Climate Determines:

An Anatomy of a Disbanded Line of Research*

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Abstract

This paper is designed to advance the view that it is important to move, particularly within social science discourse from the notion that climate determines to the idea that climate matters. It is in this context that the significant tradition of climatic determinism is crucial. Today climatic determinism lives a strange double existence: It is a widely accepted view among many segments of the public but also among natural scientists; in the latter instance, based on what are taken to be almost self-evident sets of "facts" and in the former case, common sense traditions. On the other hand, among social scientists, it is considered a long-discredited approach that has even less appeal than the notion of inherited intelligence as a basis of social inequality. Whether one is therefore able to move from the compromised notion that climate determines to the progressive conception that climate matters is, at the same time, an exercise that forces us to re-open the apparently sealed question of the linkages between natural processes and social action and social conduct and nature.

*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 shoul*d he not be changed by that same universe?

Johann Gottfried Herder, 1794:87

1. INTRODUCTION

"Climatic determinism" and Ellsworth Huntington are no longer in contemporary encyclopedia and textbooks about climatology and sociology (e.g. House, 1929; Young, 1934;). But Arnold J. Toynbee may well be right, when he wrote in an introduction to a biography of Ellsworth Huntington (Martin, 173) that 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." And indeed, when at the recent 2nd International Conference of Climate and History in Norwich in September 1998, concept and name were mentioned in passing, nobody asked about the meaning and a broad debate began, with concept and name resurfacing repeatedly in discussions and talks, with one historian even claiming "Huntington was right". That means, concept and name are specters of the past, discredited by social sciences and geographers, but it is still virulent. In particular among lay people, at least in Northern Europe, where a common climatic explanation prevails why, for instance, the Swedish are so prosperous and successful compared to people in regions with a more benign climate. An explicit example along these lines from was offered in the journal "Weather" by Beck (1993). Also modern climate-based social 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.") belong into this category.

This paper deals with "climatic determinism" and a major proponent of this line of reasoning, Ellsworth Huntington, in some detail. Wile this is an interesting exercise in itself, there are other meaningful purposes. First, it is an attempt to explain contemporary climatologists, who have mostly a training in natural sciences, that their enterprise is - as was and is with all environmental sciences - not value neutral but imbedded in a broad and strong net of socially and culturally constructed concepts (see also Bray and von Storch, 1999). Furthermore, contemporary climate impact research, which has attained a high level of visibility not only in climate sciences but also in climate politics, is in many cases conceptually closely related to the historical discredited "climatic determinism".

To explain this claim, we need to define what we mean when we refer to climatic determinism. Climatic determinism is the understanding that knowledge about the state of the climate, be it stationary or changing, provides significant insight about socially relevant processes, such as economic efficiency, physical energy and health of people or social and civilizational aspects and achievements. In the classical climatic determinism, the success of certain people in attaining "high levels of civilization" was attributed mostly to climate but sometimes also to the degree of local climate control (Markham, 1947). Also the aspect of health and physical/mental energy of humans was a classical topic and is still dealt with in the quarters of biometeorology. The modern climatic determinism has more to do with the climatic influence on crop yields, water supply, energy demand and their impact on the functioning of societies. The joint aspect of classical and modern climatic determinism is that considering climate alone is enough for providing first order information about the implications of climate change, whereas internal social processes are considered secondary.

It is not only in order to avoid the misinterpretations and misconceptions of earlier climatic and environmental reductionism that we suggest that it is mandatory to review the classical climatic determinism concepts; it is also imperative to examine the pitfalls of climate determinism at a time when widespread 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, seem to gain credibility and urgency. And, it seems to us that an examination of the legacy of climate determinism is even more important in light of the necessity to re-examine the status of "nature" in social science discourse.

Our paper, more specifically, is therefore, first, an attempt at recovering the substance of the classical ideas, their methodological conceptions and epistemological pre-occupations. Second, we are 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. Our conclusion is summed up saying that we need to move from the determinist view that "climate determines" to the idea that the much more open and deliberately contestable notion that "climate matters". Such a concern goes beyond the more common and almost undisputed 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. For example, it represents the first step the development of the concept of "societal sensitivity" against climate (in contrast as well as analogy to the term "climate sensitivity" against social action).

