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Climate Works:
An Anatomy of a Disbanded Line of Research

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CLIMATE WORKS

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> Und da der Mensch keine unabhängige Substanz ist, sondern mit allen Elementen der Natur in Verbindung stehet; er lebt vom Hauch der Luft, wie von den verschiedensten Kindern der Erde, den Speisen und Getränken: er verarbeitet Feuer, wie er das Licht einsaugt und die Luft verpestet: wachend und schlafend in Ruhe und Bewegung trägt er zur Veränderung des Universum bei und sollte er von demselben nicht verändert werden?
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> Johann Gottfried Herder, 1794:87 [1]

INTRODUCTION

At the present time, the perspective of c1imate determinism lives a strange dual existence: On the one side, it is, if we are not mistaken, a widely accepted view among lay-people and natural scientists based on common sense traditions and obvious "facts," and on the other hand, among social scientists, it is considered a long and deservedly discredited intellectual perspective. [2] Both views co-exist in a mostly dogmatic and dramatically separated manner. In the decades after W.W.II, the idea of "c1imatic determinism" appeared as a sometimes naive, simplified view of the world, and little intellectual energy was put into the topic by serious scientists let alone decisions makers in the political arena and the economy. It is only in recent years that the idea enjoys somewhat of a renaissance and mostly in the form of are-invention of an old idea. From a theoretical point of view, much of modern c1imate impact research is pure c1imatic determinism,

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[1] "And as man is no independent substance, but rather is connected with all elements of nature; he lives off the breeze of air, as well as of the various inhabitants on earth, food and drink: he uses fire, absorbing light and contaminating the air: awake and asleep at rest and in motion he contributes to the alteration of the universe and should he not be changed by that same universe?"

[2] Climate determinism may be a discredited as well as virtually abandoned line of research and perspective in social science but it is by no means entirely absent from contemporary social science discourse; in support, one could refer for example to the climate-based theories of racial identity advocated by Leonard Jeffries (see New York Times, Late Edition, East Coast. January 4, 1997, Section 1, Editorial Desk, p: 22): Jeffries "taught a climate-based theory of racial identity in which Africans were cast as 'sun people' who were 'communal, cooperative and collective,' while Europeans were scorned as 'ice people' who thrive on brutality and destruction." For an explicit example and proponent of c1imate determinism from today's natural sciences, see Beck, 1993.

but the re-inventors of this line of research are mostly unaware of their intellectual predecessors (Stehr and von Storch, 1997). [3]

It is not only in order to avoid the misinterpretations and misconceptions of earlier c1imatic and environmental reductionism that we suggest that it is mandatory to review the c1assical c1imatic determinism concepts; it is also imperative to examine the pitfalls of c1imate determinism at a time when demands for a revision of the deep intellectual divisions between the *natural and the social science*, brought about last but not least by urgent environmental problems, see m to gain credibility and urgency. [4] It seems to us that an examination of the legacy of c1imate determinism is even more important in light of the necessity to re-examine the status of *"nature "* in social science discourse.

Our paper is therefore, first, an attempt at recovering the substance of the c1assical ideas, their methodological conceptions and epistemological pre-occupations. Second, we are also interested in the lessons the abandoned line of research has to offer for present-day theoretical work and research on the role of natural conditions in human affairs. Such a concern goes beyond the more common and almost uncontested acceptance among present-day social scientists that one of the important but still neglected desiderata of social theory is *the impact of society on the environment.*

In order to advance our agenda, we concentrate mainly on one representative of "environmental determinism", namely the geographer and "c1imate scientist" Ellsworth Huntington, probably the most famous American geographer of the first part of the twentieth century who also was most influential in the scientific community at large and seems to have had a significant sway on the social elite in North America as well. Our interest is not so much on Huntington as an individual

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[3] Arnold J. Toynbee writing in the early seventies in an introduction to a biography of Ellsworth Huntington advances a somewhat different not ion of the process of intellectual influence, namely one can proceed in almost unconscious manner or in which amnesia with respect to someone's work is not a serious barrier to its cognitive authority: "Huntington is influencing present-day thinkers even if they are not aware of this, and also even if they are aware of it but dissent from Huntington's ideas." Ironically, Huntington himself displays to a remarkable degree amnesia when it comes to the great ancestry of climate determinist; for example, in what evidently constitutes the synthesis of his life's scholarly work, in his book *The Mainsprings of Civilization* (1945) one does not find a single reference to Montesquieu, Herder, or Virchow. One can only surmise that he did not see himself standing on the shoulder of giants but rather assumed that his scientific approach obliterated his predecessors.

[4] The recent Report of the Gulbenkian Commission on the Restructuring of the Social Sciences *Open the Social Sciences* (Wallerstein et al., 1996:76) does not, in our view, pay sufficient or satisfactory attention to this issue although it is mentioned as the question of "how to reinsert time and space as internal variables constitutive of our analyses and not merely unchanging physical realities within which the social universe exists." The problematic of reformulating the location of natural processes in social science discourse goes beyond reflecting on the importance of time and place as does the question of the role of the social in natural science discourse where it now occupies a slum dwelling.

but on an exemplary representative of a once highly visible intellectual paradigm now discarded by social scientists.

1. THE CAREER OF A MAJOR PERSPECTIVE

> Among all the factors which influence people's mo des of life the two that seem to be most dominant are c1imate and stage of culture already obtained.
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> Huntington, 1945:281

For centuries, scientists, intellectuals', humanist, philosophers, physicians and perhaps the public at large around the globe had few if any serious doubts that c1imate works. The subject was first discussed, as far as we know, by the physician Hippocrates of Cos (c. 460-470 B.C.), in his treatise on "Airs, Waters, and Places". Although he was primarily concerned with the relation between environment and the patho-genesis of diseases, he digressed into an often repeated discussion of the effect of c1imate upon the physical characteristics and the socio-political tendencies of the inhabitants of immediate and distant regions. Not much later, Aristotle found a climatic cause for the superiority of the Greeks over the barbarians and therefore for the typical preeminence of one's own c1imate when compared to that of other places. [5]

For the time being, the career of c1imate determinism as major intellectual perspective within the social and the natural sciences reached its apex in the first two decades of this century as naturalists, anthropologists, sociologists, physicians and geographers fashioned a much more quantitative and therefore “scientific” approach to the question of the fateful influence of the natural environment on human civilizations and history. Some of the most definite and assertive statements of c1imate determinism were published at this time although in the end they only reiterated convictions held for centuries. Ellen Churchill Semple (1911: 1-2) for example opens her widely cited study on the control of the natural environment over human affairs in 1911 with the following general declaration:

> Man is a product of the earth's surface ... the earth has mothered him, fed him, set him tasks, directed his thoughts, confronted him with difficulties that have strengthened his body and sharpened his wits, given him his problems of navigation and irrigation, and at the same time whispered hints for their solution ... Man can no more be scientifically studied apart from the ground he tills, or the lands over which he travels, or the seas over which he trades, than polar bear or desert cactus can be understood apart from its habitat.

The field of academic geography was a turning point. It was shifting from exploration to explanation. At the time, the doctrine of environmental determinism now often treated as part of

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[5] A summary of many similar statements over the centuries can be found in Barnes, 1921.

geography' s distant and disreputable past appeared to offer a solid, broadly-based and scientific foundation serving as the primary explanatory principle of the nature of the interaction between environment and people. The assertion that northern Europeans, in the words of Ellen Semple (1911:620), were "energetic, provident, serious, thoughtful rather than emotional, cautious rather than impulsive", took on an even more pronounced authority that had few if any rivals in the social science community–and the public at large. More recently, contemporary examinations of the relation between environment and society by social scientists often fail to even mention the rich history of discussions in science that pertain to the influence of environmental conditions on society.

Does that mean that what was perhaps the greatest impetus for the analysis of the influence of c1imatic conditions on human conduct, namely the desire to arrive at broad even sweeping explanatory frameworks capable of accounting for vast differences in the development of human societies or, using a concept in greater usage decades ago, human evolution, has been widely excised from social science? Indeed, this is the case as far as mainstream social science is concerned. The principal challenge as seen by geographers, philosophers, anthropologists and many other scientists at the turn of the century was to shed light on what Huntington (1927:136) calls the "degree of progress in different parts of the world".

The fascination, in addition, with the notion of periodicities, cycles and rhythms of various sorts both as an explanation for the rise and fall of geological phenomena, of plants and animals as well as social and economic processes but also its mere detection was still a vibrant enterprise in science. The conviction that "the whole history of life is a record of cycles" (Huntington, 1945:453) was by no means an idiosyncratic and isolated observation.[6] The regularity and periodicity with which some cycles or waves are seen to reoccur, for example, business cycles, price revolutions or cycles of reproduction are often taken to constitute the explanation of a phenomenon -- last but not least because the phenomenon becomes a predictable process: "It will be a vast boon to mankind when we learn to prophesy the precise dates when cycles of various kinds will reach definite stages" (Huntington, 1945:458).[7]

If in addition the assumption is advanced that any definite regularities are the result of underlying physical forces and have their origins there, then the explanatory power is assumed to be even more pronounced. Thus, for Huntington (1945:455) life as we know it is influenced by "at least three kinds of physical conditions, each of which has its own cycles. One of these is the weather,

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[6] On the contrary, the interest in the study of cycles led to the formation of a "Foundation for the Study of Cycles" by Edward R. Dewey in 1941 with a distinguished international board of scientists (cf. Huntington, 1945:458). The Foundation exists to this day and claims to have more than 3000 members

[7] The intellectual interest in cycles, waves and periodicities also, one ought to note, of course corresponded much more closely to actual experience with the ebb and flow of political regimes, war and peace, hunger and prosperity, the periodical surplus or failure of crops and so on well into the twentieth century. Today, with the advent of knowledge societies, we seem to have entered an age in which the observation of such cycles is much less part of our common sense experience. Perhaps we are have entered the end of the age of cycles. Thus, it is not altogether surprising that the search for periodicities and waves has been discredited.

in the ordinary sense of the word. Another is the electromagnetic field of the solar system in general and of the earth in particular. The third is the composition of the atmosphere, with its variations in ozone and perhaps other respects."

The search for periodicities as end-in-itself or as a means for an explanation of the transformation of social phenomena in social science has certainly been abandoned some time ago. One has great difficulties comprehending the excitement which went along with the discovery of cycles and the fascination that such accounts apparently held. Most contemporary social scientists, while not necessarily convinced that history has ended, are sold on the idea that historical processes tend to be rather directionless. In other words, we have arrived at the opposite extreme and we have therefore moved from an intensive search for definite periodicities to the careful elimination of any appearance of historical rhythms and cycles.[8]

It would not be too far-fetched to say that geographers and others who contributed to the modern c1imate determinism literature , that is research published during the first half of this century, shared with present-day social scientists an interest in global phenomena although the growing contemporary literature on globalization contains at best a passing reference to global environmental problems and then mainly as exemplars of the very existence of global phenomena in the contemporary era.

