years old), child (between 5 and 14 years old), and maternal mortality. Infant and child mortality in particular were extremely severe for historical Western populations (around 25% and 50%, respectively, in some coun-

[5] The idea underlying these models is that as mortality rates decline, the need to have large numbers of children to hedge against the likelihood that some will die young is obviated (Galor, 2012). These models could be extended to predict certain epigenetic responses to reduced environmental harshness, perhaps occasioning life history speed changes, that would, for instance, lead to reduced allocation of bioenergetic resources to mating effort (to which some might predict sperm production is related; this is relevant given that, as will be mentioned in the main text, sperm concentration is included in the global fitness factor of the model; we doubt that this particular life history model of the demographic transition is correct, however—see Barbaro et al., 2019).

tries during the Early Modern Era; Volk & Atkinson, 2013). While these measures only approximate the opportunity for selection through mortality, they should track this factor quite closely; as argued in the previous chapter, the work of Maciej Henneberg and his collaborators has provided evidence that changes in the opportunity for selection through mortality tend to track changes in the strength of negative selection.

These data were sourced from Roser (2018a; infant) and the Center for Disease Control (2009; child; data on all-cause mortality for all races and both sexes were used), and Roser (2018b; maternal) and were collected at yearly intervals from 1913 to 1975, with each indicator available for every year (so $N = 63$ years in each case). The loadings of each indicator onto the UW prior negative selection chronomeric factor (PNS; the values having been lagged by 25 years, or one standard generation relative to the predictors so that, for example, the 1940 PNS value predicts the 1965 values of the subsequent predictors in the cascade; the rationale for this lagging is the same as that for the lagging in the analysis of the prior chapter) are of large magnitude (Cohen, 1988) and are statistically significant in all cases. UWF loading (λ) values were as follows: for infant mortality $\lambda = 0.995$ ($N = 63$, $p < 0.05$), for child mortality $\lambda = 0.977$ ($N = 63$, $p < 0.05$), and for maternal mortality $\lambda = 0.965$ ($N = 63$, $p < 0.05$).

Developmental Instability Factor

Three variables were selected in order to capture temporal trends that could reflect the effects of accumulating deleterious mutations on physical condition, sourced from the United States. The first of these is sinistrality (left-handedness) (sourced from McManus, Moore, Freegard, & Rawles, 2010, obtained from fig. 2; data representative of general US population; data extracted using *WebPlotDigitizer*; Rohatgi, 2017), which is associated with a variety of other developmental instability indicators (Dutton et al., 2018; Ntolka & Papadatou-Pastou, 2018; Woodley of Menie, Fernandes, Kanazawa, & Dutton, 2018). Second, craniofacial shape and size fluctuating asymmetry (sourced from Kimmerle & Jantz, 2006, figs. 3, 4, 5 and 6, data on size asymmetry reported in Woodley of Menie & Fernandes, 2016; data from black and white samples and males and females—unweighted averages of these were computed) were chosen and combined because they potentially index developmental instability (Graham & Özener, 2016; van Valen, 1962), which also has been linked to indicators of elevated loads of deleterious mutations (Woodley of Menie & Fernandes, 2016).

Third, body mass index (BMI) was chosen, sourced from Komlos & Brabec (2010, fig. 1), which has been found to positively correlate in country-level analyses with I_{bs} net of covariates such as calorie consumption and level of physical activity (Budnik & Henneberg, 2017). The association is hypothesized to stem from relaxed negative selection allowing the accumulation of mutations impairing metabolic function (Budnik & Henneberg, 2017). (Data from Komlos & Brabec, 2010, are from black and white samples of males and females, which were combined as unweighted averages.)

Unlike with the opportunity for mortality selection indicators, the temporal coverage for these variables was in some cases associated with high levels of missingness. The craniofacial fluctuating asymmetry data cover the span of years from 1945 to 1985, with only five measurement occasions in total. The BMI measure covered ten measurement occasions spanning 1940 to 1985. The sinistrality measure was, by contrast, very well sampled across time, with 60 measurement occasions spanning 1938 to 2000, and it consequently forms the "spine" of this chronometric factor. The developmental instability chronometric factor covers 62 measurement occasions in total, spanning 1938 to 2000. The λ values for the indicators range from small to large in magnitude (Cohen, 1988). The value for sinistrality is $\lambda = 0.976$ ($N = 60$, $p < 0.05$), for BMI $\lambda = 0.813$ ($N = 10$, $p < 0.05$), and for craniofacial fluctuating asymmetry $\lambda = 0.128$ ($N = 5$, *ns*). While the loadings are all in the theoretically expected positive direction, only two of the three indicators have statistically significant loadings.

Social Epistasis Factor

Three variables were selected on the basis that they might reflect the effects of negative social epistasis. Temporal trend data in church attendance (which measures the frequency with which people attend church per week) were obtained for the general US population from Gallup (2016). Church attendance has been found to be sensitive to paternal age effects in a recently born cohort in the United States, despite controls for a variety of plausible confounds, such as parental religiosity, birth order, income, and education (Woodley of Menie, Kanazawa, et al., in preparation), suggesting that a weakening of norms enforcing religious observance may have allowed accumulated mutations to increase phenotypic variance with respect to religious behavior over time. The normative shift manifested as secularization may also constitute a mechanism through

which irreligious values held by the carriers of spiteful mutations among culturally influential people (i.e. elites) can be phenocopied[6] through biased cultural transmission.

Another indicator is psychopathic deviation, which measures a syndrome characterized by general social maladjustment, among some other abnormalities. The item coverage is quite broad and includes domains pertinent to the hypothesized action of spiteful mutations, such as an aversion to family and, more broadly, authority figures, as well as self and social alienation and a tendency toward boredom. These data were collected from Twenge et al. (2010; data extracted from fig. 3 using *WebPlotDigitizer*; data from males and females, predominantly white), who examined trends in psychopathic deviation and other Minnesota Multiphasic Personality Inventory (MMPI and MMPI-2) scales using a large sample of college and high school students.

Temporal trends in another prospectively social-epistatically salient MMPI scale, specifically depression, are also analyzed. These data also came from Twenge et al.'s (2010) study (data extracted from fig. 2 using the *WebPlotDigitizer*; data from males and females, predominantly white).[7] While Twenge et al.'s most expansive analysis was restricted to college samples, they find convergent trends among high school students also (using MMPI-a), indicating that these trends are not primarily driven by demographic shifts affecting college-age samples. There are some indications of paternal age effects on depression (Laursen, Munk-Olsen, Nordentoft, & Mortensen, 2007), suggesting a direct contribution from *de novo* mutations deriving from advanced paternal age. The moderate heritability of the MMPI depression scale (ranging from 0.31 [MMPI] to 0.39 [MMPI-2]; DiLalla, Carey, Gottesman, & Bouchard Jr., 1996) is consistent with the possibility that the trait it measures has a genetic basis, which may be open to social-epistatic effects (DiLalla et al., 1996 also found h^2 values for the

[6] "Phenocopying" refers to the expression of a phenotype resembling a phenotype that results from some genotype, but in an organism that lacks that associated genotype.

[7] One might be suspicious of our use of these time trend data, given concerns about possible temporal measurement variance. The reader should keep in mind the point raised in our Chap. 5 footnote about the narcissism epidemic and measurement variance, namely that even if some psychometric instrument fails to exhibit measurement invariance over time, this does not necessarily indicate that trends in that instrument's measure lack substance. But further, as our results and discussion sections make clear, the patterns of temporal covariation among the trends that we analyze are so strongly consistent with our theoretical predictions that it is simply unlikely that nothing is at play here but a simple measurement problem.

psychopathic deviation scale ranging from 0.38 [MMPI-2] to 0.61 [MMPI]; note, though, that social epistasis might only be related to the expression of non-additive genetic variants, but this possibility is not clearly true, and indeed we later speculate that social epistasis might be able to, e.g., suppress the effects of additive variants; on the heritability of MMPI-2 scales, see Gizer, Seaton-Smith, Ehlers, Vieten, & Wilhelmsen, 2010. Importantly, there is evidence that depression can spread through social contagion, and a social-epistatic mechanism for this phenomenon has even been proposed: "Fowler et al. (2011) found that people seek out friends who have the same genetic variants that they do beyond just physical characteristics. They hypothesise '*that a person's genes may lead to selection of friends with certain (social/asocial) genotypes which in turn facilitates or modifies the expression of a person's own genes*'" (Bastiampillai, Allison, & Chan, 2013, p. 302; italics in original). Moreover, depression was identified as a prospective target for spiteful mutations in Woodley of Menie, Sarraf, et al. (2017) on the grounds that it has been hypothesized to be a potential manifestation of pathological altruism (Oakley, 2013), that is, a form of altruism that harms rather than helps the intended targets of the altruism.[8] Pathological altruism more generally has been identified as part of a broader negative social epistasis syndrome in which the breakdown of group-selected cultural controls on the development of behavior gives rise to higher variance in behavior within populations, which may further contribute to group fitness decline.

Thus the social epistasis chronometric factor should track some of the temporal variation in those cultural controls (through changes in religious participation), and some of the temporal variation in hierarchy-resistant phenotypes (through changes in psychopathic deviation). This factor may also partly track the increase in the prevalence of prospectively pathologically altruistic behaviors through the depression measure.[9]

As with the indicators comprising the developmental instability factor, the coverage in time of the social epistasis factor is uneven; but overall coverage is more balanced in the case of the social epistasis compared to developmental instability indicators. For church absenteeism (simply the reverse-scored Gallup data), there is a total of 23 observations spanning

[8] There has been little success in identifying common polymorphisms associated with depression (see Lo et al., 2017). This is perhaps because rare variants have a substantial and underappreciated role in the genetic etiology of the disorder (Dunn et al., 2015). Given that any disruption of social functioning has the potential to trigger depression, its prospective spiteful mutational target is likely very large.

[9] One aspect of this dynamic may involve the deterioration of leadership qualities among elites, which could engender opposition to authority at other levels of the social hierarchy.

the years 1939 to 1999; for psychopathic deviation, there is a total of 41 measurement occasions spanning the years 1938 to 2000; and finally, for depression, there is a total of 41 measurement occasions spanning the years 1938 to 1999. The UWF encompassed 47 measurement occasions covering 1938 to 2000. The λ values for the factors are all positive in direction, large in magnitude, and statistically significant (church absenteeism $\lambda = 0.859$, $N = 23$, $p < 0.05$; psychopathic deviation $\lambda = 0.923$, $N = 41$, $p < 0.05$; and depression $\lambda = 0.956$, $N = 41$, $p < 0.05$).

Global Fitness Factor

For this factor, three separate temporal trend measures of fitness were chosen, reflecting this property at multiple levels of biological organization. The first of these measures is sperm concentration, sourced from Carlsen, Giwercman, Keiding, and Skakkebaek (1992), with additional data from Swan, Elkin, and Fenster (2000), which tracks changes in a population's reproductive viability (the latter paper mentions nothing about BGA, whereas the former indicates that data were taken overwhelmingly from white males; since there was apparently no effort to select on the basis of BGA in these studies, the data may roughly correspond to the BGA demographics of the US male population). In terms of the SEAM, declining sperm concentration may be especially salient, in as much as it may parallel a trend of declining testosterone in males[10] (Travison, Araujo, Hall, & McKinlay, 2009). As noted above, Kalbassi et al. (2017) determined that exposure of mice carrying the *Nlgn3* mutation to non-carriers reduced the testosterone levels of the non-carriers; this may have been a consequence of the breakdown in hierarchy formation that was noted in mixed housings of carrier and non-carrier mice (for further discussion, see Sarraf & Woodley of Menie, 2017). Declining sperm concentration in Western males (a phenomenon for which a recent and particularly well-done study has provided strong evidence; Levine et al., 2017) could stem at least in part from negative social epistasis. These data were available between 1938 and 1996 for a total of 30 measurement occasions.