In order to advance our agenda, we concentrate for heuristic purposes on one representative of modern "environmental determinism", namely the geographer and "climate 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 but on an exemplary representative of a once highly visible intellectual paradigm now discarded by social scientists. We recognize of course that "climate determinism" has both a much longer intellectual history and represented a diverse field of inquiry in different epochs and cultures. However, based on the nature his inquiry and the echo he achieved in science and politics we consider Huntington to be a, or the, leading exponent of climate determinism in the first half of the 20th century.

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 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 characterizes Huntington's activities in this field in analogy to Frederick Winslow Taylor's efforts in 1911 to develop a form of "scientific management" in order to increase the output of workers "meteorological Taylorism". In addition, the enlightening case 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, 1999).

2. THE CAREER OF A MAJOR PERSPECTIVE

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

For centuries, scientists, intellectuals, humanist, philosophers, physicians and perhaps the public at large had few if any serious doubts that climate determines. 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 climate 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 climate when compared to that of other places. [1]

1) A summary of many similar statements over the centuries can be found in Barnes, 1921.

For the time being, the career of climate 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 climate 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 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."*

Closer to the point and resonating more with common sense discourse, Willy Hellpach (1938:429-430), a widely read social psychologist in the Twenties and Thirties in Germany offers the following observation:

> *"Prevalent in the north of a given hemisphere are the character traits of sobriety, harshness, restraint, imperturbability, readiness for exertion, patience, stamina, rigidity, and the resolute employment of reason and determination. The prevalent traits of the south are liveliness, excitability, impulsiveness, engagement with the spheres of feeling and imagination, a phlegmatic going-with-the-flow or momentary flare-ups. Within a nation, the northerners are more practical, reliable, but inaccessible, and the southerners devoted to the fine arts, accessible (sociable, likable, talkative), but unreliable."*

The field of academic geography was at a turning point. It was shifting from exploration to explanation. And it is precisely at this juncture that Huntington attempted to move the analysis of climatic forces on society away from the kind of impressionistic variety of determinism represented by, e.g., Semple and Hellpach toward a much more rigorous scientific objective footing. Huntington's approach soon became the exemplary platform for the geographic or even more generally social scientific analysis of climate.

In the 19th century, moral and climatic discourses were linked closely; in Huntington's days efforts were made to differentiate these modes of discourse and today they appear to be discrete forms of discourse.[2] In the past, the doctrine of environmental determinism 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. But 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) called the " degree of progress in different parts of the world". The interpretative approach of choice that prevailed was an "essentialist" perspective; that is, a theoretical platform that assigns inherent, context independent core properties to climate asserting its definitive influence (power) over all attributes and phenomena of a particular situation. The accepted interpretive convention of climate determinism denies that the "logic" of the situation seen as largely transitory and epiphenomenal is of any explanatory importance. Supreme efficacy is allocated to climate; therefore, "climate determines". Any definite regularity is the result of underlying physical forces and has its origins there,: "[life as we know it is influenced by] at least three kinds of physical conditions ... . One of these is the weather .... Another is the electromagnetic field of the solar system .... The third is the composition of the atmosphere, with its variations in ozone and perhaps other respects" Huntington (1945:455).

Beginning in the last part of the 19th century parallel to the classical line of environmental determinism a new theoretical perspective began to develop which abandoned any serious interest in the interaction of natural and social factors, and before long became the accepted canon in social

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2) Livingstone, 1991 offers an examination of the close linkages among climatic, moral, scientific and sermonic discourses in 19th century geography and therefore the common place depiction of the world's regional climates, of race and place cast in moral idioms.

science. Social science was increasingly based on a specific, restricted concept of space and time. 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) in the case of sociology has termed a retreat of sociologists into the present.

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. What was perhaps the greatest impetus for the analysis of the influence of climatic conditions on human conduct, namely the desire to arrive at broad even sweeping explanatory frames 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 main stream social science.