Beginning in the last part of the 19th century and even more pronounced in the first few decades of the 20th century social scientists indeed abandoned any serious interest in the interaction of natural and social factors. Social science was increasingly based on a specific, restricted concept of space and time.[9] Most theoretical and empirical work assumed that existing political boundaries of the nation state fixed the crucial spatial parameters of sociological, political or economic analysis (cf. Stehr, 1994). Many social scientists also abandoned any interest in comparative analysis and the examination of broad historical trends representing what Norbert Elias (1987) has termed a retreat of sociologists into the present. Social scientists, in addition, increasingly concentrated on accounts of individual rather than general phenomena.

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[8] Exceptions of course are possible, as is for example the recent study by the historian David Hackett Fischer (1996) entitled The Great Wave; an examination of price revolutions and the "rhythm of history".

[9] Some of the disciplines in the humanities, particularly history, did not immediately nor in all countries, conform to the restrictive discourse advocated and practiced in sociology and in economics. One of the most notable efforts in history to bring together environmental factors and history may be found in the work of the *Annales* School in France. The journal *Annales: Economies, Sociétés, Civilisations* that gave the name to the School was founded in 1929 by Lucien Febvre and Mare Bloch and has included among its more recent prominent contributors Emmanuel Le Roy Ladurie and Fernand Braudel. However, there is not a sing le reference to their work or to that of the geographer Paul Vidal de la Blache who rejected any crude geographical determinism in early part of this century - and who is considered to be an intellectual forerunner of the *Annales* School– in the writings of Ellsworth Huntington, as far as we are able to tell.

2. ACQUIRED AND /OR INHERITED

The great deliberation about the relative influence of nurture and environment did not bypass the discussions about the effect of c1imate on human history and society. During the period under consideration, later contributions are written under the strong influence of Darwinian views while discussions prior to the turn of the century were also influenced by neo-Lamarckian conceptions. Contributions that were indebted to a Lamarckian conception, for example, the views associated with physical anthropology in Germany during the 1880's and 1890's, suggested that as humans are transplanted into a different c1imate their physiology would actually change and that the organic consequences of acclimatization could then be inherited by subsequent generations.

In the end it does not really matter whether it is an exclusively Darwinian, Lamarckian or an evolutionary perspective that ambivalently mixes the two approaches[10] and that provides the biological foundation for c1imate determinism because these perspectives share the prior commitment to the idea that the natural climate is a basic environmental force that accounts for different manifestations of human success or failure.[11]

The physician and anthropologist Rudolf Virchow ([1885] 1922:231) who espouses a neo Lamarckian perspective on c1imate and writing at a time when colonial expansion is on the political agenda, for example is convinced that the fertility of individuals who migrate to regions of the world in which c1imates prevail that are different from their "native" c1imate will experience a dramatic, constant decline in numbers. At least in the short run, the population of colonizers is bound to decrease and can only be sustained as a result of a constant influx of new individuals.[12]

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[10] Herbert Spencer ([1887]:349-350) shares such ambiguity which appears to be typical of contemporary discourse; for example, with respect to the importance of climate he expresses the view that "men having constitutions fitted for one climate, cannot be fitted to an extremely different c1imate by persistently living in it. because they do not survive, generation after generation. Such changes can be brought about only by slow spreadings of the race through intermediate regions having intermediate climates, to which successive generations are accustomed little by little. And doubtless the like holds mentally. The intellectual and emotional natures required for high civilization, are not to be obtained by thrusting on the completely-uncivilized, the needful activity and restraints in unqualified forms: gradual decay and death, rather than adaptation, would result." (See also Huntington, 1907:15).

[11] See the account of the racial myth underlying the settlement of Southern California at the end of the last century in Starr (1985:89-93); Starr describes the conviction of many in contemporary Southern California that it represented the "new Eden of the Saxon homeseeker" and that the Anglo-Saxon stock –weakened by an overlong confinement on the crowded and chilly British Isles – would be reinvigorated and reinforced as a result of the healthy c1imate in the Southland.

[12] Ellsworth Huntington (1915:6) concurs with Virchow and claims, referring to the "poor whites" who have settled on the Bahamas that "when the white man migrates to climates less stimulating than those of his original home, he appears to lose in both physical and mental energy." A more explicit statement that resonates closely with Virchow's observations can be found in a sociology reader to which Huntington (1927b:257) contributed: "If the white man tries to reside permanently on the equatorial coasts of Africa, and to work there

In general, neo-Lamarckians have of course a more "optimistic" outlook in that they are convinced that climate can be conquered almost perfectly by way of adaptation and then inheritance. Darwinians are resigned to the fact that inherited climatic dispositions cannot simply be altered from one generation to another but are at best in a long-term process of natural selection.

Darwinian c1imate determinists will stress the extent to which c1imatic conditions attract and pull in some while rejecting others. Similarly, c1imatic conditions will assert their superiority and drive out cultural practices that are not in accord with them (cf. Huntington, 1945:610). In the long run, as Huntington (1927: 165) observes, "ill health, failure and gradual extinction are the lot of those who cannot or will not adapt themselves to the climate, but before that happens many migrate to other climates better adapted to their physiques, temperaments, occupations, habits, institutions and stage of development."

3. ELLSWORTH HUNTINGTON

> Students of human affairs may agree or disagree with Huntington, but in either ca se they will be influenced by him, so it is better that they should be aware of him.
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> Toynbee, 1973:ix

The work of Ellsworth Huntington (1876-1947) on the linkage between c1imate and societal transformation has to be at the center of this analysis. While other modern-day climate determinists may have changed their opinion or tempered their views on the nature of the impact of climates on social conduct,[13] Huntington really never wavers an inch even when faced with devastating criticism that is supposed to undermine, even destroy his entire argument and line of

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as at home, he can scarcely succeed unless his physique is different from that of the average of his race. He must be more leisurely than at home, he must pay more attention to health, his wife and children must often live in more bracing climates if they are to preserve their health. His ideals of public service, of social and scientific progress, and of democratic government may remain unchanged, but lack of surplus energy, even without specific disease, generally causes him to be relatively inactive along such lines. Thus although the outward forms of society may remain the same in a tropical climate as in more bracing regions, the actual mode of life is almost certain to be decidedly different."

[13] Ellen Churchill Semple (1931:99) whose work we cited already and to which we will refer again as a contribution to climate determinism later developed doubts about her own position and even calls Ellsworth Huntington an incompetent authority on climate who lacks specialist knowledge in climatology; see also Marston Bates' (1952:119) characterization of his own book on tropical c1imates as an "anti-Huntington tract".

reasoning (cf. Olmstead, 1912; Sorokin, 1928).[14] His prolific writings, his considerable fame and wide influence both in the scientific community and in early twentieth American society were remarkable.

Ellsworth Huntington was born September 16, 1876 as the son of a Congregational church minister in Galesburg, Illinois. He attended high school in Maine and Massachusetts. As a young man and later in life as well, Huntington traveled extensively in an expedition-like fashion in the Near East, Asia, Europe, Africa and the Americas. Huntington obtained an undergraduate degree from Beloit College in Wisconsin; he attended Harvard University as a graduate student studying geomorphology or physiography as his teacher William Morris Davis called the study of the form of the earth's surface; in 1907 he joined Yale as an instructor in geography. Yale awarded him a Ph.D. in 1909 and promoted him to assistant professor in 1910. However, in 1915 he was let go only to join Yale again in the autumn of 1919; but he did not teach geography to undergraduates and spent twenty-eight years as a professorial research associate. Our interest is directly in Huntington the human geographer, social scientist, c1imatologist and historian but not his very public role as a proponent of eugenics. Huntington the author of *The Goal of Eugenics* (1935) was a significant force in the American eugenics movement and served as president of the American Eugenics Society (1934-1938). There can be little doubt that his work on c1imate and civilization led to convictions that prompted him to opt for eugenics and become a leader of the eugenics movement in the United States. The bridge is the role of biological inheritance. The euphemism employed to described Huntington's considerable interests in eugenics is that he was concerned "with the quality of people";[15] according to Huntington "democracy itself was threatened by the rapid multiplication of the less able members of the species" and he urged "restrictive immigration into the United States" (Martin, 1973:xiv).

As a matter of fact, Huntington was generally driven by a concern about concrete ways of improving human existence and he rarely hesitated to make practical suggestions and offer

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[14] In a letter addressed to Piritim Sorokin who at the time was teaching at the University of Minnesota, Ellsworth Huntington (December 15, 1927; Sorokin Papers, University of Saskatchewan Library) refers to Sorokin's forthcoming book on contemporary sociological theories. He indicates that "I am glad that you have thought my theories worth discussing in your new book. I shall not be disturbed by any criticisms which you raise. I am perfectly aware that I often find far more value in books which I severely criticize than in those where the only criticism is that they do not break new ground." His biographer Geoffrey J. Martin (1973:241) reports that Huntington "was annoyed with the type of extended and careless criticism amounting to dismissal which Sorokin offered in *Contemporary Sociological Theories*." The historian A.T. Olmstead's critique that the phenomena Huntington ascribes to the efficacy climate in fact are the result of cultural factors predates Sorokin's indictment of Huntington later work by decades. Olmstead (1912:168) concludes his critique by saying that "the historian is not justified in utilizing climate for more than the study of the background of his history. For influence on particular events, there are many geographical facts of far more significance." Huntington's response to Olmstead may be found in his essay "Changes of climate and history" published in 1913 in the *American Historical Review.*

[15] A term Huntington (e.g. 1945:313) himself employs.

policy advice in the area of c1imate matters as well.[16] Huntington is rarely satisfied with merely documenting his case, he also desires to draw practical lessons and apply his conclusions at once. The practical c1ues came directly from his research. Huntington wants us to exploit the benefits of climate: For example, he suggested that the seat of the United Nations should be located in Newport, Rhode Island because it had the most suitable climate for humans. And his concern for the optimum (indoor) c1imate even resulted in a close association with the American Society of Heating and Plumbing Engineers (cf. Martin, 1973:xiv).

Aside from publications in geography that are essential textbooks and his writings on eugenics, Huntington main work relevant here concerns the reasons for the "progress" of human civilizations. These ideas took shape first around 1914-1915 and quickly were crafted into a definitive thesis that changed little during the subsequent three decades. And as the historian David Arnold (1996:31) has recently indicated, "like so many environmentalist before him, he first looked east, seeking in c1imate and c1imatic change an explanation for the differences between Western dynamism and Eastern stagnation."

Huntington's early writings on c1imate change in post glacial times surely was stimulated by an interest among the fields of geography, c1imatology and geology that existed in Russia, Germany, Austria and other countries in the phenomenon of c1imate changes in historical times: this peaked at the turn of the century and quickly gave way to the conviction that c1imate is essentially a static phenomenon. Whether the long-term changes that were identified merely reflected recurring oscillations, fluctuations or "pulsations", or were indicative of progressive changes toward different states of the c1imate, for example, aridity, were among the contentious issues in discussions among scholars who shared the conviction that significant transformations could be observed.