The second measure is the total fertility rate (TFR) of the general US population. Data for this measure were sourced from Roser (2018c) for a total of 62 measurement occasions from 1938 to 2000. Changes in this

[10] See Grantham and Henneberg (2014) on the possibility that relaxed selection is contributing to reduced testosterone and sperm counts.

indicator may track factors such as "rational" fertility choices in response to reduced infant and child mortality, as well as other commonly invoked causes of the demographic transition (Galor, 2012). But given the maladaptive nature of sub-replacement fertility (at the group level), it is expected that negative social epistasis might be potentiating the decline in this indicator (via, e.g., the normalization of anti-natalist values; Woodley of Menie, Sarraf, et al., 2017).

The final measure is the US population proportion of world population minus the US population (this being a measure of group or "corporate fitness"; see Figueredo et al., 2019a, 2019b). Data on the size of the US population were available from the US Census Bureau (2016), and on the size of the global population from Earth Policy Institute (2012) and United Nations (2019). This indicator is a standing measure and captures changes in the group-level fitness of the US population, which may be strongly affected by negative social epistasis (Woodley of Menie, Sarraf, et al., 2017).

The factor is quite well balanced in terms of sampling across indicators. All λ values were high magnitude and statistically significant. Sperm concentration $\lambda = 0.828$ ($N = 30$, $p < 0.05$), TFR $\lambda = 0.933$ ($N = 62$, $p < 0.05$), and corporate fitness $\lambda = 0.939$ ($N = 62$, $p < 0.05$).

Results

Figure 7.1 plots the distribution of each chronometric factor over time.

The temporal correlations among the four chronometric factors and the natural log of time (year) are displayed in Table 7.1.

Figure 7.2 displays the results of the SEQCA for the first (favored) hypothesis.

For the first SEQCA (depicted in Fig. 7.2 LnT → PNS → DI → SE → GF), the model exhibits a good fit (as captured by the Pillai-Bartlett $V = 0.934$, and associated effect size = 0.48, $p < 0.0001$). There are six significant paths in this model.

A second SEQCA was run in order to test the alternative model (with the order of DI and SE reversed). This model (LnT → PNS → SE → DI → GF) fits equally well ($V = 0.934$); but this second model has seven significant paths, making it less parsimonious than the first (as more paths are needed to fully model the interrelations among the variables). Therefore, the first model is preferred by virtue of parsimony. In this model, the effect of DI on GF is entirely mediated by SE, as predicted by

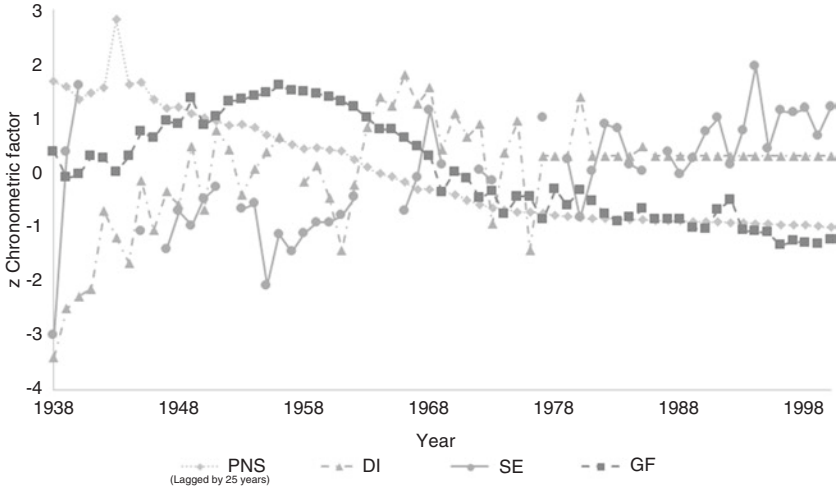

Fig. 7.1 The unit-weighted chronometric factors of prior negative selection (PNS; lagged by 25 years), developmental instability (DI), social epistasis (SE), and global fitness (GF)

Table 7.1 Temporal correlations among the PNS, DI, SE, and GF chronometric factors and Ln Time (Year; LnT)

	LnT	*PNS*	*DI*	*SE*	*GF*
LnT	1				
PNS	−0.941∗	1			
DI	0.509∗	−0.583∗	1		
SE	0.666∗	−0.643∗	0.250∗	1	
GF	−0.787∗	0.695∗	−0.116	−0.757∗	1

All correlations were in the theoretically expected direction

∗$p < 0.05$

the SEAM. There is a direct effect of PNS on GF consistent with economic hypotheses that predict that increased survivorship will decrease fertility. But the direct path from PNS to GF is of much smaller magnitude than the one from SE to GF (0.510 vs. −0.750), which suggests that the SEAM may account for the majority of the variance in the demographic transition (as captured by GF).

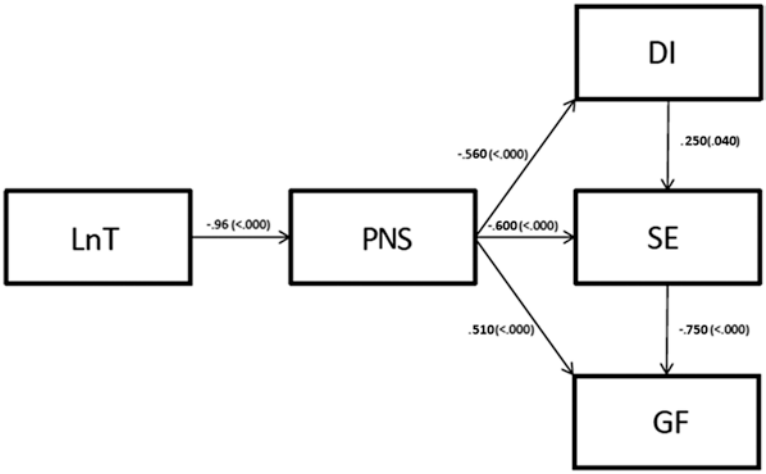

Fig. 7.2 The SEQCA for the first hypothesis, with each step in the cascade controlled for the natural log of time

Discussion

Consistent with predictions, the factor composed of proxies for prior negative selection (PNS) negatively associates with the developmental instability factor (DI) (reduced opportunity for selection through mortality → greater developmental instability). In turn, DI positively predicts a factor of hypothesized measures of negative social epistasis (SE), which negatively predicts a factor tracking the global fitness of the US population (GF). As predicted, SE completely mediates the association between DI and GF; this aligns with the expectation of geneticists that deleterious mutation accumulation *as such* should depress fitness quite gradually, but also with the novel idea that the social-epistatic amplification of spiteful mutations can rapidly depress the fitness of groups at multiple levels of organization (Woodley of Menie, Sarraf, et al., 2017).

Perhaps the most serious limitation of the above analysis is that it was not possible to consistently restrict selection of data to indicators pertaining only to the BGA group of interest, namely European-Americans or whites (since we predict that they have been exposed to relaxed negative selection and its effects to the greatest extent and for the longest amount of time of all BGA groups in the United States); therefore we did not use

single-BGA data for any indicator. None of the data sets used exclusively relates to whites or European-Americans, and representativeness of the general US population certainly differs across indicators. Still, the data come from a time period in which European-Americans comprised the overwhelming majority of the US population, so it is reasonable to infer that our data primarily reflect dynamics associated with this BGA group. The indicators perhaps least likely to reflect the demographics of the US population as a whole are the mental health indicators derived from Twenge et al.'s (2010) college samples and the fluctuating asymmetry and BMI indicators (the data for these last two indicators are from blacks and whites, but no other BGA groups). But the mental health indicator data nevertheless are "overwhelmingly white"[11] (Twenge et al., 2010, p. 149), roughly consistent with the racial demographics of the US population in the time period from which data were selected. Indeed, the majority of the data used for each indicator in the analysis is from white Americans. There is likely no substantive confounding with changes in population age over time, in light of the descriptions of the data for the various indicators.

A recent diachronic analysis is congruent with aspects of the above analysis, finding using a longer time series (1800–2005) that the decline in the strength of Western group selection has the entirety of its effect on the year-on-year change in a latent moral foundations factor mediated by the developmental instability factor employed above. It reveals a general decline in binding values and rise in individualizing ones, which is consistent with the prediction of the SEAM that accumulating mutations, a subset of which are likely to have negative social-epistatic effects, should increase the prevalence of individualizing moralities, and decrease that of binding ones. The finding that the developmental instability factor entirely mediates the group selection factor's effect on the individualizing-binding factor is remarkable. This result aligns with the possibility that high levels of group selection might be necessary to mitigate the accumulation of, in particular, spiteful mutations (Woodley of Menie, Figueredo, Jurgensen, Bose, & Sarraf, in preparation).

The SEAM appears to capture pathological aspects of modernity that are missed in standard sociological accounts. In earlier chapters we discussed the work of Ronald Inglehart (2018) and Christian Welzel (2014; see also Inglehart & Welzel, 2005), for whom industrialization and its

[11] Further, Twenge et al. (2010) state that "[t]he racial composition of college student samples has differed only slightly over this time period" (p. 149).

sequelae have almost exclusively salutary effects, especially in the long run. These processes increase human wealth and eliminate/reduce sources of morbidity and mortality and thereby offer individuals historically unprecedented levels of existential security. When life (or survival) is more secure, "the nature of life [is transformed] from a source of threats into a source of opportunities" (Alexander, Inglehart, & Welzel, 2016, p. 909). Consequently, individuals adopt value systems that enable their acting on these opportunities: "practicing and respecting *universal freedoms* becomes increasingly vital to take advantage of rising life opportunities" (Alexander et al., 2016, p. 909; emphasis added). These predictions, note, are strikingly similar to those of life history theory, which posits that humans who evolve and live under conditions of low uncontrollable and unpredictable morbidity and mortality (those with slow life history, or "high-*K*" strategies) are more cooperative, pacific, egalitarian, liberal, and happy than those who evolve and live under harsher and more unpredictable conditions (those with fast life history, or "low-*K*" strategies) (Figueredo et al., 2017). Neither model would predict that the fitness decline of modernized populations has a pathological element, but would instead (in the former case) maintain that falling fertility rates are a rational response to the decreased likelihood that offspring will die prematurely, and to the desire and ability to pursue personal interests and enjoyment, or (in the latter case) assert that low fertility rates are typically a component of slow life history strategies.