3. ELLSWORTH HUNTINGTON

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

The work of Ellsworth Huntington (1876-1947) on the linkage between climate and societal transformation has to be at the center of this analysis. Extensive details about his personal life and academic career can be found in the Geoffrey J. Martin's (1973) biography that portrays him in a most favorable light. He never wavered in his views even when faced with devastating criticism (cf. Olmstead, 1912; Sorokin, 1928). His prolific writings, his considerable fame and wide influence both in the scientific community and in early twentieth American society were remarkable.

Huntington was generally driven by a concern about concrete ways of improving human existence and he rarely hesitated to make practical suggestions and offer policy advice in the area of climate matters as well. The practical advice he offered came directly from his research. An example was his suggestion that the seat of the United Nations should be located in Newport, Rhode Island because it had the most suitable climate for humans. His concern for the optimum climate also involved a close association with the American Society of Heating and Plumbing Engineers (cf. Martin, 1973:xiv).

Huntington's main work relevant here concerns the reasons for the "progress" of human civilizations. These ideas took shape first around 1914/15 and 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 climate and climatic change an explanation for the differences between Western dynamism and Eastern stagnation." His early writings on climate change in post glacial times surely was stimulated by a worldwide interest in the phenomenon of climate changes in historical times: this peaked at the turn of the century and quickly gave way to the conviction that climate is essentially a static phenomenon (see Lamb, 1959). 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 climate, for example, aridity, were among the contentious issues in discussions among scholars who shared the conviction that significant transformations could be observed (cf. Brückner, 1890).

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 climatic change, variability and fluctuations. In his subsequent work on climate and weather, and especially in his synthesizing books published in the 1940's the time-horizon changes and the emphasis moves away from climatic variability and fluctuations and is replaced by accenting the essentially fixed nature of climate. 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". On the basis of such data he formulated the essence of his thesis on the linkage between climate 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 climate?" "brought letters of anger from southern gentlemen, inquiries from medical men and psychologists, [and] a proposal for civic celebration in Seattle" (Martin, 1973:114).

According to his biographer, the idea that climate stimulates or inhibits human energy, health and progress appears to have been suggested to Huntington initially by Charles J. Kullmer, a professor of German at Syracuse University who claimed to have found a close correlation between storm tracks and civilization and that shifts in storm tracks accounted for shifts in the location of civilizations.

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.*
>
> *Huntington [1915] 1924:(first ed. 270)*

Our discussion of climate determinism is primarily limited to contributions dealing with of the effects of climate 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 climate determinism aspired to become a recognized scientific endeavor. Climate for Ellsworth Huntington (e.g. 1945:307) mainly meant attention to temperature and secondarily, seasons, storms and precipitation. Key aspects of theory were that a strong seasonality would be demanding to people so that too much attention would be needed for the basics needs of life. Ideal working conditions would prevail at temperatures around 70^{o}F (see also Markham, 1947), and storms would be an efficient measure to counteract the dangers of climatic monotony. In his last major book, Huntington (1945:313) sums up his main thesis about the salience and efficacy of climate in the by claiming that climatic conditions constitute a distinct optimum (and conversely, a downside) and with it varies "the advance of civilization and the quality of the people." Therefore, maximum advancement has been attained in the areas of midlatitude stormtracks.

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 was 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 in the past did not imply 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).

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 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 climate according to Huntington perhaps assist in avoiding to be drawn again into reflections on climate that resemble and resonate with the tradition of modern climate determinism.

5. THE FOUNDATIONS

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), 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 invoked and appealed to experiences that he expected surely everyone of his readers shares and can replicate almost perfectly and instantly. Although it is quite easy, as a fellow geographer remarked 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." (Spate:1952:413-414). 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 meant to spawn among his readers a kind of essential assent to his thesis. 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 feel 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 determination climate exerts then clearly is an appeal to what he believes are almost universal and powerful common sense experiences with weather conditions. He tries to convince the reader 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.

6. 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 métier 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' climates 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 climate 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 climate 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, 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.

7. 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 climate 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. 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 generalization about climate 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 some 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 climatic 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.

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 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. [3]

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.

8. WHY CLIMATE DOES NOT DETERMINE

> *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 climatic 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 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.