The subsequent and remarkable change in emphasis in disciplinary paradigm or tradition is also reflected in the work of Huntington. In his early work, there is a distinct emphasis on c1imatic change, variability and f1uctuations. In his subsequent work on c1imate and weather, and especially in his synthesizing books published in the 1940's the time-horizon changes and the

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[16] In an effort to limit our examination of climate determinism, we decided not to investigate the varied political, ideological and industrial uses made of climate determinism in different contexts. Perhaps in accordance with the claim that environmental determinism is an eminently scientific undertaking and therefore must have an undeniable powerful practical utility, proponents of environmental determinism never hesitated to underline its eminent usefulness. Huntington, for example, between 1921-1929 was chair of a National Research Council (NRC) Committee on the Atmosphere and Man (CAM) that from its inception focuses its work on four projects: "an investigation of the influence of meteorological conditions on factory productivity, physiological experiments under laboratory conditions, experiments in hospitals, and an investigation of mortality caused by influenza in New York City" (Fleming, 1998). As a result, and with good justification, Fleming calls Huntington's activities in this field as a form of "meteorological Taylorism". In addition, the enlightening ease study by Frenkel (1992) of the role of environmental determinism in the development of the Panama Canal Zone very well illustrates the practical efficacy of climate determinism as an intellectual or ideological weapon (see also Weinstein and Stehr, 1997).

emphasis moves away from c1imatic variability and fluctuations and is replaced by accenting the essentially fixed nature of climate. In Huntington's case the shift of interest away from a concern with longer-term climatic changes and its periodicities also meant that he focused on the cycles of what are essentially weather rather c1imate patterns; for example, around 1914 and 1915 Huntington began to assemble and collect a great variety of empirical information about the impact of changes in weather patterns on daily "nervous activity", productivity, "feelings and energy". And it is during these two years and on the basis of such data that Huntington formulated the essence of his thesis on the linkage between c1imate and human activities. The initial findings were published in a series of three articles in 1914 commissioned by *Harper's Magazine*. The essays under the title of "Work and weather", "Climate and civilization" and "Is civilization determined by c1imate?" "brought letters of anger from southern gentlemen, inquiries from medical men and psychologists, [and] a proposal for civic celebration in Seattle" (Martin, 1973:114). Ironically, with the shift in his interests to the impact of climate on human affairs comes the retreat from the analysis of c1imate change in historical times. The latter could in fact have undermined the conclusions of his work on the progress of civilizations. Nature now exists in a state of permanence and harmony although the consequences of nature for society are not always beneficial, for that depends on were one happens to live.

4. HEALTH, ENERGY AND PROGRESS

> No nation has risen to the highest grade of civilization expect in regions where the climatic stimulus is great. This statement sums up our entire hypothesis.
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> Huntington [1915] 1924:(first ed. 270)

Our discussion of *modern* climate determinism is primarily limited to contributions dealing with of the profound effects of c1imate on human life published during the last two decades of the last century and the first few decades of this century, at a time when c1imate determinism aspired to become a recognized scientific endeavor. Climate for Ellsworth Huntington (e.g. 1945:307) mainly meant attention to temperature and secondarily, seasons,[17] storms and precipitation. Toward the end of his scientific career, in his last major book, Huntington (1945:313) sums up his main thesis about the salience and efficacy of climate in the following manner: Climatic conditions constitute a distinct optimum (and conversely, a downside) and with it varies "the advance of civilization and the quality of the people."

According to his biographer, the idea that c1imate stimulates or inhibits human energy, health and progress appears to have been suggested to Huntington initially by Charles J. Kullmer, a

[17] Huntington (1945:313) formulates with respect to seasons the following generalization: "The greater the contrast of seasons, the greater in general are the demands on man's strength and skill in order to get a decent living."

professor of German at Syracuse University who wrote to him in September of 1911 indicating that he had been working on the concept of c1imate change for some time and send him a manuscript (cf. Martin, 1973:102). Kullmer indicates in his letter that he had followed Huntington's work, for example, the book on his travels in Asia and that he wanted to consult him on the hypothesis of c1imatic change and its connection to civilization.[18] In particular, Kullmer claimed to have found a dose correlation between storm tracks and civilization and that shifts in storm tracks accounted for shifts in the location of civilizations.[19] What we are therefore confronted with is that many of the basic qualities of life in different regions of the world with similar climates tend to converge while in other respects which "have little relation to physical environment they may differ radically" (Huntington, 1945:611).

On their own, these and related hypotheses appear to support a fairly innocuous thesis acknowledging perhaps nothing more and nothing less than the distinct possibly that natural conditions impinge in various and therefore not fixed ways on human conduct. However, one needs to recall that Huntington is also convinced and attempts to offer massive supporting evidence that the evolution of civilization itself as well as the "quality of the people" cannot be separated and understood aside from climatic conditions that either favor or deter their development. For Huntington, the nature of the civilizational progress either facilitated or inhibited by climate refers to "[our] increasing ability to dominate the forces of nature .. .Is it mere coincidence [he asks] that the English can fly in the air, sail beneath the ocean, manufacture machines by the million, and talk by radio, while not a man among the Kamchadales ever thinks of doing these things?" (Huntington, 1927:136-137). Interestingly, Huntington' s definition of progress as emancipation from the forces of nature does not mean liberation from climate in the course of civilizational progress. On the contrary, progress implies greater and greater dependence on climatic conditions because the "centers of civilization keep moving into the regions where man's stage of progress makes him most efficient" (Huntington, 1927:161). As a result, the direct effect of climate assume even greater importance.

Today, Huntington's (1927:138) tireless work affirming the thesis that "climate paints the fundamental colors on the human canvas" appears to be amusing to some, to others extreme or lazy (Le Roy Ladurie, [1967] 1988:24) but most would likely consider it absurd and therefore certainly on the very margins of social science discourse about the impact of environmental factors on the human condition. However, in its own time it was by no means atypical nor did it necessarily contradict common sense assumptions about climate, health and ethnic or racial identities. Huntington' s views were easily assimilated to and resonated with the doctrines of racism and imperialism of his day. Its very success and political utility proves to be a firm

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[18] In the introductory chapter to *Climate and Civilization* Huntington [19151 1924:7) relates that he first developed his theories of climatic "pulsations" during the Pumpelly expedition in 1903. In the two years he spent in Turkkestan, he came to be convinced that "Reclau, Kropotkin, and others are correct in believing that two or three thousand years ago the climate of Central Asia was moister than now."

[19] Cf. Huntington's (1927:143-145) summary discussion of the importance of storms, as the "third great element in producing changes in weather", in addition to temperature, humidity and seasons that prove to be particularly valuable for health and climatic energy.

condition for its obliteration today. The remaining value Huntington's program may have appears to be limited to its productivity as counter example. Its particulars as enumerated in our appendix on the efficacy of c1imate according to Huntington perhaps assist in avoiding to be drawn again into reflections on c1imate that resemble and resonate with the tradition of modern climate determinism.

4.1. Climatic optima and downsides

Aside from the rich description of psychological, social, economic and political features of human life and society that are seen to evolve -- or are hindered from emerging -- in response to c1imatic conditions, c1imate determinists also advance a list of major climatic factors associated with fortuitous benefits or extreme downsides of c1imate. There is, first of all, the dreadful climatic monotony or, for that matter, perhaps equally feared, climatic extremes. In contrast, there is the very beneficial pulsating climatic variety: The specific example for each of these conditions typically are linked to just a single meteorological element, be it temperature, rain, wind, humidity, seasons etc. The main assertion Huntington (1927:142) advances when it comes to the identification of climatic optima is that "*change*" as such is exhilarating. Huntington' s (1927:141-142) enumeration of the conditions that constitute the best climate for human health, progress and energy therefore is somewhat richer since he lists a number of climatic conditions that should be present simultaneously:

> (1) A fairly strong but not extreme contrast between summer and winter is needed, the summer temperature averaging not much higher than 65° for night and day together. This appears to be the temperature at which the white race is physically most active and healthy. The winter temperature out of doors should average not much below 40°, for this is the temperature at which people with our type of food, clothing, shelter, and occupations appear to be most active mentally.
>
> (2) There must be rain at all seasons. This does not mean constant rain, but enough so that the air is moderately moist much of the time. If the air is dry for any long period, people's health is not so good as when it is damper. Abundant statistics in many regions demonstrate this in spite of the popular opinion to the contrary. That opinion probably has arisen because people confuse the beneficial effect of the outdoor life in dry c1imates with the effect of the dryness itself, or of the dust which comes with the dryness.
>
> (3) Constant but not undue variability of weather is almost as important as the right conditions of temperature and humidity. Among factory workers and students, for instance, it has been found that if the temperature of one day is the same as that of the preceding day - which generally means that the other conditions are likewise uniform - people's work is not so good as if there is a change, especially a drop of temperature. .. The point of the matter is that the change is exhilarating.

4.2. The foundations

> Das Voralpenklima (in Salzburg) macht gemütskranke Menschen, die schon sehr früh dem Stumpfsinn anheim verfallen und die *mit der Zeit bösartig* werden.
>
> Thomas Bernard, [1983] 1988:19

Once an enumeration of the seemingly endless list of factors and processes that are ascribed to be determined or effected by climate has been made (see our appendix summarizing these notions alphabetically), important questions arise about the foundations, be they theoretical, empirical or both that are explicitly advanced to make the case for the importance of climate in human affairs. Early in his discussion of the linkage between climate and social conditions, Huntington invokes and appeals to experiences that he expects surely everyone of his readers shares and can replicate almost perfectly and instantly. Although it is quite easy, as a fellow geographer (Spate: 1952:413-414) remarks in a more recent review of Huntington's work, to point to the anomalies in the famous civilization-and -climate maps, "in our hearts most of us Westerners probably believe that the facts are as stated." That is to say, in Huntington's discourse about climate and civilization we encounter an invocation of traditional cultural and political beliefs. By referring to what Huntington considers to be self-evident as well as a widely shared elementary everyday experience and reaction to changing weather conditions, for example, he means to spawn among his readers a kind of essential assent to his thesis. We wants to refer to convictions that every individual shares with every other individual. Thus, the most fundamental evidence Huntington adduces is this appeal to basic and widely shared traditional beliefs or prejudices about otherness and the way in which individuals in different climates respond to climate. Elements of such shared, intuitive evidence is of course linked. After all many climates are variable enough to allow for personal encounters with a range of weather extremes.

Huntington (1920:249) summons everyday experiences such as these: "The variations in people's strength from month to month are so important and teach us so much about the distribution of health and energy throughout the world that we well study them closely." More specifically, therefore, "let us consider how physical strength varies during the course of the year in the great section extending from southern New England and New York westward to the Rocky Mountains. October is usually the best month. At that time people feel like working hard; they get up in the morning full of energy, and go at their work quickly and without hesitation; they walk briskly to business or work; and play with equal vigor. Headaches, colds, indigestion, and other minor illnesses are fewer than at other seasons; there are also fewer serious illnesses, so that doctors have less than usual to do, and the number of death is less than at any other time of year." Perhaps with the exception of the very last assertions, these are all observations that appeal to everyday experiences and are assumed to be easily replicated. And the same is true for the conclusion that there is the "well-known contrast between the energetic people [Huntington just described] of the temperate zone and the lazy inhabitants of the tropics" (Huntington, 1920:248). It is inescapable

and widely taken-for-granted that “everyone is influenced by temperature, humidity, wind, sunshine, barometric pressure, and perhaps other factors such as atmospheric electricity and the amount of ozone in the air. On days when all these factors are favorable, people feel strong and hopeful; their bodies are capable of unusual exertion, and their minds are alert and accurate. If all the factors are unfavorable, people fee 1 inefficient and dull; their physical weaknesses are exaggerated; it is hard to concentrate the mind; the day's work drags slowly; and people go to bed at night with a tired feeling of not having accomplished much. Hence in a variable climate like that of the United States people's physical and mental energy keep changing from day to day and season to season. Sometimes one feels almost as inert as if he lived within the tropics, but soon a change comes and one again feels the health and energy which makes it possible to work hard and think clearly” (Huntington, 1920:248).