In our model, PNS, since it is composed of mortality measures, at least roughly indexes the variables that should contribute to "rational" choices not to have large numbers of offspring and to life history speed variation. But the direct effect of PNS on fitness is of smaller magnitude than that of SE on fitness (0.510 vs. −0.750), indicating that neither modernization theory nor life history theory accounts are sufficient to explain fertility declines and in fact do a poorer job of this than the SEAM. More importantly, it is unclear how life history theory or modernization theory would explain rising developmental instability and its apparent contribution to worsening mental health and increasing irreligiosity (or why variables associated with the last two categories form a well-specified factor). Indeed, modernization theory and life history theory would predict improved physical and mental well-being, given that the former posits that greater freedom through modernization improves happiness and life satisfaction (together, subjective well-being or SWB; Welzel, 2014; note that at the group level, SWB seems to positively predict at least certain

dimensions of physical health—see Minkov, 2011) and the latter takes slow life history strategies to predict greater mental and physical health and subjective well-being, as well as religiosity (Figueredo, Vásquez, Brumbach, & Schneider, 2007). Moreover, neither model has a basis on which to explain the fact that the SE factor negatively predicts indicators of global population fitness. Resultantly, life history theory and modernization theory are not alternatives to the SEAM.

It is worthwhile to consider as yet unexplored implications of the SEAM for the fate of Western civilization. We think it is reasonable to hypothesize that general effects from negative social epistasis, characterized by "far-social transfer" of fitness losses from the carriers of spiteful mutations to those in the broader population, are real (such far-reaching effects are to be contrasted with the direct organism-to-organism effects that have been observed in mice; see, e.g., Bachmann et al., 2018). Some evidence for this possibility has already been found in North American red squirrels: it appears that red squirrels that have never encountered one another can have indirect effects on each other's fitness (there is some, albeit weak, evidence that indirect *genetic* effects are involved) (Fisher et al., 2019).

A common complaint about modernized societies is that they lack any strong basis for social cohesion. With the death of nationalism following World War II (Westbrook, 2004), and the much longer-running processes of the decline of religion (Gallup, 2016) and of public ritual (Collins, 2014, p. 331), the "social fabric" of the developed world seems quite weak[12]:

> [S]ince at least AD 800, this thing we call "Europe" has been largely a by-product of Christian civilization. Its more recent love affair with nationalism has offered a substitute value system, but since both religion and nationalism are now deemed retrograde, one can only wonder what value system will unify Europe now. What spirit, aspiration, or ideal might animate European

[12] In addressing liberal hopes of harmoniously accommodating substantial ideological diversity within societies, Safranek (2015) offers the following observation: "One liberal theorist claims that 'liberalism is a search for principles of political justice that will command rational assent among persons with different conceptions of the good life and different views of the world.' And yet with each passing decade, more rather than fewer public issues are disputed in Western polities. The question of same-sex marriage, which would hardly have arisen but for specifically liberal principles, was hardly an issue in the public square two decades ago. Liberalism has not only failed to provide principles of political justice that command rational assent, but it seems to have stoked the fires of civil strife" (p. xii).

> hearts and provide the connective tissue or civic glue for its peoples? (McNamara, 2017, p. 54)

Empirical evidence for this view comes from a variety of sources. Modernized societies exhibit low trust in major institutions and low social conformism, but are high in out-group trust[13] and social activism (Welzel, 2014, p. 405). Modernization also appears to strongly depress willingness to fight in war for one's country (Inglehart, 2018; Inglehart, Puranen, & Welzel, 2015). Furthermore, as noted in Chap. 2, individualizing moral foundations have been increasing with time, as binding ones have been decreasing (a result replicated in Woodley of Menie, Figueredo, et al., in preparation). Also, to reiterate a point, a number of studies have found indications of declining altruism and groupishness in Western populations[14] (Greenfield, 2013; Kesebir & Kesebir, 2012; Konrath, O'Brien, & Hsing, 2011; Woodley of Menie, Figueredo et al., 2017; Zarins & Konrath, 2017). Perhaps relatedly, there are signs of rising political polarization in at least some Western societies (Steenvoorden & Harteveld, 2018; Twenge, Honeycutt, Prislin, & Sherman, 2016), as well as indications of widespread "societal pessimism," or the belief that "society is changing for the worse"[15] (Houwelingen, 2016; Steenvoorden & van der Meer, 2017). Finally, evidence of increasing intra-group competition in Western populations has been noted: one study found that the rate of cuckoldry, an index of inter-individual sexual competition, rose over a few centuries (Larmuseau, Matthijs, & Wenseleers, 2016), which is consistent with declining group selection (in the most recent period examined by Larmuseau et al., a decline in the cuckoldry rate was noted; but the authors conclude that this was likely a result of the introduction of birth control, not decreased extra-pair copulation). But especially intriguing on this score is a study from Lindfors, Solantaus, and Rimpelä (2012) offering evidence of what might be psychological effects of declining group-selective pressure and increasing intra-group competition—specifically,

[13] In the United States, however, trust in others fell precipitously from at least the mid-to-late twentieth to early twenty-first centuries (Twenge, Campbell, & Carter, 2014).

[14] Consistent with these trends, there is evidence that at least one aspect of ability-based emotional intelligence has declined over time in English-speaking populations (Pietschnig & Gittler, 2017).

[15] Importantly, attitudes about societies may strongly predict the latter's health and fate, whereas individuals' attitudes about their own lives may not (Eckersley, 2009; Turchin, 2016).

the "fears" that Finnish youth have concerning the future have shifted over time, such as to suggest increasing preoccupation with individual-level as opposed to group-level "risks" (e.g. war vs. loneliness).

The impression these facts offer is that the members of modern Western societies have little commitment to the maintenance of these societies as such, that is, as exclusive communities defined in terms of particular structures, traditions, heritages, religious beliefs, and so on. Rather than orient themselves to the internalization of collective norms and the realization of traditional collective ideals (social conformism), they seek to *change* their societies (social activism), potentially given perceptions of injustice, as reflected in low institutional trust. Similarly, pro-out-group attitudes may motivate efforts to improve societal inclusivity at the cost of traditional norms, values, and demographic conditions. This is consonant with a broader shift of morality in the West, from one that emphasized attainment of objective goods (virtue, fidelity, etc.) to one that prioritizes subjective or mental goods (specifically individual satisfaction and fulfillment) (Manago, Greenfield, Kim, & Ward, 2014; Rubin, 2015), insofar as this shift brings individuals to believe that institutions (especially those of government) should serve their interests, rather than that they (individuals) should serve collective interests (Rubin, 2015). This potentially explains, at a proximate level, the relative lack of willingness to sacrifice for one's nation now common in the developed world, although once the opposite apparently held: "[A]s late as 1914 the flower of both the British and German intelligentsia rushed to die on the killing fields of Flanders" (Young, 2007, p. 465; see also Stromberg, 1982). Everywhere that modernization is long established, prevailing desires seem to be for open, non-competitive (in the sense of explicit and especially violent competition), peaceful, egalitarian, and inclusive societies that cater to individuals' idiosyncrasies and maximize their preference satisfaction (see Meisenberg, 2004; Minkov, 2009). These aspirations seem to co-occur with certain features of societies and general social behavior, such as generous welfare states and consumer/service economies, and readily dissolvable interpersonal ties (also known as relational mobility; see Thomson et al., 2018)—all of which appear to augment individuals' security or range of options in the pursuit of desire satisfaction.

We posit that the ultimate basis for these developments does in fact partially consist of slowing life history speed (as discussed in Chaps. 2 and 3), but more importantly of the synergistic effects of slowing life history speed, individual-level (as opposed to group-level) selection,

mutation accumulation, and (resultantly) disturbed patterns of social epistasis.

As noted in Chap. 3, it appears that pre-industrial group-selected human societies of the West exhibited high levels of social cohesion and rigid conformity to received norms of conduct, deviations from which were often harshly punished. Theoretically, one expects that a social order of this kind would have the effect of imposing *centripetal selection*, that is, selection that has the effect of limiting at least certain kinds of genetic variance in a population (Meisenberg, 2007, predicts low levels of genetic variation in pre-industrial societies, but does not frame this as a consequence of group selection). Populations involved in regular inter-group competition involving warfare need to maintain particularly demanding adaptive optima, given that the potential costs of defeat in war are extreme; thus, behavioral systems yielding social and sexual selective pressures that maintain *monomorphic* group-level adaptations—such as high population levels of (in-group) altruism, heroism, and religiosity—by disfavoring whatever sufficiently deviates from those optima, seem essential. Interestingly, there is solid historical evidence that medieval European societies took on strong persecutory attitudes toward non-Europeans, and other "outsiders," and became inclined to ideas of biological group differences when exposed to the perceived threat of conflict with Islamic populations (Epstein, 2009), a phenomenon that may have placed Europeans under group-selective pressures and activated pre-existing group-selected adaptations for inter-group conflict. In contrast to theories that emphasize the role of parasite avoidance in collectivism and groupish behavior (e.g. Thornhill & Fincher, 2014), the theory offered here posits that such behavior may have the effect of preparing groups for inter-group conflict by compressing relevant genetic variance around adaptive means.[16]

[16]A recent paper has offered experimental evidence allegedly indicating that the "behavioral immune system" in humans has the effect of promoting avoidance of persons carrying pathogens, but not avoidance of ethnic out-group members (van Leeuwen & Petersen, 2018). The results of this work are irrelevant, however, in that the participants in the experiment were not exposed to any sort of stimulus that would be expected to activate psychological adaptations for inter-group conflict. Moreover, with respect to carriers of spiteful mutations as opposed to ethnic out-group members, one should consider that there is evidence that moral judgment and disgust sensitivity may be more deeply related than is ordinarily assumed (Chapman & Anderson, 2014), perhaps due to shared evolved psychological mechanisms partly underlying both phenomena. This possibility suggests that phenotypic signals of spiteful mutations may be mentally processed in ways similar to signals of pathogen stress, which would be consistent with the observation that disgust sensitivity strongly pre-

In light of the SEAM, the sensitivity of evolved psychological mechanisms (mental modules) underlying groupish behavior of this persecutory sort may be placed under rapid directional selection in populations exposed to inter-group conflict, given that social-epistatic amplification of fitness-depressing variants may have large deleterious effects on whole populations (see the simulation in Woodley of Menie, Sarraf, et al., 2017), and that maintenance of group fitness is especially crucial in times of war. Therefore, these modules, activation of which may be dependent on cues of inter-group conflict, may be reasonably termed *social-epistasis control modules.*

Following the collapse of group selection in Western populations, stemming from climatic warming and industrialization that relaxed triggers of inter-group conflict (high morbidity and mortality, resulting especially from resource scarcity), natural, social, and sexual selection redounding to group-level fitness have been profoundly attenuated (Woodley of Menie, Figueredo et al., 2017). We have already argued at length that this relaxation of selection has permitted the accumulation of deleterious mutations. But an important consequence of this process merits attention. Mutation accumulation entails increasing genetic diversity, and indeed reduced opportunity for selection predicts rising morphological variation (a likely consequence of expanding genetic diversity) in European populations over many epochs (Henneberg et al., 1978; more recently, Staub et al., 2018 found evidence of increasing BMI variability in Swiss conscripts, and increasing markers of ill health, consistent with relaxed negative selection).