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 climate 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 climate-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 climate. 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

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[3] 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).

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.

8.1. 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 climate 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.

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.

8.2. 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.

8.3. THE STABILITY OF CLIMATE 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 [4].—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." [5] 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).

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.

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

5 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).

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.

8.4. THE DICHOTOMOUS NATURE OF CLIMATE

One of the remarkable features of climate within climate 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 determines 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?

9. 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. [6] 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. [7] 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

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6 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 themselves 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.

7 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 mankind are immeasurable. The productiveness of the soil can be increased to infinity through the application of capital, work, and science."

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 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. [8] 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. [9] Also, now that the "evolution" of modern 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 one of 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 unemployment. As a result, environmental sociology has not succeeded in changing the paradigmatic relation of society and nature in social 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.

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8 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.

9 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.

1993) programme in the social studies of science to abandon the dualism of nature and society, the diverse work of feminist eco-sociology or, the ideas of neo-Marxist thinkers (e.g. Gorz, [1991] 1994).

In the present-day field of climate impacts research, now under intellectual and political constraints very different from those faced by climate determinist inside the academic and public arena but with similar ambitions when its comes to generating practical knowledge in the form of policy advice, a linkage between climate and society is forged that resonates with some of the fundamental assumptions found in climate determinism. Within the social sciences, we are now confronted with a fully institutionalized disciplinary structure. In the Twenties and Thirties, the boundaries were much more porous, distinct national profiles could be discerned and the hierarchy of the social sciences as well as the self understanding of social scientists differed from what it is today. In the course of the structuring of the modern social sciences, general categories and modes of orientation have lost their significance and made way for orientations that are much disciplinary. Based on the differential prestige attached to the now discipline-bound social sciences, economic discourse clearly has gained in ascendance as has a particular logic and orientation within economics. The societal stature of economics not only benefits from the correspondence between it and the economic system (which cannot be said for many of the other social sciences) but also from the widely shared expectation that economic discourse can deliver what is expected of modern science, namely useful, technical knowledge.

Recent interdisciplinary efforts such as impacts research reflect the state of social science. For Huntington, the stress is in the then prevailing orientation within social science of the impact of climate on many socio-cultural attributes and manifestations of human conduct (see our appendix). For present-day climate impact researchers, the logic of their inquiries while insisting of course that climate is or could be quite powerful examines climatic consequences primarily in economic terms. The impact that is analyzed concerns the economic system (or its subsystems), the vocabulary that informs such inquiry invokes “yield”, “net revenue”, “costs”, “market damages”, “benefits”, “businesses”, “industries” and the method strive to follow Huntington by providing numerical values (cf. Schneider, 1997:239-240). After all, the formal integrated assessment models of climate change now dominant trace their origins to economic and technical models of energy policy (see Weyant, 1996). By the same token, integrated assessments models are not designed to reflect culture, knowledge and its trajectories or, they implicitly reflect a culture that is one-sided, even banal (cf. Dowlatabadi, 1997). However, the shift in disciplinary orientation and vocabulary does not exculpate impacts research. It represents based on its fundamental premises a variant of climate determinism.

Our proposal stresses the need to discover new phenomena as the cognitive precondition for resisting the appeal of either naïve 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.

10. CLIMATER MATTERS

Everyone knows climate is important especially the extremes.

William F. Ogburn, 1943:785

Ellsworth Huntington ([1915] 1924:403) concludes his best known work Climate and Civilization with what he declares is a farfetched warning. Huntington’s prediction about the horrifying social, political and economic consequences of global climate change for the state of the world must have been for his contemporaries a thoroughly frightening scenario “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”. [10] Even discounting the possible and radical descent of advanced civilizations into a backward state of tropical societies, the prospects are clearly dismal as Huntington concludes because changes in the location of the regions around the globe with the highest

10 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.

"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."