At the center of the foundations of Huntington's observations about the work climate does then clearly is an appeal to what he believes are almost universal and powerful common sense experiences with weather conditions. He asks us to rely for confirmation of his basic assertion on self-analysis, on how we respond to varying weather patterns or climatic conditions. Huntington is convinced that all of us easily identify with his conclusions because we can quickly and surely assemble experiences that warrant the basic thesis as factual.

4.3. The limits of imagination

In the end, the type, range and possible limits of kinds of human conduct that are attributed to climate are, so it seems, only limited by the limits of the imagination of the authors. Any superficial examination of the inventory reproduced in our Appendix of forms of social conduct brought about by climatic conditions must conclude that this is an almost exhaustive list of consequences. But this is not really the case. There are discernible limits. And the boundaries are those of the particular theoretical and cultural commitments of the author. None the less, the mere enumeration of factors and processes that are seen as varying with climatic conditions and regions indicates that there are few striking limits. The same conclusion can be drawn from what is an essential lack of discipline or constraint when it comes to what climate determinists claim to be linked to climate. In a dispute about the importance of the role of different explanatory factors, Huntington (1914b: 19) feels prompted to make a similar observation, except that it is among the metier of the historians that he discovers what might be called the cognitive fallacy of failing to restrain one' s assertions:

> At the beginning of their volumes the historians speak respectfully of the influence of geographical factors, but that is usually all. Thenceforth they become so impressed with the importance of economic considerations, or of purely human matters, such as ambition, religious ardor, mechanical invention, constructive statesmanship, or scientific, literary, and artistic achievement, that they feel that other subjects are scarcely worth considering.

But what about the role of the historians purely human matters if “ in many ways” they are “molded by the physical environment” (Huntington, 1914b:19)? At the outset of one's reflection, purely human matters deserve brief mention but as Huntington himself demonstrates, the

geographer promptly follows the lead of the historians he criticizes and cultural, merely human matters that is, promptly withdraw into a black box:

> Among primitive men the nature of the province which a tribe happens to inhabit determines its mode of life, industries, and habits; and these in turn give rise to various moral and mental traits, both good and bad. Thus definite characteristics are acquired, and are passed on by inheritance or training to future generations
>
> (Huntington, 1907:15).

Moreover, it is quite common to find that individual authors will do their best to remain internally consistent, for example by arguing that Northern latitudes typically go hand-in-hand with such and such temperament and traits. Yet different authors who agree on the extraordinary influence of climate on human affairs but who obviously do not confer with each other about specific attributes and geographic boundaries within which they are supposed to occur, will often advance entirely contradictory substantive assertions.

While Huntington for example insists on the fatelike effect of climate induced differences between Northerners and Southerners in most countries, Leroy-Beaulieu (1893:139-144), on the other hand, is convinced that there are discernible convergences in the character of Northern and Southern Europeans because the populations in both regions are subject to climatic extremes and long periods of enforced idleness, as a result. The upshot of course is that climate determinism as a whole has as one of its profound characteristics a kind of arbitrariness. Such arbitrariness of course dissolves at the level of the individual author. The speculations about the force of climate become an ill-disguised substitute for ideological and ethnocentric beliefs: As widely proclaimed, “temperate climates or 'mild' c1imates were favorable to the development and survival of a superior type of people, but each writer has construed the doctrine so that his own land was regarded as the norm of the temperateness in climate” (House, 1929:17).

Perhaps other discernible limits and conditions for possible forms of social conduct that are rarely enumerated as “caused” by c1imate are important as well. We are thinking especially about the absence of any mention of "technology" and technical developments in the climate determinism literature. Huntington does refer as cited to innovation in the field of technology as linked to c1imate but is silent about the ease of its dissemination. Thus, if modern technology is unprecedented and one of the attributes that separates the last two centuries from all previous history,[20] then the omission of any reference to the global impact of technological regimes may well be significant. For if the uniqueness of today's experience is the uniqueness of the technical and scientific knowledge that gives rise to what is not only the motor of the modern economy but of modern warfare and the conditions for peace, then such a blank is quite significant.

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[20] Not irrelevant if this context is Werner Sombart's (e.g. 1931:98) description of modern technology as the liberation of the economy, for example, from the limits and constraints imposed by *living* nature. Climate in this sense is living nature and the emancipation from climate is the liberation from living nature.

4.4. The power of generalizations

Among the central features of texts written by climate determinist are not only their almost poetic excesses but also their mundane redundancies. In addition, one of the distinct narrative features of the discourse of c1imate determinist about the pervasive authority of climate over human affairs concerns the almost runaway vigor of their assertion about climate for it quickly becomes a powerful and all exclusive generalization that drives out any qualifications.[21] 21 And to that extent the narrative again and again literally is immune from efforts to restrain it by alluding to other or "intervening" forces, restrictions or exceptions.

Take for example Huntington's (1945:275) efforts to confine and delimit his own rhetoric about the utmost significance of temperature on human affairs. He summarizes and concludes the relevant discussion as follows:

> thus, if all other influences were eliminated, we should expect civilization to advance most rapidly in climates which have few or no months with temperatures above the optimum and many below, but none too far below, the optimum. As a matter of fact, the actual distribution of civilization approaches this pattern but departs from it in some respect because mean temperature is only one of the climatic factors of environment, and the effects of physical environment are modified by cultural environment.

As far as we know there are of course no human civilizations anywhere that would enable us to observe their comparative development solely on the basis of non-climatic factors. But this does not really matter since the development of civilizations we in fact are able to observe correspond to such close degree to the expected evolution in response to different climates that one can discard, or even ignore, other environmental factors and culture.

Moreover, since temperature is but one among a range of climatic attributes, the correlation between environment and civilizational development is actually underreported as long as one relies for its empirical representation on data about temperatures alone. This in turn considerably strengthens the case that climate is the crucial dimension. In other words, efforts to restrain the

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[21] C. Wright Mills (1959) has written a widely known and often quoted indictment of “grand theory” in sociology. However, in contrast to Grand Theory - as a form of an all-inclusive, hermetic perspective and a style of work - castigated by Mills and described by him as not readily comprehensible social science discourse, Huntington's generalizations are immediately intelligible and applicable. They do not seem to outrun, as is the case for grand theory, any specific and empirical problem or constitute a formalist as well as permanent withdrawal into systematic work. “The basic cause of grand theory,” as defined by Mills (1959:33) “is the initial choice of a level of thinking so general that its practitioners cannot logically get down to observation.” Huntington's generalizations need not be “translated” into plain or straightforward English. Mills 11950:31) tries to demonstrate that the result of the translation effort of grand theory would not be very impressive. Huntington's generalizations clearly do not raise the issue of intelligibility. Perhaps they raise the opposite dilemma. They are too impressive. They do not have a sense of “unreality” surrounding them.

generalization about c1imate often appear to have the opposite effect, they appear to reinforce and invigorate the generalization.

Similarly, as Huntington (1945:344) attempts to explicate the influence of climate on mental activities, in particular in light of what some have called the rise and fall of entire civilizations or the absence of remarkable intellectual accomplishments in regions in which the climate is almost at an optimum, he builds bridges, advocate caution, hints at exceptions, appears to minimize the influence of climatic conditions but in the same context also injects entirely new hypotheses which almost totally eliminate any ability to "falsify" his generalizations. The assertion that we are from time to time faced with major climatic cycles in history is a prime example for such a hypothesis that immunizes assertions almost completely against any falsification attempt. In the end, it would appear that we face an insurmountable argument about the influence of climate on human conduct, an argument in the form of a tautology. Huntington (1945:344) indicates for example that mental alertness or intellectual activity-- rather ambivalent terms, to say the least -- depend on a variety of factors:

> Climate and weather are simply others in this series. They receive special treatment here because they are little understood as yet and because their cyclic variation seems to have influenced so me of the greatest historical changes. The highest mental achievement is possible only when favorable conditions exert a combined stimulus. Our task just now is to separate c1imatic effects from those of heredity, culture, and the non-climatic physical environment.

In short, Huntington never lives up to his promise to factor out different influences but construes chains and causal connections among factors, so that, in the end, only climate emerges as the real and effectively independent variable in the equation.[22]

Perhaps the power of the generalization is even more intense because Huntington tends to reverse possible qualifications of the impact of climate on society by suggesting that social forces in the end actually reinforce "climatic destinies." For example, he refers to selective migration that

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[22] One fascinating statistic that Huntington (1945:345) utilizes in this context are circulation figures from twenty-eight public (city) libraries in the United States and Canada (more precisely, weighted averages – generally for twenty years, 1920-1939 – of fiction and non-fiction books in circulation). Huntington groups the libraries into four categories according to latitude. In the six most northerly libraries (St. John, New Brunswick, Minneapolis. Portland. Oregon, Seattle. Spokane and Vancouver, British Columbia) the proportion of all circulating books that are classified as non-fiction is 55.2 while the corresponding figure for the eight most southerly cities (Tampa, Houston, New Orleans, Jacksonville, El Paso. Savannah, Shreveport, and San Diego) is 28.9 percent; actually, the reported differences are confined to the latter group and all other city libraries because the two intermediate categories also have percentage of non-fiction circulation above fifty percent. Huntington simply reports these figures, of course quite uncritically, and without further comments. He is convinced that the reader will be convinced as well that the evidence is clear-cut and of undeniable force. What the evidence confirms according to Huntington is that people of high latitudes are, on the whole, more intellectual than those of low latitudes.

amounts to a kind of climatic cleansing, “a process of selection through migration is tending, slowly perhaps, to concentrate the more easy-going type in the warmer climates” (Huntington, 1945:277). All of this only reiterates again and again the basic insight that “social and economic systems everywhere tend to adjust themselves to geographical environment and to the occupations which provide a living in a particular environment at any particular stage of human progress” (Huntington, 1945:280). The generalization quickly and surely has been stripped of all restrictions and qualifications.[23]

The general question these peculiar features of Huntington's discourse raises concerns the reason for his inability to restrain his generalizations despite what we assume are his good intention to do so. That is, if we assume for a moment that his announced efforts to suppress excessive generalization are well-intentioned, not merely a preemptive strike against critics precisely bemoaning the lack of restraint or, the result of advocating, in the end, factors that resonate more closely with his disciplinary identification, we have to ask what might account for the difficulties in restraining one's generalizations? After all, this is not a dilemma peculiar to Huntington.