This "increasing variation of human biological characters" (Rühli & Henneberg, 2017, p. 269) could be a contributor to contemporary Western populations' unique individualism, alongside high levels of *K* (Twenge & Campbell, 2018) and exogamy (MacDonald, 2001; Woodley & Bell, 2013). These factors, together with the breakdown of group selection, may serve as the ultimate bases of the pressure that citizens of "postindustrial" or "late modern" nations put on institutions to achieve greater levels of democratic participation and liberal toleration of an ever-broader set of lifestyles (see Welzel, 2014 for sociological documentation of the drive toward "emancipative values" in the West). The effects of slow life history strategists on this process are of particular note. Those with slow life history strategies have relatively high levels of developmental plasticity and thus may have especially strong motivations to secure

dicts political conservatism (Smith, Oxley, Hibbing, Alford, & Hibbing, 2011), which is associated with aversion to "deviant" behaviors, individuals, and so on.

conditions allowing them the freedom to exploit the niches that maximize their interests (conversely, the behavior of fast life history strategists is more strictly governed by heritable dispositions, suggesting that they should have lower motivations to maximize freedom in niche selection) (Woodley of Menie et al., 2015). This may explain their endorsement of individualistic and hedonistic attitudes, which empower them to pursue whatever objective conditions (niches) that enhance their mental well-being (an ancestral proxy for opportunities to enhance personal fitness, which individual-selected humans should have particularly strong interests in), rather than be relegated by given norms to some predetermined set of circumstances. Moreover, slow life history strategists that do not face the threat of inter-group conflict have little reason to submit to collective or group-level coordinative mechanisms that are needed to ensure a population's survival in war. Rather, given peaceful conditions, a group of genetically diverse (due to mutation accumulation) slow life history strategists will strive for a social order that is basically libertarian, allowing them to radiate into idiosyncratic niches to which they can become developmentally calibrated (deepening their individuality), a process facilitated by their promotion of social institutions that serve mainly to aid and encourage them in this process.

The problem with this particular dynamic favoring the evolution of slow life history strategies is that it lacks a mechanism with which to control mutation accumulation and its negative social-epistatic consequences. Slow life history strategists act to maintain a basically liberal, egalitarian, and irenic social arrangement because this enables stable niche exploitation. Resultantly they (at least the Western variant) seem to be religiously opposed to discriminatory social practices (Rubin, 2015; Twenge, 2017), especially the traditional moral hierarchies that justified punishment and exclusion of those incapable of norm compliance (the behavior of whom may stem ultimately from genetic abnormalities to at least some extent). This should not only weaken selection against carriers of spiteful mutations, but also remove controls that would have traditionally limited their access to positions of power. Such an absence of "filtration" could be considered especially problematic given that the lineages of social elites, by virtue of both greater wealth and delayed parenthood, as suggested earlier, presumably have experienced the longest-running and most thorough relaxation of negative selection and paternal-age-related mutation accumulation, and thus hold the greatest concentrations of individuals possessing "dyscorporate genotypes" (the corrosion of corporate or group-level fit-

ness being the most salient effect of spiteful mutations; note that this would reverse the probable historical tendency for spiteful mutations to predispose to low social status—and while there is little doubt that certain types of deleterious mutations predispose to this outcome in modernized populations, this may not be true of all spiteful mutations with behavioral effects, especially in the case of people who can compensate for the social-status-reducing effects such mutations might have through, e.g., leveraging of high intelligence). We conceive of this dyscorporate type as encompassing those who can broadly be defined as opposed to conditions fostering social cohesion. Through their disproportionate influence on media, business, academia (and education more broadly), government, and so on, these elite dyscorporate types potentially have the power to alter patterns of social epistasis in highly maladaptive ways. And as deleterious mutations come to afflict the public more generally, support for the aims of dyscorporate-type elites should grow, insofar as those mutations might leave such individuals with conditions and behavioral predispositions that lead them to seek a liberal "canopy" that protects them from the threats that traditional belief systems and corresponding behavioral patterns pose to them. Moreover, the developmental plasticity associated with slow life history suggests that slow life history strategists are especially amenable to social-epistatic influence, both negative and positive. All of this implies that social epistasis control modules can become rapidly subverted in Western populations at least, such as to have the effect of *intensifying* rather than *mitigating* negative social epistasis. It also suggests a potential biological basis for conflict over the construction of culture, a process explicated by MacDonald (2009). The cultural constructs that predominate in a population may ultimately (although, of course, not entirely) depend on which individuals are situated to control broad-scale epigenetic influences on behavioral development via social epistasis. Conflict will therefore emerge among individuals with different relevant genetic makeups, and thus interests in favoring and disfavoring the fitness of different genotypes through variable epigenetic rules of development (see Chap. 2's discussion of inclusive fitness). By extension, theories of culture-gene coevolution, which posit that distinct cultures have differential effects on the fitness of genotypes, can also be recast in terms of epigenetic control through social epistasis.

Among dyscorporate-type elites, there may exist a hitherto unrecognized anthropological type that we term the *anti-genius* (see also Dutton & Charlton, 2015). Whereas a genius is a highly intelligent and intellectually creative individual, typically with low personal fitness, whose ideas and inno-

vations deliver (sometimes enormous) benefits to the fitness of their group (Woodley of Menie, Figueredo et al., 2017), an anti-genius, while also possessing high intelligence and intellectual creativity, produces (typically highly anti-normative and atomizing or individualizing) ideas that *depress* the fitness of their group.[17] The intellectual gifts of anti-geniuses may be misdirected, so to speak, as a result of behavior-disturbing deleterious mutations. Among students of human evolution, it is uncontroversial that mutations have the ability to impair psychology and behavior (see, e.g., Keller & Miller, 2006 and associated commentaries). It is thus reasonable to assert that the cultural products of psychology and behavior, such as the ideas of geniuses, while in adaptive contexts fitness enhancing, can be corrupted via the action of deleterious mutations and thereby have the effect of *reducing* fitness. Examples of strains of anti-genius thought can be found on both sides of the contemporary political spectrum. On the left, one might include certain manifestations of Marxism and extreme variants of feminism.[18] The former has tended to yield mass death and social dysfunction for the populations that have officially adopted it (see Courtois et al., 2001; Gregor, 2012)—despite their groupish nature, Communist societies have had a peculiarly self-destructive, maladaptive quality; furthermore, in practice Communism and derivative ideologies have in many instances had dysgenic, specifically *g*-reducing effects on the populations strongly under their influences, via selective emigration and violence targeting of socially successful individuals who likely had higher-than-average *g* (Flynn, 2013; Glad, 1998; Sunic, 2009).[19] Intriguingly, Karl Marx suffered with a rare skin condition known to cause psychological disturbances of a sort purportedly consistent with his intellectual output (Shuster, 2007). And even in modernized liberal democracies, factors such as liberal gender attitudes seem to contribute to reduced fertility, net of other factors (Meisenberg, 2010). There is even evidence of morphological and behavioral differences between feminist activists and the broader population of women from which they are sampled, possibly consistent with the former having undergone idiosyncratic developmental trajectories (Madison, Aasa, Wallert, & Woodley, 2014).

[17] See Murray (2003) for details on the demographics of genius.

[18] We have in mind the strains of third-wave feminist thought that rose to prominence in the 1960s and actively preached violent, socially destabilizing action within those groups that might act on their principles (e.g. Solanas, 1967/2016).

[19] An interesting possible exception to this might have occurred in the German Democratic Republic, where the government actively incentivised the fertility of those with high levels of educational attainment (Weiss, 2000).

Among those individualizing ideologies classified as right-wing in contemporary context, one potential example of anti-genius thought might be found in "Objectivist" libertarianism, which essentially degenerated into a personality cult centered on Ayn Rand (Murray, 2014). According to "the biography [of Rand pupil Barbara Branden] … among Rand's closest disciples 'objectivism' was translated into a radical, and secret, sexual experimentation, including forms of polygamy and polyandry" (Introvigne, 2016, p. 308). Introvigne notes that Rand strongly influenced Anton LaVey, perhaps the foremost proponent of Satanism in the United States. Introvigne (2016) notes that "Rand's 'man worship' is close to the ideology of the Church of Satan" (p. 308). When aspects of ideologies take on truly "extreme qualities," whatever their nominal political classification, they become non-normative in the context of deep Western social history, and, if highly influential, they may have the potential to disturb group-level adaptations via negative social epistasis, engendering rapid group-level fitness decline.

* * *

The general drift of Western populations into progressively more fitness-depressing ideologies and behaviors offers some evidence consistent with our hypothesis. Individualizing moral foundations (as captured by self-reported liberalism) negatively associate with fertility at the individual (Goldstone, Kaufmann, & Toft, 2011) and, across time and space, group levels, when operationalized as postmaterialism (Inglehart & Appel, 1989; see also Fieder & Huber, 2018, who find evidence that, especially in recent years, rightists are advantaged in reproductive success over centrists and leftists in some Western populations, with more extreme rightism tending to go with greater advantages of this sort—importantly, their findings are robust to a number of controls, such as for education, age, and income). Such moral foundations have clearly been ascendant in the West for decades at least, as indicated by our analysis in Chap. 2 (see also Inglehart, 2018; Woodley of Menie, Figueredo, et al., in preparation). Irreligiosity, as we have seen, potentially positively associates with burdens of deleterious mutations, which is one potential genetic basis for the finding of a nexus linking religiosity to higher mental and physical health (on this nexus, see Flannelly, 2017; Koenig, 2012). Political ideologies associated with individualizing moral foundations seem to be positively associated with irreligiosity (Piurko, Schwartz, & Davidov, 2011), and such political

ideologies and irreligiosity exhibit a similar nexus of correlations with undesirable traits—taken together, this all suggests the possibility of a common factor behind this set of associations that is at least in part reflective of an individual's load of deleterious mutations (with more of such mutations leading to higher levels of irreligiosity, individualizing values, and poor health and other markers of poor phenotypic condition).

Congruent with this possibility, when measured as self-reported liberalism, an inclination toward individualizing moral foundations appears to positively relate to a variety of correlates of poor mental health, such as elevated psychoticism (Verhulst, Eaves, & Hatemi, 2011) and neuroticism (McCann, 2014 and references therein; but see Verhulst et al., 2011 and the erratum to their paper in the references), diminished SWB (Okulicz-Kozaryn, Holmes, & Avery, 2014) and meaning in life (Newman, Schwarz, Graham, & Stone, 2019), and lower appearance quality (Berggren, Jordahl, & Poutvaara, 2017; Peterson & Palmer, 2017; appearance quality positively associates with mental and physical health and therefore may be a signal of underlying mutation load; Nedelec & Beaver, 2014). Political ideologies related to individualizing moral foundations may also associate with engagement in non-normative behavior, such as crime (Wright, Beaver, Morgan, & Connolly, 2017). These political ideologies further are associated with openness toward, and thus probably possession of, non-normative gender identities and sexualities that might be linked to developmental instability (Erickson-Schroth, 2013; Swift-Gallant, Coome, Monks, & VanderLaan, 2017), to poorer mental health (Zietsch, Verweij, Bailey, Wright, & Martin, 2011), and, in some instances to autism[20] (Glidden, Bouman, Jones, & Arcelus,

[20] A puzzle about modern populations concerns their sexual behavior, which on the face of things appears "hedonistic" and promiscuous—not at all what one would expect of a slow life history population. As it happens, however, although average lifetime number of sexual partners in, for example, the United States spiked with the sexual revolution, it has declined since; on the other hand, the percentage of sexual experiences occurring outside of committed relationships has increased (Twenge, Sherman, & Wells, 2015). Additionally, rising participation in sexual activities long considered non-normative (though increasingly less so) has been documented (Brody & Weiss, 2011). This set of trends suggests that while Western people are becoming less sexually active, consistent with slowing life history strategy and with decreasing sexual health and function (Saniotis & Henneberg, 2014), the sexual experiences they do have are more frequently abnormal. One driver of these developments may be autistic-like personality traits, which are potentially growing in prevalence in Western populations (Sarraf & Woodley of Menie, 2017), since they are associated with paraphilias (Schöttle, Briken, Tüscher, & Turner, 2017). More importantly for our purposes,

2016; *cf* Turban & Van Schalkwyk, 2018). Perhaps relatedly, males who self-report greater levels of egalitarianism have lower upper-body strength and social dominance orientation than inegalitarian ones (upper-body strength and inegalitarianism/social dominance orientation in males appear to have a partial common basis, which may be genetic; see Petersen & Laustsen, 2019).