To move from Huntington's essentialist idea that climate determines in such a definitive and context insensitive manner to what we consider a more realistic and open notion that climate matters requires, first of all, the firm refusal to succumb to the seductive simplicity of climatic determinism and its 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, [11] he actually did considerable damage, as we have tried to document, to 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. [12] 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 mainly a social construct. How does the natural climate demonstrate its "reality" in society and for social conduct? And how, for that matter, is nature generally inscribed and embedded into the fabric of society and thereby reflects the ways in which we comprehend natural processes in everyday life? What is at issue can also be formulated as the theoretical task of development the idea of "societal sensitivity", [13] that is, a notion that constitutes the impact of climate on society as a hybrid process in which natural and social attributes merge in the context of the social order.

In a most general sense, we want to propose that natural and social processes are mainly imprinted or inscribed into the boundary conditions of each other, that is 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 in important ways affected by, resonates with, and is shaped by "extreme" climatic responses—that at times may well be the consequence of human interventions into global climate processes. [14] The inscription of climate into society is never obvious and transparent but requires interpretation. Interpretations of how climate determines on society are not completely arbitrary and divorced from the capacity and capability of climate to leave its imprints on society. We want to argue that the inscriptions climate achieves in society mainly operates via its extremes. What is apprehended as an extreme is by no means obvious. It is subject to different readings.

The evident fascination and even rapture with extremes of all descriptions among the public and the media in our times is well known but probably not a novel response. Varied, even "ritualistic" cultural responses to extremes ultimately display and often celebrate the familiar, namely, "normal" patterns

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11 It therefore it perhaps worth noting that Ellsworth Huntington was a founding member of the Ecological Society of America.

12 If one chooses to reject the idea that climate is also real, even offers resistance that is institutionalized in society and maintains instead that climate is merely a social construction, "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).

13 In analogy, the rather successful and now robust term of "climate sensitivity" refers to the imprint of society in the natural order creating the hybrid notion of "anthropogenic climate change".

14 This assertion about the significance of extremes should not be misunderstand to represent a kind of ontological thesis rejecting any kind of :gradualism" (for example in natural history, see Gould, 1980:226) but as an empirical hypothesis about the practical ways in which nature becomes pertinent for society.

as well as homeostatic processes. Extremes constitute a "crisis" and are apprehended as temporarily disturbed equilibria. Using a term coined by William James, extremes are "coercive facts". It is in this sense that climate extremes violate taken-for-granted and trusted conceptions and observations about climate (Stehr, 1997). Although such extremes themselves likely are not interpreted as static over time, what is experienced as climate extremes are taken to be anomalies and disappointments. Climate extremes remind us of the reality hidden behind the surface of the social climate construct. Climate extremes offer and manifest the resistance of natural reality. A such they become imprinted into the social climate construct. They allow for the possibility of observing, categorizing and criticizing our observations about climate. In order to observe our observations about climate and its effects on society, we have to step back, we need to be forced to leave accepted interpretations or constructs. Climate matters as a event and mechanism that precisely accomplishes this feat. [15]

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 (or inscribed as we also have called it) 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 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. [16]

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.

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15 In historical times, that is, climate matters but not as manifest, recorded or apprehended in form of gradual changes since these secular variations in meteorological phenomena such as temperature changes -- that certainly are documented constituting reliable observational data -- tend to occur in a very narrow range. The narrowness of the range of secular variations "and the autonomy of human phenomena which coincide with them in time, make it impossible for the present to conclude," as Le Roy Ladurie ([1967] 1988:275) stresses in his study of the interaction between climate and history since the year 1000 that "there is any causal link between them."

16 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."

10.1. 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 unmatched 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 stems 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 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 observer 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 determines to the idea that climate matters for social conduct.

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12. Appendix: The Efficacy of Climate: An Inventory

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)

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 65º F., whereas mental activity seems to be greatest at a lower temperature, averaging perhaps 40º" 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 are practically 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 50º 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, 19945:273; "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).

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).

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)

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 ("In 1922 four California cities led the list of suicides…Possibly these facts may be connected with the constant stimulation of the favorable temperature and the lack of relaxation through the variations from season to season and from day to day, although other factors must also play a part. The people of California may perhaps be likened to horses which are urged to the limit to that some of them become unduly tired and break down" Huntington, [1915] 1924:225; Huntington, 1945:365)

Superstition: (e.g. Huntington, 19924b: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 climate, 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)