5. WHY CLIMATE DOES NOT WORK

> In contrast to the helpless dependence upon environment of stationary plants and animals, whose range of movement is strictly determined by conditions of food and temperature, the great mobility of man, combined with his inventiveness, enables him to flee or seek almost any c1imatic condition, and to emancipate himself from the full tyranny of climatic control by substituting an indirect economic effect for a direct physical effect.
>
> Semple, 1911 :608

It is peculiar that climate determinists also offer arguments that negate their own perspective. Take for example Ellen Churchill Semple's observations about what Rudolf Virchow calls the “cosmopolitanism of the human being” (Virchow, [1885] 1922:216), namely the ability of

[23] See also Huntington's (1945:24) discussion of the various maps of the United States he adduces to buttress his argument about the essential superiority of climatic factors as an explanations for a host of features of social life (most of those already enumerated). He pores over these maps and discovers a variety of “minor differences” or a lack of full resemblances with the basic pattern of climatic efficiency and then concludes that all the maps really show the same basic feature and that “the resemblances are too close and too widespread to be accidental”. The maps acquire their basic resemblance from climate. He adds, “nothing that man can yet do has any appreciable effect upon the weather, with its changes from day to day and season to season, or upon climate, with its in temperature, humidity, and wind. On the other hand, everyone knows that human feelings, health, and activity are extremely sensitive to weather and climate” (Huntington, 1945:249).

humans to settle in any parts of the world; such an assertion about the "openness" to environmental conditions of humans obviously severely restricts or limits the potential work climate can do.[24]

Without question, climate determinism lacks analytical elegance; it often conflates the "climate variable" with other explanatory factors and borders on the tautological. Some of these features it shares with other grand theories designed to explain civilizational transformations but what should concern us most is the poor example climate determinism offers for work that proposes to bridge the divide between the cultures of the social and the natural sciences and the potential dangers or misunderstandings "scientific" climate determinism may generate as it enters the public arena.

But in order to indicate why climate does not work in the way in which climate determinists are convinced it does, it is necessary to explicate additional assumptions that typically accompany discourse of climate-based theories. A critical analysis of the assumptions will lead to the conclusion that c1imate matters but does not work--at least not in the undifferentiated and indiscriminate fashion found in the literature committed to climate determinism.

The assumptions or the climate construct to which we want to draw attention concern the following attributes of discourse of c1imate-based theories of social conduct: (1) The essential stability of climate and conduct; (2) Climate does not tend to discriminate, and (3) the one-dimensionality of c1imate. Aside from the features we already have identified, especially the inability to constrain the basic assertion and that climate, as a result, effects human conduct without exception, the assumptions to be explicated now have the remarkable common attribute that they all contradict some of the most widely shared convictions among social scientists about the "nature" of social life. That is, (1) social life tends to be fragile; it is constantly changing and attention to its mutable character is a prime requirement in examining any social action whatsoever. (2) Most things in life tend to be stratified, and (3) social conditions tend to be "complex" quite independently of their volume, range and significance. But first, we want to explicate the climate construct employed by Huntington.

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[24] Virchow's assertion is in line with and in the spirit of his staunch advocacy of monogenism. In contrast to the United States and France where influential "polygenist" supporters were influential during the latter part of the 19th century, German anthropology during the same period was dominated by scientists who strongly believed in the "unity and equality of man kind". Virchow's radical liberalism generally was well known and included his vigorous opposition to Teutonic racism among anthropologists and in politics; Virchow's position is by no means consistent. Most physical anthropologists before 1900 were neo-Lamarckians. But depending on the circumstances Virchow takes a neo-Lamarckian or Darwinian position. In the case of his discussion of "acclimatization" in 1885, Virchow advocates a staunchly neo-Lamarckian position in opposition to August Weismann's theory of heredity; Weismann had claimed during the same conference that humans are not capable of acquiring and then biologically passing on characteristics in response to climatic conditions (see also Massin. 1996).

5.1. The social construct of climate

The social construct of climate found in Huntington writings can be best be described as a meteorological construct. Its scale is regional. The impact of c1imate is unconditional. As a matter of fact, the operative climate construct is virtually taken-for granted and largely obscured in Huntington's writings. For example, Huntington ([1915] 1924:136) approvingly refers to Mark Twain: “Climate lasts all the time and weather only a few days.” But what exactly lasts or varies all the time, Huntington does not say. However, based on how he examines the effects of climate on society, it becomes evident that Huntington's conception of climate resonates strongly with and affirms what the pioneers at work at the turn of the century of the emerging scientific fields of meteorology and climatology considered to be climate.

One of the most important meteorologists of the time and considered to be one of the founders of modern meteorology as the science of the physics of the atmosphere is Julius Hann.[25] In the classical *Handbuch der Klimatologie*, first issued in 1883, Hann (1883:1) defines climate as the “sum of all meteorological phenomena that characterize the average conditions of the atmosphere at any given location of the earth.” From an operational point of view, and given the technical means available at the time, Hann's definition of climate refers to macro-meteorological phenomena that can be measured at the surface of the earth. Climate is the sum total of quantifiable climatic elements especially temperature, humidity, precipitation and wind speed averaged over a certain period of time. As Hann stresses, in contrast to a mere and indeterminate subjective impression of climate, scientific apprehension of climate requires the numerical expression of climate elements based on empirical information. When it comes to ordering the relative importance of the range of meteorological phenomena Hann (1883:5) advocates that their influence on “organic life” should be decisive. Climatology itself is not able to advance such a ranking. It is dependent, for example, on geography. Huntington follows Hann's reasoning to the letter. For Huntington climate without exception means an average of one of the meteorological conditions. In most instances, this happens to be temperature. Hann's discussion of individual meteorological phenomena in his *Handbook* indeed beg ins with what he considers to be the most important condition, namely temperature. From the beginning, instrumental measurements of the meteorological conditions imply that they constitute and are relevant as macro-phenomena. They refer to conditions that exist outside of what might be called the

[25] Julius Hann, who was born in Wartberg, Austria, studied mathematics, physics, geology and geography at the University of Vienna. After a career in teaching, he became professor of physics at the University of Vienna and in 1897 professor of meteorology at the University of Graz. Between 1900 and 1910 he occupied the newly created chair for cosmological physics at the University of Vienna and served as director of the Institute for Meteorology and Geodynamics. Hann was an enemy of speculative thinking; his main goal was to establish the facts (Brückner, 1923:155). Hann was descriptively oriented, that is, keen to establish the observational basis for various meteorological phenomena. In addition, Hann was for more than fifty years editor of the *Meteorologische Zeitschrift*. He died in 1921 at the age of 83 in Vienna. Julius Hann compiled the first textbook on climatology. He first published his *Handbuch der Klimatologie* in 1883; the *Handbuch* appeared in a number of subsequent editions and became a classic in climatology. An English edition based on the second edition of the German version of the *Handbook* was published in 1903 (Hann, 1903).

indoor-climate fabricated for millennia by society for its members, for example, in the form of clothing, nutrition and shelter.

However, based on the widely shared self-understanding and ambitions of climatologists and geographers, the climate conception employed by Huntington could also be called a naturalistic, or scientific conception of climate. It is nature itself, in this case the dynamics of the atmosphere, that speaks to the observers through the readings of the instruments. There is no indication that we are confronted with a reading of nature that is culturally conditioned. Huntington' s confidence in the tremendous impact of climatic conditions on individual, society and civilizations is obviously reinforced by his macro-meteorological conception of climate for it appears to relentlessly impose its force on humans in an unmediated fashion from which there is no escape.

Natural conditions, for example, available natural resources and their limits but also climatic processes do affect human conduct and be it only as the result of certain social re-constructions of these features as constrains of social conduct; but they only constitute constraints for human conducts, they do not necessarily determine it. Even as conditions their impact varies historically, is stratified, at times virtually perceived to be negligent, at times seen as crucial. The same applies to climate. Climate conditions human conduct only insofar as it is perceived and socially constructed as such a condition. It does not affect social conduct in its pristine, objective condition (see also Hoheisel, 1993:137). Climate does not affect us both in its material and cognitive sense unconditionally, as Huntington still believes.

5.2. Climate does not discriminate

Among the characteristic “social scientific” features of discourse that champions climate determinism is, as one might call it, its peculiar egalitarianism. Climate is responsible, as we have seen, for a wide range of human attributes and textures of life-worlds in different regions of the globe. Within each of these forms of life imposed by different climatic conditions there is an almost perfect impartiality and equality. Indeed, it would be most peculiar to suggest the opposite, namely that the impact of climate is somehow stratified and affects say the level of climatic energy of individuals depending on their social standing, their wealth or their political influence. On the contrary, the benefits and the costs associated with climate and therefore the destinies due to climate are almost always distributed without regard of those social and cultural factors social scientists otherwise would want to invoke as agents of social change, the identities of individuals, social mobility and inequality. Climate does not discriminate. The apparent lack of any selective, unmediated appropriation of climate in mentalities, its direct manifestation in cultural forms and social structures, make climate determinism a highly unrealistic description of the interaction between nature and society.

5.3 The stability of c1imate and conduct

A further dubious element in the equation advanced by climate determinists concerns the often unacknowledged but evident stability and lack of fragility of social conduct. Climate not only

does not discriminate, it also lacks for the most part any dynamic character and therefore the ability to insure anything but extremely stable life worlds. A steady and robust climate produces only static and repetitive consequences. Huntington does not entirely rule out the possibility of "phases of a long climatic cycle". In his early as well as in his last major work, he invokes the notion of long phases of climatic change in order to account for the shift in the fortune of regions and nations in the course of recorded history. For example, Huntington (1945:343) attributes the "Dark Ages" and the "Revival of Learning" in Europe to such a change in climatic conditions, more specifically, the prevalence of storms:

> "The Dark Ages and the Revival of Learning occurred at opposite phases of a long climatic cycle. Storminess apparently reaches a low ebb in the Dark Ages but an abundance and violence in the fourteenth century. These two periods were likewise times of psychological contrast. The Dark Ages were characterized by widespread depression of mental activity, whereas the Revival of Learning ushered in a period of alertness and hope."

In his early work on climate and human affairs, for example in his books *The Pulse of Asia* (1907) and *Palestine and its Transformation* (1911) -- both are narrative accounts of his travels in Central Asia in the years 1905-1906 and in the Middle East[26]. -- Huntington stresses climatic change, pulsations, periodicities and cycles both in historical and geological times, or short-term and long-term variations. He concedes that to him "who has devoted years to this particular line of study, they probably appear more important than they really are" (Huntington, 1913:222) He was convinced terrestrial climate changes are mainly due to fluctuations in the heat of the sun. In the final chapter of his book on Asia, Huntington (1907:359) summarizes the lessons of his observations concluding that "during historic times, climate, the most important factor in that environment [of Central Asia], has been subject to notable changes. ..it appears that the changes of climate have caused corresponding changes not only in the distribution of man, but in his occupation, habits, and even character."[27] Despite the caution and reservation Huntington himself issues, he quotes himself in the same 1913 essay and maintains that the rise and fall of civilizations occurs in close correspondence with favorable or unfavorable conditions of climate: "In the regions occupied by the ancient empires of Eurasia and north Africa, unfavorable changes of climate have been the cause of depopulation, war, migration, the overthrow of dynasties, and the decay of civilization; while favorable changes have made it possible for nations to expand, grow strong, and develop the arts and sciences" (Huntington, 1911:251).

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[26] *The Pulse of Asia* is one of the most reviewed geography books written by an American in the early years of this century.