These findings can only be interpreted as tentative support for our hypothesis, but suggest the existence of a common nexus among individualizing moral foundations/irreligiosity, poor mental and physical health/phenotypic condition (perhaps especially apparent in the form of social learning disorders such as autism), and sex-atypical behavior. Our own analysis above has found that trends in church absenteeism and diminished mental health form a well-specified factor that is positively predicted by

slow life history strategies, of which autistic-like personality is but one extreme variety (Del Giudice, Klimczuk, Traficonte, & Maestripieri, 2014), may be especially predisposed to non-traditional sexualities in the presence of negative social epistasis. As discussed above, Dunne et al. (1997) found that the heritability of one indicator of sexual behavior, age at sexual debut, rose over time; we argue that this was possibly due to the relaxation of social-epistatic controls that reduced variance in age at first intercourse prior to the sexual revolution. If one reason for the lower heritability of behavioral factors observed in slow life history strategists (Woodley of Menie et al., 2015) is the greater influence of social epistasis on trait development in these individuals (e.g. by suppressing the effects of additive genetic variants), the rapid non-normative changes in sexual behavior observed in slow life history populations (at least the Western ones) over the past few decades could be a result of intensifying negative social epistasis.

Importantly, there are indications that efforts to promote non-normative sexuality have been part of efforts to change traditional Western cultures, especially among those of extreme political orientations (Dougherty, 2004), some of whom are prospective anti-geniuses. The radical philosopher Herbert Marcuse is known to have supported the acceptance of "polymorphous perversity" (Lind, 2000), and early Critical Theorists generally sought to thwart supposed incipient fascism through the establishment of an "erotically fulfilled" society explicitly and highly at odds with the defining characteristics of traditional Western life (Gottfried, 2017, p. 7). Certain researchers have argued that disruption of monogamous norms regulating sexual relations between males and females tends to significantly reduce indicators of population fitness (Unwin, 1934; Zimmerman, 1947). Consistent with these expectations, General Social Survey data indicate that females' number of lifetime sexual partners negatively correlates with their reproductive success (Survey Documentation and Analysis, n.d.). This result suggests that, at least in Western groups, monogamous (i.e. high-attachment oriented) behavior is essential to population-level fitness, and thus that efforts to undercut these norms are harmful to fitness, and so potentially have their ultimate source in the influence of spiteful mutations.

developmental instability, and which negatively predicts global population fitness, consistent with the existence of the hypothesized nexus.[21]

The implications of this empirical and theoretical investigation for the future of Western peoples are quite stark. The "soft" existential conditions of the West have permitted the evolutionary and epigenetic development of self-oriented slow life history strategists who favor individualizing moralities. Unfortunately, this may have co-occurred with the buildup of deleterious mutations in the gene pools of Western populations. Slow life history strategists, at least of the Western type, are too humanistic to tolerate the sorts of social mechanisms that originally functioned to limit the influence and presence of spiteful mutations in their groups. Moreover, the high *conditionability*, related to the developmental plasticity, of slow life history strategists leaves Western populations especially vulnerable to the negative social-epistatic influences that seem to have quickly intensified over time. In periods of inter-group conflict, this plasticity is potentially useful if *positive* (fitness-enhancing) social epistasis predominates and helps ensure that individuals are developmentally calibrated for violent competition. But in modernized conditions, the major effect may be to promote individualistic or atomized "drift" from adaptive norms through uncontrolled negative social epistasis, a process which might also generate opportunities for extreme dyscorporate-type individuals and anti-geniuses to potentiate negative social epistasis through their access to elite culture.

This tendency likely attenuates not only global population fitness but also dimensions of quality of life, such as mental health and existential meaning, which, to reiterate, appear to associate significantly with religiosity (religion potentially being an exemplar of a group-selected adaptation; Wilson, 2002) at the individual and group levels (Flannelly, 2017; Oishi & Diener, 2014). Strikingly, there is evidence that belief in "social-moral progress" can function as a surrogate religion and thus offer some substitute meaning in life[22] (Rutjens, Van Harreveld, Van der Pligt, Van Elk, & Pyszczynski, 2014). Therefore, the adverse consequences of negative

[21] Interestingly, there are possible grounds for synthesizing the SEAM with religious and spiritual perspectives; Beck (2007), for example, considers the implications of genetic and epigenetic science in relation to Christian doctrine, noting that "[t]he human brain and all of man's thinking and feeling [including inner life and religious outlook] are intimately connected with [the epigenetic activation of genes relevant to health]" (p. 67).

[22] Dutton and Dunkel (2019) found evidence that atheists/agnostics are "relatively hedonistic … and less interested in family" (p. 70), consistent with the expectations of the intellectuals discussed in earlier chapters, such as Max Weber, who suspected that modernization,

social epistasis may establish maladaptive feedback loops, whereby further maladaptive behaviors and norms are invested in to escape these problems,[23] that is, they serve as psychological compensatory mechanisms. It is doubtful that these compensatory mechanisms will be successful, since they occur in the context of a generally declining human condition (Lynch, 2016), and because, given their atomizing effects, they are unlikely to satisfy the sorts of needs that may exist to encourage group-fitness-enhancing conditions (intense intra-group binding, sacrifice for one's fellows, shared religious experiences, and the like). This all raises the possibility that negative selection, a phenomenon thoroughly explored in the previous chapter, is actually still quite active in the West, but is occurring at the *group* level, through the negative-social-epistasis-induced fitness collapse of Western populations exhibiting high mutation loads.

The distinctive conditions that generated Western excellence are set to continue deteriorating so long as selection does not favor heroes, geniuses, and saints, but rather "Last Men" (Nietzsche, 1891/1999) whose quest for personal happiness likely cannot sustain a civilization in the long run.

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in undoing public sources of meaning such as religion, would lead people to withdraw into private, self-interested pursuits.

[23] For example, moralized condemnation of those who hold to traditional norms and resist individualizing moralities is a signal aspect of contemporary Western culture (Rubin, 2015).

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CHAPTER 8

Biocosmic Pessimism

The Decline of the West Is Multifaceted, and Other Considerations

Given the findings presented in the previous chapter, concerning the role of the social epistasis amplification model (SEAM) in understanding the "decline" of Western populations and cultures, it needs to be stressed that the reality of Western decline is multi-dimensional, with many independent and complementary factors contributing. Contemporary work has examined several of these elements, which include recent (i.e. since circa 1850) "dysgenic" trends in g, probably brought on through a climate-change-related shift of the balance of selection in Western populations from the group to the individual level (Woodley of Menie, Figueredo, et al., 2017), and heightened exposure to evolutionary novelty and resultant maladaptive and supernormal stimulation of certain psychobehavioral responses (evolutionarily novel levels of conspicuous wealth inequality may be one such stimulus, and these potentially overactivate the egalitarian aspects of human moral psychology; Charlton, 1997; Woodley, 2010). There is also a host of proximate-level factors involving purely cultural evolutionary trends that doubtlessly have unique effects on general social malaise and its consequences (such as rising nihilism and declining fertility) in Western groups and perhaps others (as discussed in Chap. 7).

This is not to say that the SEAM lacks considerable power as an explanation for biocultural decline. That the results of the previous chapter's

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analysis are robust to controlling for both the natural log of time[1] and also the independent effects predicted by rational-choice theories of the demographic transition (e.g. Galor, 2012) suggests that the SEAM does have such power. In the theoretically favored (and more parsimonious) model, the social epistasis factor accounts for 56% of the variance in the global fitness factor, independent of other predictors. There is a distinct possibility that SEAM dynamics are present in non-Western cultural contexts, which merits further study. Many non-Western countries are succumbing to the same modernization effects (Bongaarts, 2009). The fact that the SEAM can potentially account for the cross-cultural generalizability of the demographic transition using a single causal mechanism (i.e. the accumulation and vertical transmission of spiteful mutations, and thus their negative effects on social epistasis) gives the model scientific appeal. The SEAM might capture a *sufficient* cause of biocultural decline, but not a *necessary* one.

So our findings leave room for other proximate and also distal biocultural factors in Western decline. Indeed, there may be subtle interactions among these different factors, which tie them to the dynamics of SEAM. Many of the proximate-level explanations for the demographic transition are based on the idea that individuals make rational tradeoffs among outcomes for which they have variable preferences. For example, people may "trade" offspring quality against offspring quantity or fertility against personal human capital—such as when an individual devotes years of his or her life to education that could be used to have and rear offspring (Galor, 2012). The fact that the "costs and benefits" of specific behaviors and activities vary with "particular forms of culture" (MacDonald, 2009, p. 208) predictably leads to conflict in the construction of culture among persons whose preferences differ for genetic reasons (MacDonald, 2009). We might further say that genetic differences among individuals, and groups of individuals, drive them to shape their environments and ecologies in ways that suit their individual or corporate (group-level) genotypes, such as to, for example, facilitate the maximal satisfaction of certain preferences.

But individuals exhibit unequal effectiveness in so transforming their surroundings. One factor determining variation in this effectiveness may

[1] This shows that the findings do not result from so-called temporal autocorrelation effects, or the confounding of temporal-trend data by the closeness of measurement occasions to one another in time.

be individuals' average genetic similarity to the other people constituting their group. To the extent that Western populations have taken on progressively larger shares of individuals carrying spiteful mutations, and have become adapted to inter-individual as opposed to inter-group competition, those who do not carry spiteful mutations are likely progressively less advantaged, and thus unsurprisingly less successful, in the competition with the carriers of these mutations to structure culture. People not carrying spiteful mutations may "lose out" to a dyscorporate elite insofar as the former are compelled to align their explicit preferences to those of said elite, who may impose their preferences in a top-down fashion. In light of considerations in the prior chapter linking negative social epistasis to low fertility, it may be that a hallmark of a society undergoing social-epistatic decay is a prevalence of inducements to low fertility. These may be both economic and cultural and seem to be coupled with the derogation and deconstruction of systems of traditional values. Further, such inducements and effective "anti-values" are likely transmitted vertically via both genetic and cultural inheritance mechanisms that adapted cultural groups for high levels of inter-group conflict historically, but, in the absence of this conflict, lead to rapid group fitness collapse.