[27] In a retrospective note that may be found in the copy of the second edition of *The Pulse of Asia* located in the library of the American Geographical Society. Huntington recalls that his "dominant motive in writing the Pulse of Asia was the hope that it would have a profound influence upon the course of human thought. I believed that in "pulsations" of climate I discovered a key which would unlock some of the great mysteries of history" (cf. Martin, 1973:68)

Huntington observations about the facts of climate change did not go uncontested. One of the first and prompt critics of his general thesis about the efficacy of climate vs. cultural (mental) factors, the historian A.T. Olmstead (1912), not only challenges his conclusions about the role of climate on the history of the Middle East but also the very assertion that these regions have been subjected to any significant change in climate in historical times that supposedly explain the fate of Middle East societies and fortune over time (e.g. Olmstead, 1912: 166).

But as we have already indicated the professional concern in both geography and climatology in the 1920s moved away from climatic change and increasingly stressed climatic stability in historical times. In the case of Huntington, he changes time-horizons and becomes more concerned with the impact of what are actually weather patterns on human activities, for example, he examines rather short cycles in weather patterns, storms, days of great humidity etc. In the work of Huntington, attention to stable robust features of climate are liberally interwoven with comments about periodicities, long and short cycles and weather fluctuations. The attraction of such a liberal mixing, of extending and then collapsing the time horizon is of course that is makes any concerted effort to amass counterevidence very difficult if not impossible. Switching among time horizons becomes an effective strategy toward the immunization of the basic argument about the efficacy of climate.

None the less, one of the frequent criticisms leveled against earlier climate determinist, for example, against the work of the philosophers of the French enlightenment concerned their assumption that climate, apart from the succession of seasons, was essentially stable.

5.4. The dichotomous nature of climate

One of the remarkable features of climate within c1imate determinism is its all or nothing quality; that is., climate determinism has the tendency to explicate the consequences in dichotomous categories. As a result, specific climatic conditions are for example either stimulating or its exact opposite, namely unstimulating, reflected in the diminished energy its inhabitants display -- as the contrast between the climate of the State of New York and the State of Hawaii demonstrates according to Huntington (1945:390-391). Under stimulating conditions, such “matters as serious reading, inventions, new projects, and the promotion of education, health, and good government” get far more attention than in less stimulating climatic regions of the world. Although the kind of activities just enumerated are not completely absent, “they proceed more slowly than among people of similar ability, character, and training in more stimulating climates” and they tend to be “led by people who frequently go to the more bracing climates for education, recuperation, and stimulus” (Huntington, 1945:391-392).

Part of the one-dimensional analysis of climate in human affairs among climate determinists is also the uncanny way in which their analysis of how nature or climate in works corresponds to their own opinions about humans and human society. Climate used in this way affirms that there cannot be an analytical reference to “climate in itself”. Climate acquires its meaning in a particular context. One therefore is not only justified but forced to refer to the social construct of climate. What is the hidden model of climate in climate determinism?

6. THE RESTRICTION OF THE RANGE OF SOCIAL SCIENCE DISCOURSE

As is well known but also widely supported, mainstream social science eliminated from consideration any perspective that made reference to natural forces as explanatory variables.[28] And it did so, as one should emphasize, for good reasons (cf. Grundmann and Stehr, 1997). As the result, social science discourse for the most part also has been successful in avoiding the seductive simplicity of most forms of technological, economic and biological determinism. Thus, the history of the social sciences in this century can also be written as a struggle against social Darwinism, racism, climate determinism and, to a great extent, socio-biology. Mainstream social science has succeeded in restricting its discourse to *sui generis* processes, such a social, political, economic or cultural. The basic problem for social theorists became how social order is possible. Any material or ecological conditions for the possibility of social order are treated as unproblematic or assigned by way of a division of intellectual labor to other academic disciplines.[29] Using a triad Werner Sombart employs, It is culture, technology and social structure that determines the foundation of social order. The social scientific perspective that now dominates is fundamentally opposed to the liberal mixture of explanatory dimensions one still encounters in the writings by climate determinists of this century. The fact that climate determinism continued to be practiced well into this century indicates that mainstream social science never fully succeeded in cleansing itself of inopportune intellectual perspectives, however much these perspective were ostracized. Less radical attempts to alert social scientists to adaptive constraints and ecological dimensions, for example, as part of the human ecology perspective remained marginal within social science discourse.

The social sciences not only deliberately discarded references to physical, biological and generally environmental factors because they aspired to establish their own disciplinary, professional and academic identity firmly based on the definition of a subject matter that transcended that of the natural sciences; the social sciences also, for the most part, shared in certain ideological or moral assumptions related particularly to the notion of modernity and progress which incorporated the conviction that the march toward modern societies and desirable living conditions included an extensive emancipation from the immediate effect and dependence

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[28] As an early survey of proper social science conceptions by Floyd N. House (1929:16) therefore puts it with respect to climatic factors: “Questions of the sort with which Hippocrates and Ibn Khaldun concerned them selves are today regarded as the province of the physiologist.” The ascent of the theoretical paradigms now taken-for-granted did not occur in tandem in social science disciplines; as a matter of fact geography is one of the exceptions; the vigorous environmental determinism in the early decades of this century in geography, now “often treated as part of geography's distant and shameful past” (Frenkel, 1992:146) is a case in poignant example.

[29] For classical social theorists, societal adaptation to environmental conditions surely was not the problem. The opposite appear to be self-evident for classic theory; Karl Marx ([ ]1974:517) and others were impressed and fascinated by the evident progress in the material capacity of distancing society from the constraints of nature: “The productive forces of man kind are immeasurable. The productiveness of the soil can be increased to infinity through the application of capital, work, and science.”

on environmental conditions. The liberation from (reductionist) naturalism is therefore a version of social emancipation.

The success social scientists generally have enjoyed in discarding and dismissing any reference to natural processes except in the vaguest sense of an insignificant background noise has been supported for decades by the view prevalent in natural science that nature exists in a state of equilibrium and permanence. Climate as an inert and essentially steady phenomenon can therefore easily be abandoned as a relevant dimension in social evolution, especially at a time of otherwise massive dramatic and often abrupt economic, political and social transformations around the world.

But now that impact of society on nature and, but less so, of "nature" on society are at the forefront of many discussions in science and politics; as a result, social science discourse is forced to re-examine its own relations to nature. Moreover, in elements of natural science discourse, the concept of "nature" increasingly is loosing its static character and closed system attributes; it is depicted as mutable, dynamic as well as subject to human interference. Thus, the decades nature occupied a slum dwelling within social science discourse perhaps are numbered.[30] But most importantly, now that environmental factors are not merely a matter from which societies successfully distance themselves, considerations in social science discourse of climate matters for example acquire a new relevance.[31] Also, now that the "evolution" of modem societies appears to have lost is immediately visible direction and drama, perhaps is even directionless, reference to natural processes and the impact or threat they are said to pose become a more credible perspective. However, the central task is to secure a sense of nature and climate in social science (as well as natural) discourse that transcends the intellectual traps liberally invited or perpetuated by modern climate determinism.

In short, we need to reconstitute the notion of nature in social science discourse. However, we have to avoid, on the one hand, the pitfalls of any (reductionist) naturalistic determinism including of course climate determinism and, on the other hand, remain satisfied with the mere introduction of the *topic* of the environment into social science discourse. Environmental sociology, for example, is the initial as well most sustained effort in recent years to re-introduce environmental conditions into social science discourse. But for the most part it is a plea to incorporate ecological topics into social theory thereby recognizing that society affects the environment. The environment continues to be located externally to society. Environmental sociology constitutes the environment within sociological discourse as a social problem analogous to many other and more traditional social problems such as deviant behavior, divorce and

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[30] The notion that nature is neither changeless nor cyclical did not of course emerge in the last few years but took decades to develop and has many intellectual parents as well as social developments that aided its development.

[31] The discovery of a possible reversal in the successful distancing of society from natural constraints is not a disclosure that could be expected to be made within social science today. It is a discovery that originates in models, images, concepts and research programmes in the natural sciences. But that does not mean that these issues should remain the exclusive domain of natural science discourse.

unemployment. As a result, environmental sociology has not succeeded in changing the paradigmatic relation of society and nature in socia1 science discourse (cf. van den Daele, 1992). In addition to environmental sociology, there are other emerging efforts that propose a reconciliation of nature and society in social science discourse. One could refer to Bruno Latour's (e.g. 1993) heroic programme to abandon the dualism of nature and society, the diverse work of feminist eco-sociology or, those of neo-Marxist thinkers (e.g. Gorz, [1991]1994). Our proposal stresses the need to *discover new phenomena* as the precondition for resisting the appeal of either naturalism, or concepts that rely on a purely constructivist perspective. What is needed is the discovery that the "ecological deficit" in social theory extends primarily toward ways of incorporating "nature" into social science phenomena.

7. CLIMATE MATTERS

> In a thousand years ... no highly favorable region may exist upon the globe, and the human race may be thrown back into the dull, lethargic state of our present tropical races.
>
> Huntington, [1915] 1924:403

Ellsworth Huntington ([1915] 1924:403) concludes his best known work *Climate and Civilization* with what he declares is a farfetched warning, namely a thoroughly frightening scenario about the horrifying social, political and economic consequences of climate change on the global conditions as we know them.[32] Even without the possible and radical descent of advanced civilizations into a backward state of tropica1 societies, the prospects are dismal as Huntington concludes because changes in the location of the regions around the globe with the highest "climatic energy and the consequent rise of new powers and the decline of those now dominant may throw the world into a chaos far worse than that of the Dark Ages. Races of low mental caliber may be stimulated to most pernicious activity, while those of high capacity may not have energy to withstand their more barbarous neighbors."

However to move from the idea that climate works to the notion that climate matters requires the firm refusal to succumb to the seductive simplicity of climatic determinism and fatalistic utopias. Although Huntington examined the "progress of civilizations" in relation to the natural environment and thereby anticipated or preceded many contemporary voices that demand such an inclusive perspective,[33] he actually did considerable damage, as we have tried to document, to

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[32] If one describes Huntington's scenario as a "negative utopia" triggered, as it were, by massive climate changes, then his description of the societal consequences does not differ much in their characteristics from those found in more recent discussions about the potential effects of rapidly enhanced concentrations of greenhouse gases in the atmosphere.

[33] It therefore it perhaps worth noting that Huntington was a founding member of the Ecological Society of America.

a perspective that begins to reconcile the separation and alienation of nature and society in social science discourse.

Nature is no longer viewed as a regular, static entity and therefore climate is no longer seem as resting in a state of fixed equilibrium. Such a fundamental re-invention of nature should also have significant effects on the ways in which it might be re-introduced into social science discourse. We need to find a way of conceptualizing climate, for example, as a social construct that is not only a figment of our imagination and that does not merely refer to climate as "impacting" society.[34] But how can one conceptionalize "climate" in such a manner? That society is imprinted into nature is hardly controversial any more because nature as we know and encounter it today it is in fact main1y a social construct. How does the natural climate demonstrate its "social reality" and how, for that matter, is nature generally inscribed into social conditions?