Dysgenic Selection Against *g* and the Co-occurrence Model

Another major biocultural model, discussed in previous chapters, is the dysgenic selection model, which is based on the observation that among those with lower *g* or proxies for it, fertility is typically higher than among those with higher levels of the trait, which suggests, given the relatively high heritability of *g*, that over time the trait should decrease (Galton, 1869; Lynn, 1996; Skirbekk, 2008). The regime of selection that favors the fitness of those with lower levels of *g*, and also reduces the fitness costs associated with high mutation load, is characterized by environmental mildness engendering an absence of inter-group conflict; this in turn yields diminution of social harshness, to which those with (or probably with) low *g* and those with high mutation load were historically far more vulnerable than those with high *g* and those with low mutation load (Clark, 2007; Woodley of Menie, Figueredo, et al., 2017). Moreover, the low-*g* and high-mutation-load groups partially overlap—it has been found that mutations, specifically rare variants, predict a large percentage of the variance among individuals in levels of *g* (Hill et al., 2018). Given the presence

of small-magnitude negative associations between *g* and indicators of developmental instability, such as fluctuating asymmetry (Banks, Batchelor, & McDaniel, 2010), which may be associated with mutation load, the accumulation of relatively more common variants (as discussed in Chap. 6) may be directly contributing to the decline in *g*. For example, craniofacial shape asymmetry (as a measure of fluctuating asymmetry) is likely negatively related to *g*, and so its increase potentially indicates a *g* decline of 0.16 points (on a standard IQ scale) per decade (Woodley of Menie & Fernandes, 2016b). Additionally, the secular increase in sinistrality may correspond to an increase in mutation load that has reduced *g* by 0.01 points per decade (Woodley of Menie, Fernandes, Kanazawa, & Dutton, 2018). The average decline across such indicators is 0.09 points per decade.

The overall decline in *g* is probably much larger (with estimates ranging from −0.38 points per decade [Woodley of Menie, 2015] to around −1.3 points per decade when the decline in variants associated with *g* are directly measured and extrapolated to a dysgenics rate estimate [see discussion of Abdellaoui et al., 2019 in Chap. 5]). This decline seems to be driven primarily by selection pressures that favor the fitness of lower-*g* phenotypes (Reeve, Heeney, & Woodley of Menie, 2018) and genotypes exhibiting lower frequencies of genetic variants predictive of educational attainment and *g* (Beauchamp, 2016; Conley et al., 2016; Kong et al., 2017; Woodley of Menie, Rindermann, Pallesen, & Sarraf, 2019; Woodley of Menie, Schwartz, & Beaver, 2016). A subset of studies relevant to selection for intelligence used polygenic scores[2] predictive of cognitive ability to estimate the resultant decline in the phenotype of interest. For instance, using a US sample, Beauchamp (2016, *cf.* Woodley of Menie, 2016) estimated a loss in educational attainment equivalent to 1.5 months per generation. And Kong et al. (2017), using a large Icelandic sample, estimated a loss in IQ of −0.3 points per decade. As each study utilized very low estimates for the additive heritability of educational attainment and IQ, respectively, these are likely substantial underestimates of the true *g* loss, which may fall in the range of 0.5 to 1 points per decade on a standard IQ scale, i.e. with a median of 100 and standard deviation of 15 (Woodley of Menie, Figueredo, et al., 2017). An even more recent study employing the Wisconsin Longitudinal Study (Woodley of Menie et al., 2019) and utilizing a newly released educational attainment polygenic score also estimated *g* decline and employed the same

[2] A "polygenic score" tracks some set of genetic variants reliably associated with a particular phenotype or outcome.

formula as Kong et al. (2017). It found that with a low-end additive heritability estimate for IQ ($h^2 = 0.4$), IQ would be expected to decline at a rate of −0.21 IQ points per decade; however, this rate doubles when a classic behavior-genetic estimate of the additive heritability of IQ is used ($h^2 = 0.8$; IQ decline = −0.42 points per decade).

The Flynn effect constitutes a major challenge to predictions stemming from the dysgenic selection model, because population-level performance across IQ batteries in different countries has been rising at a rate of three IQ points per decade on average over roughly the past century (Pietschnig & Voracek, 2015; Trahan, Stuebing, Hiscock, & Fletcher, 2014). Knowledge of this phenomenon (despite being called the Flynn effect, after James Flynn, who did more than anyone else to bring it to widespread attention) predates Flynn by several decades. Those explicitly looking for evidence of dysgenic declines in intelligence made some of the earliest observations of the effect (Cattell, 1950). The apparent failure of efforts to detect these declines despite apparent dysgenic selection was subsequently termed *Cattell's paradox* (Higgins, Reed, & Reed, 1962), after psychometrician Raymond B. Cattell, who was a committed proponent of the dysgenic selection model in the early decades of the twentieth century (Cattell, 1937). A position emerged in the 1990s to the effect that dysgenic selection was so far only reducing genotypic IQ (i.e. the genetic basis of intelligence), but that environmental enrichments of one sort or another (e.g. increased health, wealth, nutrition, etc.; Lynn, 1996) more than offset this genetic effect and so were enhancing phenotypic IQ. In other words, IQ-test performance was rising despite dysgenic selection (Loehlin, 1997 and Lynn, 1996 expressed the idea with the image of "rising tides" lifting "leaky boats").

More recently, however, another solution to Cattell's paradox was proposed, drawing on the idea that dysgenic selection and the Flynn effect have their effects on different variance components of IQ. The first major variance component is general intelligence or *g*, discussed earlier in this book, and the second is (collectively) specialized mental abilities (sometimes abbreviated to *s*), which are narrow factors each of which predicts variance in performance on specific cognitive tasks (Carroll, 1993; Spearman, 1904). (These can be further divided into heritable [*g.h*] and environmental [*g.e*] general intelligence, as well as heritable [*s.h*] and environmental [*s.e*] specialized abilities.)

Moderation analysis has found that the magnitude of the negative correlation between performance on a subtest of an IQ battery and fertility is

positively related to that subtest's *g* loading, meaning that the more perfectly a subtest measures *g*, the greater will be the magnitude of the negative association between performance on that subtest and fertility (Woodley of Menie, Figueredo, et al., 2017). Additionally, the correlation between the heritability of performance on an IQ subtest and *g* is very strong, and may even be perfect (i.e. 1.0; van Bloois, Geutjes, te Nijenhuis, & de Pater, 2009; Voronin, te Nijenhuis, & Malykh, 2016). But in considering the Flynn effect, it is the subtests that most *weakly* measure *g* that show the largest gains in population-level performance over time (te Nijenhuis & van der Flier, 2013). Therefore, dysgenic selection acts on the most heritable variance component of IQ (*g*), whereas the Flynn effect acts on the less heritable variance component(s) (those sources of *s* that can be easily trained or are most responsive to enhancement of phenotypic condition).

This *co-occurrence model* predicts that if a measure of cognitive ability can function as a *stable* measure of *g* over time by virtue of measurement invariance (lack of measurement invariance, or the tendency of an instrument to measure different parameters across different measurement occasions, is a methodological problem associated with measurement of the Flynn effect; Wicherts et al., 2004), then performance on it should show a decline consistent with the action of dysgenic selection. Indicators that reveal this pattern include simple visual and auditory reaction times (Madison, Woodley of Menie, & Sänger, 2016; Woodley of Menie, te Nijenhuis, & Murphy, 2015), 3D spatial rotation ability (Pietschnig & Gittler, 2015), (certain facets of) ability-based emotional intelligence (Pietschnig & Gittler, 2017), working memory capacity (measured using backward digit span and backward Corsi block span; Wongupparaj, Wongupparaj, Kumari, & Morris, 2017; Woodley of Menie & Fernandes, 2015), utilization frequencies of high-difficulty vocabulary items (Woodley of Menie, Fernandes, Figueredo, & Meisenberg, 2015), and color-hue discrimination ability (Woodley of Menie & Fernandes, 2016a). The most significant potential manifestations of declining *g* include factors of social significance related to complex problem-solving ability, such as the per capita rates of macro-innovation and also the frequencies of eminent individuals responsible for the production of such innovation, both of which have declined precipitously since the mid-nineteenth century (Huebner, 2005a; Murray, 2003; Woodley & Figueredo, 2013; Woodley of Menie, Figueredo, et al., 2017). These "reverse" Flynn effects were recently termed "Woodley effects," after Michael A. Woodley of Menie, who, along with Bruce Charlton, first hypothesized their existence (Sarraf,

2017). Importantly, the declines in the frequencies of genetic variants positively associated with educational attainment and *g* (established using temporal data collected from Iceland and the United States) have been found to predict 25% of the variance in a latent chronometric factor comprised of various Woodley effects, even after controlling for time and changing levels of neurotoxic pollution (Woodley of Menie, Sarraf, Peñaherrera-Aguirre, Fernandes, & Becker, 2018).

Woodley of Menie, Figueredo, et al. (2017) developed a model that ties the consequences of increasing mutation load (such as increasing BMI, sinistrality, and fluctuating asymmetry) to parallel temporal trends among various "Woodley effects" and Flynn effects through a latent nexus factor. This factor captures the shared temporal variance among three latent chronometric factors (estimated in the same way as those employed in the analysis in Chap. 7): one capturing trends in various indicators of declining heritable general intelligence (*g.h*), one capturing trends in various indicators of rising environmentally sensitive specialized abilities (*s.e*), and one capturing trends in various somatic modifications (*s.m*), which include trends likely tracking mutation accumulation (such as fluctuating asymmetry) and those tracking environmental improvements (such as increasing height). The latent nexus variance among these convergent measures stems from increasing climatological mildness changing the patterns of selection pressure acting on various traits (this is consistent with the presence of a temporal correlation of −0.8, $p < 0.05$ between an estimate of global temperature increase and the nexus factor score spanning the years 1810 to 2010). It was predicted that a major factor that reversed due to increasing climatological mildness was group-selective pressure, with groups no longer having to compete for scarce resources as a consequence of the challenges related to cold, harsh, and variable climates (Woodley & Figueredo, 2013; Woodley of Menie, Figueredo et al., 2017; Zhang et al., 2011).

With a warmer climate, socio-ecological pressures, which formerly favored the fitness of those with high levels of *g* and placed a large fitness premium on low levels of mutation load, are relaxed. This permits those with lower *g* to gain a relative fitness advantage over those with higher *g* (who increasingly employ technology, such as contraceptives, to regulate their fertility and trade this against the acquisition of human capital, e.g. educational attainment), and relaxed negative selection allows the population burden of relatively more common and mildly deleterious, in addition to prospectively rarer and much more deleterious, mutations, including spiteful ones, to increase. Indeed, the process of mutation-induced

demographic decline and concomitant alterations in patterns of social epistasis, as discussed in Chap. 7, may be potentiating dysgenic selection and thus the decline in *g* in Western populations, in that the relatively high social sensitivity of those with higher *g* may render them more susceptible to epigenetically phenocopying anti-fitness values and norms emanating from an elite potentially burdened with spiteful mutations (Dutton & van der Linden, 2015; Woodley, 2010). This is consonant with the finding of a negative correlation between the strength of dysgenic selection (scaled negatively) and time in a recent meta-analysis of studies of dysgenic fertility for IQ, indicating that the strength of dysgenic selection has increased over time (Reeve et al., 2018; $r = -0.37$, $p = 0.05$).