In a most general sense, we want to propose that natural and social processes are mainly imprinted into the *boundary conditions* of nature and society. In the case of society we would suggest that although it is significantly shaped by historical or selective constructions, our understanding of and encounter with climate is also significantly affected by, resonates with, and is shaped by its "extreme" (natural) responses -- that at times may well be the consequence of human interventions into global climate processes. Climate extremes violate taken-for-granted and trusted conceptions and observations about climate (Stehr, 1997). Although they likely are not static over time, what is experienced as climate extremes are anomalies and disappointments. Climate extremes remind us of the reality hidden behind the climate construct. Climate extremes offer and manifest the resistance of reality in the background of the social climate construct. They allow for the possibility of observing and criticizing our observations about climate In order to observe our observations about climate and its effects on society, we have to step back or be forced to leave accepted constructs. Climate matters as a mechanism that precisely accomplishes this feat.

That society has in the past and continues to respond to climate extremes that become imprinted into social action can be shown easily because climate extremes are institutionalized in society, for instance, they are inscribed in the form of a wide variety of myth, ideologies, stories (including more or less elaborated narratives of nature in everyday life), technologies, regulations, organizations etc. An obvious as well as stable and powerful example are protective dikes erected at both rivers and oceans as well as the laws and regulations that govern their construction, maintenance and use. In much the same way, the evolution of shelter, clothing and nutrition is to some extent an inscription of climate extremes into the social fabric. Climatic extremes are engraved and objectified in the construction, maintenance and utilization of many of the modern means of transportation. Modern instruments of transportation are not only utilized to link open spaces with each other and carry commodities, information and humans but they constitute

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[34] Rejecting the idea that climate is real and offers resistance but is a construction means that "the objectivity of nature and the objectivity of the ecological problem would vanish in a constructivist fog. We would then be dealing not with real risks, but with a 'construction' of crisis and not with real risks, but with mere perceptions of risks" (van den Daele, 1992:532).

artifacts that are responses to climate, especially climatic extremes. In a way, means of transportation are portraits of and embody social encounters with climate. Of course, importantly such encounters manifest themselves in efforts to exclude or, to draw boundaries of exclusion for climatic extremes. Transportation takes place in familiar spaces, artificial zones and fairly tight enclosures that keep out undesirable climatic conditions. None the less, engraved into the enclosure are climatic conditions or, nature that is not "our" nature from which we desire to withdraw. The greater the distance such artifacts have to travel the greater the likelihood that climatic extremes are inscribed into the construction of the object As time and distance become increasingly irrelevant to social and economic life, the greater the influence of extremes on such construction of such artifacts. Paradoxically, as these extremes are built-into the object they tend to vanish from view and certainly from direct experience and encounters.[35]

Although nature manifest in climate processes may be institutionalized in society and take on moral qualities (as in "nature strikes back" for example) of which it otherwise appears to be deprived, the institutionalization of nature paradoxically converts climate into an almost invisible entity. The institutionalization of climate in society paradoxically means to distance society from climate and decrease the contingencies for society that may issue from climate. The successful fabrication of a decline in the contingencies that arise from (the natural) climate allows for an increase in the contingencies that come with the socio-cultural development of knowledge.

CONCLUSIONS

At the end of the last and the beginning of this century, proponents of social science discourse and sociological discourse in particular, now considered to be major classics of their disciplines, discovered that social phenomena are unique in important respects, for example, in terms of their inherent complexity as well as their unique developmental patterns that both demand and require a clear and distinct separation in explanatory principles and methodological procedures from the already then very successful natural sciences. Indeed, one of the enduring qualities of classical social science discourse is its insistence that social phenomena constitute a reality *sui generis*. The real virtue of this notion sterns not so much from any inherent opposition between phenomena and the logic of their development, as they relate to the evident ethical and political consequences of attempts to relinquish or discursively join both attributes. It is a matter of historical record that any naive effort in this regard leads to a victory of reductionist conceptions (see Grundmann and Stehr, 1997).

In the 18th Century, which according to many contemporary historians of social science represents the era in which modern social science discourse originated, was an age in which the educated part of the population in France, Germany and England spend enormous intellectual

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[35] Therefore, it is with justification that Bates (1952:120) makes the following case against Huntington's thesis about the rise of civilizations, or, better, puts it on its head, when he says, "the western European environment, lauded by Huntington and his followers as ideal for the development of civilization, was an insurmountable obstacle to civilization until methods had been found for mitigating its effects."

energy to argue about the climatic determinants of the civilizational peculiarities of entire nations (relying e.g. on works by Montaigne, *Essais*, Montesquieu, *Esprit des Lois*, Falconer, *Remarks on the Influence of Climate*). As a contemporary ob server was prompted to point out there was an endless number of writers who ascribe supreme efficacy to climate. Although the discussion of the impact of climate on societies did not cease abruptly in social science, it ultimately was discredited and, only fairly recently, vanished almost without any trace as a largely compromised and widely discredited line of inquiry. It therefore has become more common today to find it "amusing to think that the men of former times would not have been put out by ... climatic explanation, implicating as it does the heavens" (Braudel [1979] 1992:51).

There are good reasons that account for the differentiation of cognitive agendas in science, chief among them the following

- biological and cultural evolution are not identical,
- the natural environment of society is for the most part independent of human action,
- societies have succeeded in emancipating themselves from many environmental constraints

Nonetheless, the ecosystem, refashioned to a lesser or greater extent by social action by way of appropriating its resources, remains a major material source and constraint for human conduct. More recently, it has become evident, mainly as the result of research in the natural sciences that the emancipation of social conduct from nature is by no means firm and final. As a result, a re-examination of the well entrenched intellectual division of labor in science may be in order. But such a revision of the asymmetric division among domains of inquiry will have to demystify first and foremost the persistent claim of natural science discourse to be located upstream and up front of social science. We have attempted to show how steps may be taken in this direction by suggesting to move the issue of the impact of climate on social action away from the established notion that climate works to the idea that climate matters for social conduct.

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APPENDIX:

The Efficacy of Climate: An Inventory [36]

Alcoholism (Semple, 1911:626)

Arrests (Huntington, 1945:363-364)

Asiatic handicap ("In Europe and especially Asia the value of the climate as an aid to civilization declines quite steadily eastward" (Huntington, 1945:385)

Attitudes ("People feel growingly optimistic in the spring and still more so in the autumn;" Huntington, 1945:318)

Business activities and cycles (Almost every advanced country has sharp seasonal variations in its occupations, wages, trades, transportation, bank clearings, and other phases of business" Huntington, 1945:312)

Capacity for work ("Differences in health indicate corresponding differences in inclination to work, as well as in actual capacity to work. Vigorous people prefer to work rather than sit idle. The will to work beyond the required limits is extremely important in crisis, such as war, flood, or other disaster. It is one of the main factors in leading people to make inventions, explore new lands, carry out scientific experiments, initiate reforms, and produce works of art, literature, and music" Huntington, 1945:238)

Circulation of books (Huntington, 1945:610)

Civilizations, distribution of ("As the Tropics have been the cradle of humanity, the Temperate Zone has been the cradle and school of civilization. Here Nature has given much by withholding much" Semple, 1911:635; Fig. 86 "Map of Civilization" on page 256 in Huntington and Cushing, 1921:256; "The distribution of civilization throughout the world has always depended closely upon climate" Huntington, 1927:165; "By encouraging one type of social organization and discouraging another, climate has great influence upon the development of civilization" Huntington, 1945:276)

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[36] As already noted, one of the systemic features of the narrative of c1imate determinism is its redundancy as if an assertion gains credibility by being repeated and repeated. No attempt has been made therefore to list every instance in which specific assertions are advanced in the writings of Huntington, for example. Huntington's observations about the importance of c1imate for the emergence of slavery in the Southern United States for instance can be found throughout his various writings covering a period of more than four decades. The inventory tries to be complete in a different sense, as many substantive assertions as possible about "causal" links between climatic conditions and social conduct are enumerated.

Civil war (in the United States: “In all these respects climatic contrasts paved the way for civil war” Huntington, 1945:280)

Cleanliness (“The climate itself may also be largely responsible for the lack of cleanliness [in this case, among Icelanders]. So far as I am aware, this lack prevails among every people who live in a cool, moist climate where the water is always cold and where animals are the chief means of support. .. The cleanest people in the world are the inhabitants of warm, moist countries, where the state of culture requires clothing, and where there is plenty of water” Huntington, 1924b:289)

Commerce (the decline and rise of commercial activities as dependent on climate, e.g. Huntington, 1924b:300).

Communication (as dependent on favorable climatic conditions, e.g. Huntington, 1924b:300)

Crime (Huntington, 1945:365-367)

Cultural development (“Climate ... helps to influence the rate and the limit of cultural development. It determines in part the local supply of raw material with which man has to work, and hence the majority of his secondary activities, except where these are expended on mineral resources. It decides the character of his food, clothing, and dwelling, and ultimately of his civilization” Semple, 1911:609; “the North Temperate Zone is preëminantly the cultural zone of the earth” Semple, 1911:634; “Cultural variations from season to season seem to be intimately connected with physiological conditions that manifest themselves in reproduction and in rate of work” Huntington, 1945:319).

Cultural patterns (“Cultural habits rarely survive and thrive if they are actively in opposition to the demands of the physical environment” Huntington, 1945:319).

Cycles of activity (“Annual cycle of mental activity, which is especially clear in the circulation of serious books" Huntington, 1945:610)

Decline or decadence of civilizations (“The question has been repeatedly raised as to whether there have been changes in climate in historical times, especially rainfall fluctuations, sufficient to explain the decline and fall of the Roman Empire and the decadence of civilization, by reason of which large sections of the Mediterranean lands, once thriving and populous, have become depopulated or impoverished. Arguments supporting this position have been advanced chiefly by historians, archeologists, and other incompetent authorities not concerned with climatology. The majority of competent authorities have reached a contrary conclusion...Ellsworth Huntington attributed the decline of Palestine, Syria, Asia Minor, Greece and Italy to the same cause, but his arguments have been questioned both by historians and climatologists” Semple, 1931:99-100)

Degeneration (as the climate becomes unfavorable--as in cold and stormy in Iceland, e.g. Huntington, 1924b:293)

Diseases (The impact of climate on health is stressed b y many climate determinists, even though it may only be in a kind of superficial and less consequential fashion -- see below -- than the stronger assertion that infectious diseases of one sort or the other are either promoted or repressed by climatic conditions: “Climate undoubtedly modifies many physiological processes in individuals and peoples, affects their immunity from certain classes of diseases and their susceptibility to other” Semple, 1911:608)

Dishonesty (see stupidity)

Economic cycles (“The rhythm in the activity of economic life, the alternation of buoyant, purposeful expansion with aimless depression, is caused by the rhythm of the yield per acre of the crops; while the rhythm in the production of the crops is, in turn, cause by the cyclical changes in the amount of rainfall. The law of the cycles of rainfall is the law of the cycles of crops and the law of economic cycles.” Moore, 1914:)

Economic prosperity and development (“Economic prosperity and general well-being are distributed according to much the same geographical pattern as social welfare” Huntington, 1945:232)

Efficiency (“Extremes both of heat and cold reduce the density of population, the scale and efficiency of economic enterprises” Semple, 1911:611)

Elites (see inequality)

Energy and progress (Fig. 85 on p. 255 in Huntington and Cushing, 1921 “Map of Climatic Energy” shows how “human energy would be distributed if it depended wholly on climate”; the map sums up the “combined effects of temperature, humidity, seasons and storms upon health and energy” Huntington, 1927:145; “the energy and progress of the world's leading countries is due to the constant repetition of the physiological stimulus which comes with the changing seasons” Huntington, 1945:319).