Cycles of Time

Western (and maybe other) groups are apparently locked in biocultural cycles characterized initially by periods of intense inter-group conflict driven by harsh climates (Zhang et al., 2011), chronic downward social mobility (Clark, 2007, 2014), strong negative selection against (especially spiteful) mutations, and consequent bootstrapping of these populations as *g* and other traits associated with industriousness rise, along with population size and corporate fitness (Woodley of Menie, Figueredo, et al., 2017; see also Weiss, 2007). Then these societies start to degrade. Increased climatic mildness reduces the strength of negative selection, permitting mutations to accumulate. Under a regime of individual-level selection, those with lower *g* gain a relative reproductive advantage over those with higher *g*, giving rise to the Woodley effect and decreased innovativeness and cultural vitality. Great accomplishments (such as putting a man on the Moon) become rare and are replaced with other priorities. Societies become overwhelmed with spiteful mutations and the resultant veneration of nihilistic and anti-group-selected norms coincides with an epidemic of psychobehavioral abnormalities, leading to growing individual alienation and social dysfunction.

On the surface, there are improvements, such as increases in wealth, (aspects of) health, and (the *s.e* component of) IQ, in addition to reductions in early-life mortality and both inter- and intra-group violence. Continuing selection favoring certain components of slow life history strategies may in part drive these trends in modernizing and modernized populations (Woodley of Menie, Cabeza de Baca, Fernandes, Madison, & Figueredo, 2017). But as noted in Chap. 5's critique of Steven Pinker's optimism regarding the supposed fruits of the Enlightenment, these

trends are in fact masking a collapse, presumably back into a Malthusian regime, in that civilization is no longer able to solve the increasingly complex problems associated with maintaining a developed and highly stratified techno-economy. In such a setting, the civilization succumbs to what can best be described as mass senescence, as its population simply fails to reproduce itself and, eventually, large numbers of individuals die off, recapitulating the observed historical demographic dynamics of both ancient Rome (Dutton & Woodley of Menie, 2018) and Calhoun's mouse utopia Universe 25 (Calhoun, 1973).

Techno-optimists of various flavors tout the inevitability of certain forms of scientific progress that will yield and have yielded potential solutions to the problem of biocultural decline, such as pre-implantation genetic diagnosis, embryo selection, germ-line gene therapy, CRISPR (which can be used to remove deleterious mutations), and radical life extension (e.g. Bostrom, 2002). The more wildly enthusiastic members of this crowd have even promoted the idea that it may be possible to upload the human mind to, and realize it on, a computational substrate, once the requisite computing power is available and the resolution of brain-scanning technology is high enough to capture the ultrastructure of the neurocytoarchitectonics of the brain so as to permit reliable digital reconstruction (Kurzweil, 2004). This has led to much scientific and philosophical speculation under the banner of "transhumanism" concerning what has come to be termed the *Singularity Hypothesis*, or the idea that recursive biological and technological improvement has the potential to radically redefine what it means to be human, including perhaps the elimination of inequality among people and possibly also among species (e.g. Eden, Moor, Søraker, & Steinhart, 2012).

There are significant reasons to be skeptical of these technological prophecies, however. Gene editing/manipulation techniques fall broadly into the category of *second-wave eugenics* (Woodley of Menie, 2020) and are often promoted by, or are implicitly harmonious with, a libertarian ethical framework, that is, one that makes central the role of personal choice in selection for offspring characteristics (e.g. Agar, 2004; Anomaly, 2018). These techniques are also (generally) feasible, in that the science of genomics as applied to significant traits such as intelligence is sufficiently advanced at present to theoretically permit crude forms of embryo selection that would enhance g in offspring to some degree (polygenic scores for educational attainment and g can currently account for nearly 10% of the variance in g among representatively sampled individuals, which is not trivial; Lee et al., 2018). Advances are being made in identifying genetic

variants responsible for pathological-range personality variation as well (e.g. Lo et al., 2017).[3]

While such personal reproductive choice may (and currently does) help reduce the prevalence of genetic diseases (amniocentesis and selective abortion have had the effect of reducing the prevalence of Down's syndrome in certain populations for example; de Graaf, Buckley, & Skotko, 2015), major regulatory barriers currently exist in Western populations (in particular) that are unlikely to be much altered in a way that will be permissive of some kind of marketized reproductive-genetic engineering. Indeed, part of the problem may stem from the fact that certain fashionable moral/ethical views have severely attenuated support for "genetic enhancement" by changing perceptions of the value of different phenotypes. The attitude that, for example, high levels of intelligence are more valuable than low ones may in part be a consequence of historical group-selective pressures favoring those groups with the largest numbers of intelligent, industrious individuals and "genius" innovators (Woodley of Menie, Figueredo, et al., 2017). Under a regime of individual-level selection, it is easier to convince people of the value-equality of different levels of traits, absent strong ecological sorting of phenotypes as a function of their fitness payoffs to the group. Furthermore, an ecology of virtue signaling can arise from the phenocopying of axiological attitudes that elite carriers of spiteful mutations hold; this process may explain, at least in part, the modern phenomenon of some individuals ascribing equal value to objectively pathological and healthy phenotypes (consider, e.g. Szasz, 2010).

From such a severely altered social-epistatic ecology, virtues of a sort that promote further reductions of group-level fitness would be likely to emerge, which, if enmeshed with the power of gene-manipulation technologies, could unleash an epidemic of psychobehavioral pathology that would collapse a civilization very quickly. A good example of this may be imagined in the opportunity that freedom-of-choice genetic engineering might give individuals to deliberately select into their offspring traits associated with psychopathic tendencies (such as dominance and risk-taking facets of extraversion and heightened inter-personal manipulativeness[4]),

[3] The mind-uploading idea may depend on the assumption that the entirety of the human mind is ultimately physical, which is far from certain (see Barušs & Mossbridge, 2017).

[4] A study of how females rate the relative desirability of certain traits in hypothetical offspring indicates an overwhelming preference for extraversion (which includes facets related to social dominance and venturesomeness) and relatively little preference for intelligence and conscientiousness (Latham & von Stumm, 2017). One might find this pattern of preferences

which under a regime of individual-level selection may be strongly associated with success, for example, in the globalized corporate world (Brooks & Fritzon, 2016, found that as many as 1 in 5 corporate CEOs may exhibit psychopathic personalities—compared to a population prevalence of 1 in 100).

One of the very few people to realize the extreme danger of enmeshing personal-choice ethics with reproductive-genetic technologies was Raymond B. Cattell (1972, 1987), who saw that group selection was essential to maintaining the evolutionary viability of civilizations and to conditioning selection for traits that would further that viability:

> A group positively planning well for its future will employ all three of the [following]: (1) differential birth/death rates, (2) rhythms of segregation and well-chosen hybridization, and (3) creation of mutations along with genetic engineering.… These methods we need to use toward group goals to bring about by a collective movement of its citizens (a) survival of the group, and (b) launching out on its own evolutionary adventure. (Cattell, 1987, pp. 210–211; emphasis in original)

especially concerning in light of evidence that extraversion and intelligence are negatively genetically correlated (Bratko, Butkovic, Vukasovic, Chamorro-Premuzic, & Von Stumm, 2012), indicating that selection for extraversion runs the risk of selection against intelligence. In any case, this preference pattern is potentially consistent with the observation from evolutionary psychology that females respond to environmental and social cues by adaptively modulating their mate preferences (see, e.g. Del Giudice, 2011); contemporary Western women's preferences for offspring traits are logical, given that high intelligence and conscientiousness (see, e.g. Perkins, 2016; Skirbekk & Blekesaune, 2014) may not tend to benefit offspring fitness in those females' populations (indeed the former trait is quite robustly negatively associated with fertility in females and males [Reeve et al., 2018], although variation across regions and over time is apparent [Kolk & Barclay, 2019]). Moreover, while women certainly prefer status in male mates, and so indirectly prefer intelligent males, most evidence seems to indicate that women are not sexually attracted to high levels of intelligence per se (Gignac, Darbyshire, & Ooi, 2018).

It is conceivable that with the normalization and widespread availability of reproductive-genetic tools, these preferences could translate into population-genetic change in ways that lead to *runaway artificial selection* for exaggerated levels of individually selected traits that are pathological vis-à-vis the well-being and fitness of biocultural groups. One could argue that male preferences for offspring traits may offset any negative externalities of female preferences in the use of reproductive-genetic techniques. But between the large proportion of children born to single mothers in contemporary Western populations, and Western law and culture's favoring of female over male procreative choice and autonomy (Baskerville, 2017), this hypothetical offsetting would probably be negligible (and that is *assuming* that relevant male and female offspring trait preferences substantially differ at all).

Cattell's belief system was promoted under the rubric of *Beyondism*, a scientifically informed moral-ethical system of planned biocultural evolution, the function of which would be to use various techniques to enhance the flourishing of a group through the artificial selection of traits that were maximally conducive to inter-group competitiveness. The value system of Beyondism was to have a religious character, since it was derived from Galton's (1904) belief that "eugenic" virtues would have to replace religious ones in order for selection against socially desirable traits to be stopped or reversed. Importantly, Cattell saw that it would be necessary to instigate inter-group competition in order to sustain the value system of Beyondism.[5] Cattell's preferred method was a form of *cooperative competition*, whereby "like players in some greater more vital game than men usually play, cultural groups recognize that the maintenance of inter-group competition is indispensable to evolution and they agree to cooperate in whatever rules are necessary to maintain it in effective action" (Cattell, 1972, p. 86).

The consequences of losing in this "great game" would be extreme, however, amounting to nothing less than the "phasing out" of defeated biocultural groups (i.e. having the biocultural distinctiveness of groups eliminated through dismantling). Such a value system, while in theory solving the individual-level runaway artificial selection problem inherent in the libertarian ethics of second-wave eugenics, nevertheless makes Beyondism very unlikely to ever take root as a viable alternative to liberal and social democracy in the West, since it is seriously objectionable to many. The potential for mutually assured destruction among the hypothetical "players" of such a "great game" makes efforts to stimulate inter-group rivalry and competition, even if done with some kind of oversight, fraught with existential risk.

Finally, a brief note on the status of radical life extension and mind emulation as prospective solutions. It is worth noting that these ideas are surrounded by hype that makes it difficult to determine whether real progress has been made toward the goal of realizing these technologies. Moreover, there are significant doubts about the scientific foundations of

[5] One might here think of Bruce Charlton's (2008) proposal to genetically engineer spiritual and religious values into people (a program that he terms *genospirituality*). This would probably have the effect of making populations more viable in inter-group conflict, given the historical role that religion seemingly played in rendering groups more fit for such conflict (see Chap. 3).

certain of these claims (for criticisms of the sufficiency of brain scanning for the purposes of reconstructing consciousness *in silico*, see Regalado, 2013). What is known, however, is that the rate of macro-innovation (major events in science and technology per year, per billion of the world's population) has been declining sharply since the mid-nineteenth century—the period in which the IQ-fertility correlation changed from positive to negative, or became dysgenic (Woodley of Menie, Figueredo, et al., 2017). It appears that dysgenic trends in *g* are making populations less innovative *despite* larger populations and prolonged and more universal exposure to schooling. The decline is even apparent in noted techno-optimist Ray Kurzweil's (1999) data on innovations in computing, when these are recomputed on a per capita basis, with most of the macro-innovation having occurred in the 1950s (the decade in which William Shockley invented the transistor; Huebner, 2005b). There is, then, little reason to believe that real and sustained progress toward effectively "sci-fi" technologies is occurring.