Fertility (Virchow, [1885] 1922:231)

First class factories (Gilfillan, [1935] 1970:49; G. calls climate the most *fundamental* among the variables he examined)

Health: One of the more frequently cited effects of the climate is that on health. (“The climate of Iceland is not only healthful but stimulating” Huntington, 1924b:289; “the geographical distribution of health and vigor depends largely on the combined effect of climate and cultural conditions” Huntington, 1945:240; “in the United States infants conceived in the fall and born in the summer are especially numerous and have the lowest percentage of congenital defects” Huntington, 1945:319; "the resistance of infants ... to digestive diseases apparently varies according to their age in a way that suggests an innate adaptation to a particular kind of climate.

The peculiar ability of people, especially women, in the reproductive ages of life to resist disease during the late winter suggests the same thing" Huntington, 1945:610).

History ("The greatest events of universal history and especially the greatest historical developments belong to the North Temperate Zone" Semple, 1911:611; "where man has remained in the Tropics, with few exceptions he has suffered arrested development" Semple, 1911:635)

Homicide ("Homicide shows a significant relation to temperature both geographically and seasonally ... seasonally as well as geographically, the rates increase from cooler to warmer weather...warm weather apparently is associated with lowered self-control. It also makes people feel disinclined toward steady effort, lack of self-control is a primary factor in the failure of public sentiment to express itself in observance of law" Huntington, 1945:232)

Immorality (see stupidity)

Inequality ("The old South distinguished sharply between aristocrats and 'poor whites,' as well as between whites in general and Negroes. This distinction of classes was in strong contrast to the relative democracy which prevailed in the North, where the squire might care for his own horse, cow and garden. When slavery disappears, a system of tenancy almost invariably grows up in regions where differences in ability to manage people and property are especially important in comparison with the ability to do manual work.")

Insanity ("At that time [June] the physical stimulus which merely leads to health and increased powers of reproduction among normal people apparently overestimates those who are poorly poised, weak of will, oversexed, or otherwise abnormal" Huntington, 1945:365)

Intelligence ("People of high latitudes are, on the whole, more intellectual than those of low latitudes" Huntington, 1945:367).

Inventions (Huntington, 1945:391)

Life expectancy (Huntington, 1945:610)

Mental activity: ("among European races physical activity appears to be the greatest when the temperature averages not far from 65° F., whereas mental activity seems to be greatest at a lower temperature, averaging perhaps 40°" Huntington, 1924b:290; in addition, climate variability stimulates mental activity, e.g. Huntington, 1924b:290))

Migration ("The acclimatization of tropical people in temperate regions will never be an equation of widespread importance ... [The Negroes'] concentration in the 'black belt,' where they find the heat and moisture in which they thrive, and their climatically conditioned exclusion from the more northern states are matters of local significance. Economic and social retardation have kept

the hot belt relatively underpopulated" Semple, 1911:625-626; "the people in poorer climates arepractically certain to have poorer health and less energy than others. The population as a whole is likely to be less prosperous, so that education and contact with other people are less prevalent. Moreover, under such circumstances there is a strong tendency for the more able people to leave the poorer environment" Huntington, 1927:162; "Climatic conditions begin to mold and select the migrants to the new environment" Huntington, 1927:165)

Mortality ("Bodily temperatures rises [in the Torrid Zone], while susceptibility to disease and rate of mortality show an increase ominous for white colonization" Semple, 1911:626)

National character (Huntington, 1945:303)

Patent productivity ("An isoplethic [or 'contour'] map I have made, of American patent productivity per capita, shows a heavy concentration in the narrow belt of best climate, near the 50° F. isotherm, from Chicago to Philadelphia and Boston" Gilfillan, [1935] 1970:46).

Physical activity ("Physical vigor is basic in human progress...Vigor is needed in order that people may work hard without undue fatigue and have a reserve of strength in emergencies. It is especially important in promoting mental activity and clear thinking" Huntington, 1945:237; "Physical vigor is one of the main factors in the growth of civilization" Huntington, 1945:275; the "optimum temperature depends upon the conditions under which man took the evolutionary steps which gave him his present adjustment to climate" Huntington, 1945:273; "at temperatures above the optimum, fatigue is readily induced, the inclination to work diminishes, and the easiest way to make oneself conformable is to do as little as possible. At temperatures below the optimum the inclination to work is stimulated, partly because bodily activities promote warmth, partly because there are many ways in which a moderate degree of inventiveness enables people to keep themselves warm artificially" Huntington, 1945:275)

Physiology ("The effects of a tropical climate are due to the intense heat, to its long duration without the respite conferred by a bracing winter season, and its combination with the high degree of humidity prevailing over most of the Torrid Zone. These are conditions that are advantageous to plant life, but hardly favorable to human development. They produce certain derangement in the physiological functions of heart, liver, kidneys and organs of reproduction" Semple, 1991:626).

Productivity (see capacity for work; energy and progress)

Profitability ("The climate makes certain occupations profitable, and other unprofitable" Huntington, 1927: 165)

Progress ("A map of climate, or rather of climatic energy, as we may call it, resembles a map of progress far more closely than does a map of any other factor which may be a cause rather than a result of the distribution of progress" Huntington, 1927:140)

Prostitution and sexual extravagance "seem to reach a maximum in the hottest parts of the world, that is, in the dry parts of a belt located ten to thirty degrees from the equator" (Huntington, 1945:296).[37]

Reading, serious (Huntington, 1945:391)

Religion ("Diversity of physical environment has also been effective in leading to religious differences, and among the environmental factors climate has been especially important" Huntington, 1945:281).[38]

Reproduction (The reproductive "cycle varies according to climate." In the northern United States and western Europe the maximum of births normally occurs in March or April as a response to conceptions in June or July. Elsewhere the maximum tends to shift to earlier dates in hot climates and later ones where the climate is cold" (Huntington, 1945:273-274).

Revolutions ("In the world as a whole the tendency toward lack of self-control in politics, in sex relations, and in many other respects rises markedly in hot weather and in hot countries. This is not the only reason for the frequency of political revolutions in low latitudes, but it must play a part" Huntington, 1945:365)

Riots ("Weather as a promoter of riots has hitherto been neglected. Nevertheless it seems to agree with the distribution of riots [in India]"; "it is noteworthy that in the United States Negro riots occur most often in unusually hot weather" Huntington, 1945:362, 364)

Self-control ('climatic "extremes weaken the power of self-control" Huntington, [1915] 1924:404; there is "evidence that dry weather, especially when hot, is associated with a decline in self-control" Huntington, 1945:296)

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[37] Huntington (1945:296) refers, in this context to Hellpach (without further specificity; however, in the bibliography, Hellpach's 1911 *Die geopsychischen Erscheinungen des Wetters, Klima und Landschaft in ihrem Einfluss auf das Seelenleben* is listed) and quotes him as saying that "in Southern Italy sexual irregularities increase greatly when the sirocco is blowing. The people recognize this so well that offenses committed under such circumstances are in a measure condoned."

[38] Since religious belief systems are not merely other-worldly but from this world, early mythological and later more systematic religious belief systems always display certain environmental constraints with which their originators struggled and they even tend to reflect or incorporate certain c1imatic conditions (cf. Hoheisel, 1993) but this is of course a far cry from maintaining an almost indiscriminate assertion that religious beliefs and practice are driven by climatic conditions. Moreover, as Hoheisel (1993:130) points out, available ethnographical information lack reliability and validity to clearly tie religious beliefs and practices to climatic conditions: "In jeden Fall erschweren zunehmende räumliche Mobilität und fortschreitende Befreiung von Naturzwängen etwa durch Fernhandel und Gewerbe, vor allem aber die Möglichkeit, an Überlieferungen ganz unterschiedlicher Herkunft anknüpfen zu können, den Nachweis, daß Glaubensvorstellungen oder andere religiöse Lehren von bestimmten klimatischen Gegebenheiten geprägt sind, erheblich,"

Sexual offenses (Huntington, 1945:365)

Slavery ("It was not only the enervating heat and moisture of the Southern States, but also the large extent of their fertile area which necessitated slave labor, introduced the plantation system, and resulted in the whole aristocratic organization of society of the South" Semple, 1911:622; "Slavery failed to flourish in the North not because of any moral objection to it, for the most godly Puritans held slaves, but because the climate made it unprofitable" Huntington, [1915] 1924:41; "The suppression of slavery in the North was not due chiefly to moral conviction. That arose after long experience had shown that slavery did not pay in a cool climate ... the combination of good food, stimulating climate, and northern type of culture made the white northerners so energetic that it irked them to wait for slow-moving Africans" Huntington, 1945:279)

Scientific research (... the world's scientific research and other intellectual activities, as well as its financial, commercial, industrial and political control are more and more becoming concentrated in the few limited regions where the climate is most healthful and stimulating" Huntington, 1927: 160)

Social ideals ("The difference in inclination toward work had much to do with the development of diverse social ideals in these parts of the United States. In the North the successful family was the one where everybody worked hard as well as intelligently. Hard work became the supreme virtue, as it is to this day in spite of other tendencies. In the South the successful ante-bellum family was one that eschewed physical labor and at the same time got a good living. This system favored slavery and attached a social stigma to work with the hands. An aristocratic society was almost inevitable, because the mental ability to get a good living through slave labor is more limited than the physical ability which was so important in the North" Huntington, 1945:280)

Social systems (" In the United States we see a social system closely in accord with the stimulating seasonal changes and storms which characterize the culture. We also see that the combined effect of the climate and the social system is so strong that children are especially active here, manufacturing and other forms of business forge ahead with a zest rarely seem elsewhere" Huntington, 1945 :341)

Stupidity ("the climate of many countries seems to be one of the great reasons why idleness, dishonesty, immorality, stupidity, and weakness of will still prevail' Huntington, [1915] 1924:411)

Suicide (Huntington, 1945:365)

Superstition: (e.g. Huntington, 1924b:297)

Temperament ("The northern peoples of Europe are energetic, provident, serious, thoughtful rather than emotional, cautious rather than impulsive. The southerners of the sub-tropical Mediterranean basin are easy-going, improvident except under pressing necessity, gay, emotional,

imaginative, all qualities which among Negroes of the equatorial belt degenerate into grave racial faults" Semple, 1911:620)

Tempo of social change ("The compression of climatic differences into a small area enlivens and accentuates the process of historical development" Semple, 1911:618)

Thinking (see mental activity)

Thrift ("The necessity of preparing shelter, clothing , and fuel as means of combating the cold and moisture of winter tends to promote a social system which places high value on foresight and thrift" Huntington, 1945:277)

Unrest and violence (see riots)

Wages ("The low cost of living keep down [the] wages, so that the laborer ...is poorly paid [in southern countries and regions] ... The laborer of the north, owing to his providence and larger profits, which render small economies possible, is constantly recruited into the class of capitalist" Semple, 1911:620-621).

Work attitudes ("A hot c1imate, especially if it is humid, makes people feel disinclined to work. This encourages the more clever people to get a living with as little physical exertion as possible. Their example fosters the growth of a social system in which hard work is regarded as plebeian" Huntington, 1945:276; "the greatest social influence [of climate] is probably its effect on inclination to work" Huntington, 1945:282)