Biocosmic Pessimism

Finally, and admittedly more speculatively, is the possibility that the cyclical dynamics of civilization may be recurrent across advanced intelligences wherever they are found in the universe. The *Fermi paradox*, or sometimes *Fermi-Hart paradox* (Jones, 1985), results from the following assumptions and observation: life is relatively common in the galaxy (assumption) and some small subset of that life, beyond the human species, is intelligent enough to develop along space-faring lines (assumption); further, a great deal of time has elapsed since the origin of life on Earth (roughly 4.5 billion years; observation, or rather observation-based). From the foregoing, it is assumed that Earth should have been repeatedly colonized by waves of extraterrestrial expansion.[6] But the fact is that instead of a vast alien empire of colonized worlds teeming with intelligence, radio astronomers detect nothing but a *great silence* (Brin, 1983). So in brief, the Fermi-Hart paradox can be expressed with the following: "if they [advanced extraterrestrial

[6] Even assuming that these civilizations cannot expand into a galaxy very fast, given the ability to travel at only a relatively small fraction of the speed of light maximum, it should be possible for them to colonize all prospectively habitable worlds in a galaxy in a time-frame encompassing a couple of millions of years—in terms of cosmic timescales, this is a "blink of an eye" (Hart, 1975).

intelligences] exist, then they should be here already." The paradoxical finding that "they" are not here already has led to a cottage industry in solutions, which can be broadly aligned with the so-called *great filter* model (Hanson, 1998). The great filter is simply the idea that there are potential barriers that must be overcome on the path to advanced intelligence and beyond. Some argue that these barriers have been passed already (abiogenesis might be incredibly rare; unicellular living things, once originated might seldom make it to multicellularity; and multicellular life might seldom evolve into greater intelligence, etc.).

If these barriers have a cumulatively very low probability of being overcome, then it might be that life on Earth is a unique phenomenon—so the *rare earth hypothesis* might be true (Ward & Brownlee, 2000). Sources of life may exist in various places in the universe, but they may be thinly spread out across galaxies, which largely prevent different sources of life from coming into contact owing to the vast distances involved in intergalactic travel. Others argue that the filters may lie ahead of us in the form of *existential risks*, for example, nuclear war; natural disasters, such as asteroid strikes or stray gamma ray bursts; artificial intelligence (AI) uprisings; nanotech "gray goo" scenarios; and so on (Bostrom, 2002). Some have even argued that there are no great filters per se and that it is simply the case that older and significantly more advanced machine-phase civilizations are "aestivating"—that is, they have entered into states of quiescence, awaiting future cosmic eras when energetic and computational resources will be more numerous and colonization/expansion more thermodynamically favorable (Sandberg, Armstrong, & Cirkovic, 2017). Another possibility, consistent with the Singularity Hypothesis, is that ancient advanced civilizations inevitably "transcended" into an "inner space" or "a computationally optimal domain of increasingly dense, productive, miniaturized, and efficient scales of space, time, energy, and matter, and eventually, to a black-hole-like destination" (Smart, 2012, p. 55). Thus they simply operate at a physical level that is beyond the ability of less advanced civilizations to detect.

* * *

A major belief among those who think that humanity is the sole advanced intelligent species in the galaxy, and has escaped the great filter, is that its destiny is to become a space-faring civilization and realize continual population growth. The solar system alone presents humanity with potentially

millions of bodies that could be colonized and exploited for their raw materials. Efficient conversion of these resources into orbiting habitats could, with a sufficient density of these habitats englobing the sun (i.e. the construction of a Dyson "sphere," or rather swarm; Dyson, 1966), permit humanity to transition from a Kardashev (1964) Type-1 civilization (i.e. one able to use all of the available energy resources on Earth; note humanity is not currently at even that stage) to a Kardashev Type-2 one (able to use all of the energy output of the sun in order to sustain populations of quadrillions of humans). Beyond that is the possibility of becoming a truly galactic civilization at Kardashev Type 3, entailing the ability to use all of the resources available in all the star systems comprising a galaxy, allowing for human biomass to increase to uncountably high levels as humanity establishes itself as the dominant form of life in this part of the universe. To reiterate, rooted in this optimistic view of humankind's future is the belief in continual population growth; but as we have argued, strong negative selection and selection acting against those with low *g* and other traits that disfavor group fitness are necessary to *sustain* population growth, which had its roots in fierce inter-group competition during the Age of Empire (Figueredo et al., 2019).

We no longer have empires, we no longer have inter-group competition at the requisite level, and we no longer (perhaps mercifully) have differential mortality and fertility of the necessary degree. The Woodley effect and the probable high prevalence of spiteful mutations among elites have given rise to pathological norms that have likely undermined a biocultural fabric that took centuries of evolution to establish. We have already made the case that second-wave eugenics (see Anomaly, 2018) will not work, for even if it were readily taken up, it may yield the creation and dissemination of new psychobehavioral and possibly even biophysiologically pathological forms, the existence of which could in some instances break certain fundaments of our adaptive structuring. The evident inability of the West under dysgenic and relaxed negative selection to sustain its biomass does not augur well for its prospects as a space-faring civilization. Such a civilization would have to coordinate the vastly complex social ecologies that might emerge from the eventual transition into a Kardashev Type-2 civilization involving quadrillions of humans in the solar system.

Chronically low birth rates and collapsing fertility potential, coupled with (and partly a function of) the rise of atheism and other nihilisms, are currently driving the most techno-economically advanced civilizations on Earth into collapse, and their present biomass is but a drop in the ocean of

the population size needed to sustain a Kardashev Type-2 civilization. We posit that the interorganismal pleiotropic effects of spiteful mutations scale in proportion to the size of the social-epistatic network and their opportunity to target it (Woodley of Menie, Figueredo, et al., 2017), which in turn scales, probably exponentially, with population biomass and social complexity. Imagine the size of the target for these mutations presented by a civilization of quadrillions of heavily interdependent and technologically sophisticated humans. Human social complexity undoes itself under the weight of its own biocultural failings, and groups that have undergone this complexification process rapidly scale back into small-population-size Malthusianism, as happened following the Roman Empire and the Islamic Golden Age of centuries past (Dutton & Woodley of Menie, 2018). That the same thing is happening to the contemporary West indicates that we may be passing through the great filter *right now*.

As a solution to the Fermi-Hart paradox, an objection to the SEAM may be raised on the grounds that assuming the possible existence of many other intelligences in the galaxy, could not such intelligences have essentially inscrutable natures, being bound by essentially alien evolutionary principles? Also, assuming some at least superficial similarities, why has not a single one of them instituted some draconian Beyondism-like policy, and by virtue of intense group selection, both among themselves and possibly other alien civilizations encountered during the inter-stellar colonization phase, managed (either in whole or in part) to avoid spiteful mutational meltdown or some other dysgenic existential risk? After all, it would only take one intelligence either adaptively optimized or bioengineered for conquest to spoil our proposed solution (such an intelligence would be here already after all, as per Fermi and Hart).

One possible explanation may relate to convergent evolution—that is the ability for different species that share no (recent) common ancestry to evolve along extremely similar lines morphologically as a function of their occupying very similar ecological niches. A classic example of this is in ichthyosaurs and modern-day cetaceans, which occupied very similar marine niches and even closely resemble one another in terms of morphology, despite having no recent common ancestry (Conway Morris, 1998). Examples of convergent evolution abound in nature and are far more numerous than once thought (Conway Morris, 2004). Convergent evolution is not restricted to the species-morphology level either. There are examples of genetic convergent evolution, involving identical genes arising completely independently of common descent (Stern, 2013); addi-

tionally, convergent evolution has been observed at the level of ecological communities, with entire assemblages of species interacting with one another in ways that are highly similar across assemblages in different biomes (Melville, Harmon, & Losos, 2006). Simon Conway Morris (2004, 2017) has even proposed what could be termed a *rash dictum*: So ubiquitous is convergent evolution on Earth that there is reason to predict that given similar initial conditions, different sources of life on different planets may end up convergently evolving to the point that they will be strongly recognizable to one another as intelligent life, possessing similar evolved biological features. Extending Conway Morris' rash dictum even further, into the realm of *xenopsychology* (Freitas Jr, 1984), the parallelisms may not end there, but may be reflected in convergent modes of social and cultural organization (Flores Martinez, 2014) and so in the convergent susceptibility of particularly complex social organization, arising from relaxed negative selection, to spiteful mutations.

If the convergence principle extends to the level of xenopsychological organization, then it strengthens the view that the SEAM identifies a source of the great silence. Civilizations throughout the galaxy consistently come to embrace nihilistic values and undergo decline, which prevents them from ever being able to comprehend the problem (at the level of civilizations), which in turn inhibits them from taking any kind of meaningful (i.e. group-focused and collective) action to mitigate the problem, perhaps especially because sustainment of large populations seems to require an enhancement of prosociality that softens, so to speak, treatment of others (Norenzayan & Shariff, 2008; Purzycki et al., 2016), which might be redirected in pathological ways through the effects of deleterious mutations. Resultant technological and economic decline from these genetically based trends then leads these convergently doomed civilizations to collapse back into Malthusianism, restarting the civilizational cycle.

Another fascinating, and highly controversial implication of Conway Morris' rash dictum, is parallelism in time of inter-planetary civilizational development. We may be living in a special cosmological era characterized by chemical and energetic conditions that are especially suitable for the emergence of life, or even for the transfer of life from one origin planet to another via panspermia (Steele et al., 2018). This may be a consequence of humanity's having evolved in the *stelliferous era*, in which matter is structured into stars, galaxies, and super-clusters, with stellar nucleosynthesis serving as the primary form of energy generation and source of "metals" (elements with atomic numbers ≥ two)

(Adams & Laughlin, 1999). It might even be predicted that a subset of this era has been especially conducive to the emergence and evolution of life, perhaps by virtue of the presence of especially optimal structure, energy, and proportions of various elements. This hypothetical period could be termed the *viviferous subera*. Consequently, we may share a galaxy along with other advanced intelligences, which all evolved from life that originated within the relatively narrow window of time that might characterize the *viviferous subera* (which may simply cover the 0.5- to 1-billion-year period in which life arose on Earth), essentially developing in parallel with one another, each trapped in its own cycles of time, and so unable to spread beyond the confines of its home system. One tantalizing but highly controversial piece of evidence for this comes from the research of Trottier and Borra (2016), who examined the spectra of 2.5 million F2 to K1 range (solar-like) stars, finding indications among a subset of 234 of them of modulated pulses of light using a Fourier transform that may have an artificial source (specifically a laser orbiting the star) (for opposing views, see Isaacson et al., 2018; Tamburini & Likarta, 2017). This method had previously been theorized as an excellent way to signal between stars (Borra, 2010) and, in terms of human technological capacities, is not much beyond what we can do at present (Borra, 2012); indeed it was this theoretical work that inspired the sky survey in question.

If we are in fact detecting "beacons" of other civilizations, not separated too far from us in time, what we may be seeing is the *technological plateau*—the point beyond which no civilization has been able to advance before collapsing, a point that may not be much further down the road technologically from where human civilization is at present. The duration of technological Dark Ages that succeed such collapses (hundreds or even thousands of years; Huebner, 2005b) furthermore heightens the vulnerability of those populations—which may eventually reacquire lost civilization by virtue of fortuitous biocultural evolution—to existential risks of the natural-hazards variety (e.g. and as indicated before, an asteroid strike, stray gamma ray burst, or caldera eruption). These phenomena could end the civilizational cycle on Earth permanently. If this scenario holds for all intelligent life in the universe, then it gives us pause, and reason to be ultimately pessimistic about our own future as a species.

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